

QUALITY MANUAL

FOR

ASTRONAUTICS CORPORATION OF AMERICA

1426 WEST NATIONAL AVENUE
MILWAUKEE, WISCONSIN 53204-2116
AND
4115 NORTH TEUTONIA AVENUE
MILWAUKEE, WISCONSIN 53209-6731
AND
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Revision History

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A	Initial release of this manual. This manual follows an example of an FAA manufacturer's quality system manual provided to Astronautics by the Minneapolis Manufacturer's Inspection District Office. This is a <u>stand-alone quality manual</u> specifically reflecting the FAA regulations to be in force on 14 April 2011, and is separate from the previously submitted QM-ISO manual. This stems from changed noted in the Federal Register Final Rule: 14 CFR Parts 1, 21, 43, and 45, dated 10/16/2009.	2011-04-14	Jeffrey Williams

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Part 1: Introduction and Quality System Requirements

1-1 Quality Manual - Introduction

14 CFR §21.138, §21.308, and §21.608

Astronautics Corporation of America (Astronautics) holds Parts Manufacturing Approvals (PMAs) and Technical Standard Order (TSO) authorizations or approvals, and as a result, is a production approval holder (PAH). This quality manual was written to fulfill the requirements for such a manual as a PAH, as outlined in Title 14 of the Code of Federal Regulations (CFR) Part 21 (a.k.a. 14 CFR Part 21), in "Quality manual" paragraphs §21.138, §21.308, and §21.608.

This manual addresses the specific quality manual requirements as detailed in 14 CFR part 21, §21.137. This manual describes Astronautics' quality system, it is written in the English language, it is retrievable in a form acceptable to the FAA, and it must be approved by the FAA before use.

For the purposes of the FAA Minneapolis Manufacturing Inspection District Office (MIDO), this is the quality manual that applies to Astronautics as a production approval holder for the manufacture of its FAA approved articles and products.

1-1.1 Quality System - General

14 CFR §21.137, §21.138, §21.307, and §21.607

To the extent possible, this quality manual, as noted in 14 CFR §21.138, §21.308, and §21.608, is organized in the order outlined in 14 CFR Part 21. For clarity and ease of review, the required elements of the quality system in this manual are found in Part 2, and they follow the order in 14 CFR Part 21 Subpart G, §21.137 "Quality system", which is called out as the quality system requirement of both §21.307 and §21.607.

This manual is written to meet the requirements of 14 CFR Part 21, Subpart K, "Approval of Materials, Parts, Processes, and Appliances" and Subpart O, "Technical Standard Order Approvals." The requirements, recommendations and best practices of the documents listed in the reference section of this document were key inputs into the construction of Astronautics' quality system and of this FAA quality manual.

This Quality Manual has been written to ensure the conformity of components and assemblies to Astronautics Corporation of America's (hereafter referred to as Astronautics') FAA approved design data. The FAA Parts Manufacturing Approval and Technical Standard Order approval (TSOA) programs are under the management of Astronautics, with the FAA Liaison acting as the FAA's point of contract. The management recognizes it is fully responsible for the quality of its PMA and TSOA parts, whether manufactured in-house at Astronautics or subcontracted to outside suppliers.

14 CFR §21.140

In compliance with 14 CFR Part 21, paragraph § 21.140, "Inspections and tests", Astronautics shall allow the FAA to inspect its quality system, facilities, technical data, and any manufactured products or articles and witness any tests, including any inspections or tests at a supplier facility, necessary to determine compliance with the applicable FAA rule.

14 CFR §21.150

In compliance with 14 CFR Part 21, paragraph § 21.150, Astronautics acknowledges that each change to the quality system is subject to review by the FAA. In addition, Astronautics shall notify the FAA, in writing, within ten business days of any change that may affect the inspection, conformity, or airworthiness of its product or article.

1-1.2 Quality System Regulatory Compliance

This Astronautics' quality system reflects the requirements of 14 CFR Part 21 and its associated 14 CFR Parts for which the compliance date is April 16th, 2011. These include the following

Applicable Parts of Title 14 of the Code of Federal Regulations (CFRs)

- Part 1 Definitions and Abbreviations
- Part 21 Certification Procedures for Products and Parts
- Part 43 Maintenance, Preventive Maintenance, Rebuilding, and Alteration
- Part 45 Identification and Registration Marking

Specifically, Astronautics' quality system, as noted in this manual, is organized to meet the requirements of 14 CFR Part 21 Subpart G, §21.137 "Quality system", which is the quality system requirement for both 14 CFR Part 21 Subpart K §21.307 "Quality System" and 14 CFR Part 21 Subpart O §21.607 "Quality System".

The requirements, recommendations and best practices of the documents listed in the reference section of this document were key inputs into the construction of Astronautics' quality assurance program and this manual.

1-1.3 Manual Revisions

This manual shall be revised as necessary to ensure the current requirements are addressed, and that current procedures are being followed in this manufacturer's quality system. All proposed manual revisions will be submitted to the Minneapolis MIDO, which is responsible for the production certificate oversight of Astronautics.

Applicable comments resulting from the FAA's review shall be incorporated and an updated preliminary version of the document shall then be resubmitted to the MIDO for review. The proposed revision will not be released for use by the Astronautics quality system until written documentation approving the revision has been received from the managing FAA MIDO.

Proposed updates will be submitted when considered necessary and will be submitted on an "as needed" basis. Whenever revisions to this manual are necessary, the new revision will be identified by a revision letter (e.g. A, B, C, etc.) and a revision date.

1-1.4 Acronyms and Initialisms

<u>Acronym or Initialism</u>	<u>Definition</u>
AC	Alternating current
ACO	Aircraft Certification Office
ACP	Astronautics Corrective (Action) Procedure
CFR	Code of Federal Regulations (applicable “parts” of Title 14, e.g. Part 21, Part 45, etc.)
CO	Change Order
COA	Certificate of Authority
CMP	Configuration Management Procedure
DMIR	Designated Manufacturing Inspection Representative
EDP	Engineering Department Procedure
ESD	Electrostatic discharge
FAA	Federal Aviation Administration
FOD	Foreign object damage
Hz	Hertz (frequency)
MDOI	Manufacturing Department Operating Instruction
MIDO	Manufacturing Inspection District Office
MID/MTT	Material Identification & Discrepancy Record and/or Material Transfer Ticket
MRB	Material Review Board
NIST	National Institute of Standards and Technology
PAH	Production Approval Holder
PDOI	Production Department Operating Instruction
PMA	Parts Manufacturing Approval
PO	Purchase order
QA	Quality Assurance
QAP	Quality Assurance Procedure
QDP	Quality Department Procedure
RGL	Regulatory and Guidance Library
SEDP	Software Engineering Department Procedure
TSO	Technical Standard Order (a set of instructions, the successful completion of which may lead to an FAA <u>design</u> approval – also called a “TSO” – and to an FAA <u>manufacturing</u> approval, such as a TSO Authorization approval.)
TSOA	Technical Standard Order authorization or Technical Standard Order approval (an FAA <u>manufacturing</u> approval at the “box level” for an aircraft part or appliance that performs a specific function as defined in a TSO, e.g. a Horizontal Situation Indicator)

1-2 Company Location and Layout

14 CFR§ 21.139 (c)

1-2.1 Astronautics' Facilities

Astronautics primary location of its manufacturing operations of FAA approved articles is in one commercial building, located at 1426 West National Avenue in Milwaukee, Wisconsin. This building is titled “Plant 4”.

However, some quality system operations, required by § 21.137, includes such things as design data control and document control, which are part of the activities performed in the Headquarters building as well as in Plant 4. If required, support activities such as environmental stress screening, may also be performed at Astronautics' Plant 3 facility located at 133 East Washington Street in Milwaukee.

The primary point of contact for the MIDO is the FAA Liaison, who, at this writing, is in the Plant 4 facility. As a result, the FAA Liaison may be reached using the Plant 4 switchboard number, 414-671-5500. Additional phone numbers are provided below as backup numbers to ensure contact can be made, as different people may have this role over time

Facility Addresses and Contact Numbers

Facility	Address	Phone & Facsimile Numbers	E-mail address
Plant 4	1426 West National Avenue Milwaukee, Wisconsin 53204-2116	Tel - 414-671-5500 Fax -414-671-0000	Customer Service: customerservice@astronautics.com
Headquarters	4115 North Teutonia Avenue Milwaukee, Wisconsin 53209	Tel - 414-449-4000 Fax -414-447-8231	General Information: busdev@astronautics.com
Plant 3	133 East Washington Street Milwaukee, Wisconsin 53204	Tel - 414-647-9166 Fax -not applicable	General Information: busdev@astronautics.com

1-2.2 Facility Layout

The production area allows for sufficient facilities for all operation pertaining to manufacturing operations.

1-2.2.1 Plant 4 Facility

Astronautics' primary manufacturing facility is housed within Plant 4 located at 1426 West National Avenue, Milwaukee, Wisconsin. Plant 4 is a brick building that contains both offices and production facilities. It contains approximately 150,000 square feet of space. See Figures 1 and 2 below.

1-2.2.2 Headquarters Facility

The Astronautics Corporation of America's Headquarters building is located at 4115 North Teutonia Avenue, Milwaukee, WI 53209. Headquarters is a brick building that contains offices and engineering laboratories for development purposes.

The Headquarters facility consists of floors constructed of concrete floors and columns, with carpeting in the offices and concrete or wood floors. All office and shop spaces are lighted with fluorescent and incandescent lighting. It contains approximately 106,000 square feet of space

1-2.2.3 Plant 3 Facility

The Astronautics Corporation of America Plant 3 facility located at 133 East Washington Street in Milwaukee. The Plant 3 contains approximately 21,000 square feet of space. The areas that may be used for manufacturing operations are almost exclusively on the first floor (10,000 square feet of space). This facility contains environmental chambers and vibration tables, and is primarily used as a backup or overflow facility for the environmental stress screening areas in Plant 4. It also houses a model shop (I.e. machine shop used for development work) and storage areas. Refer to Figure 3 below.

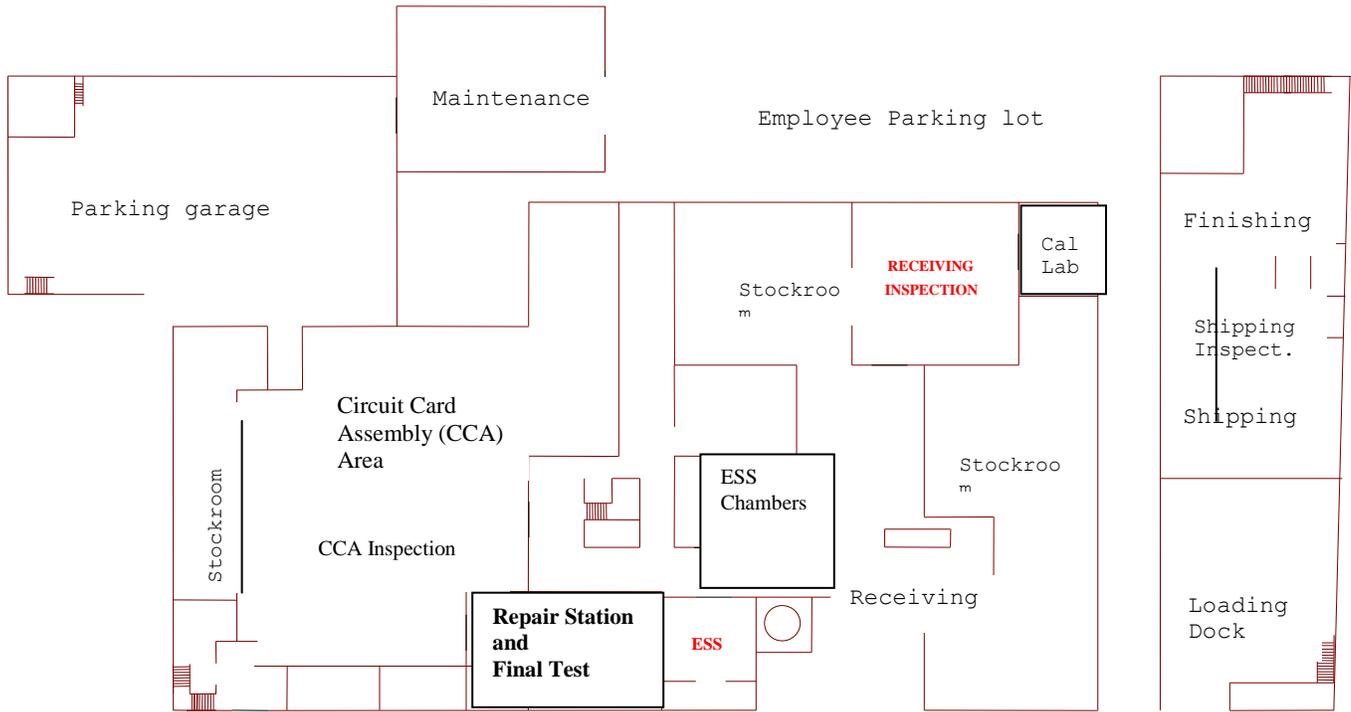


Figure 1: Plant 4, First Floor

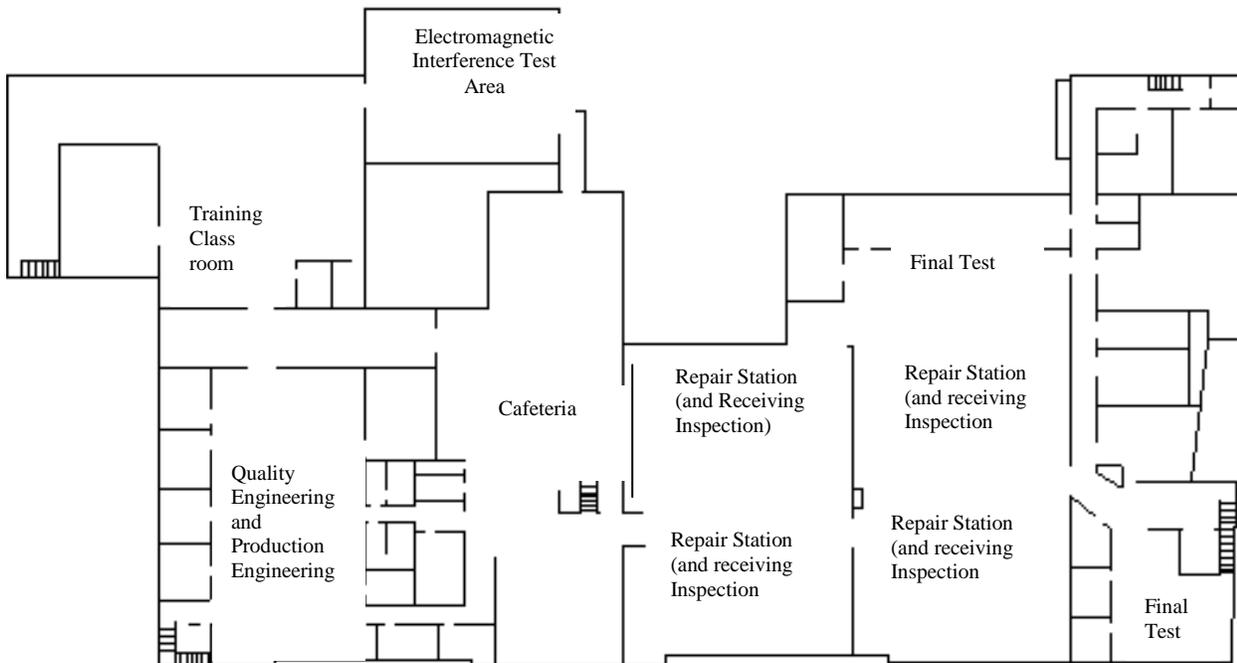


Figure 2: Plant 4, Second Floor

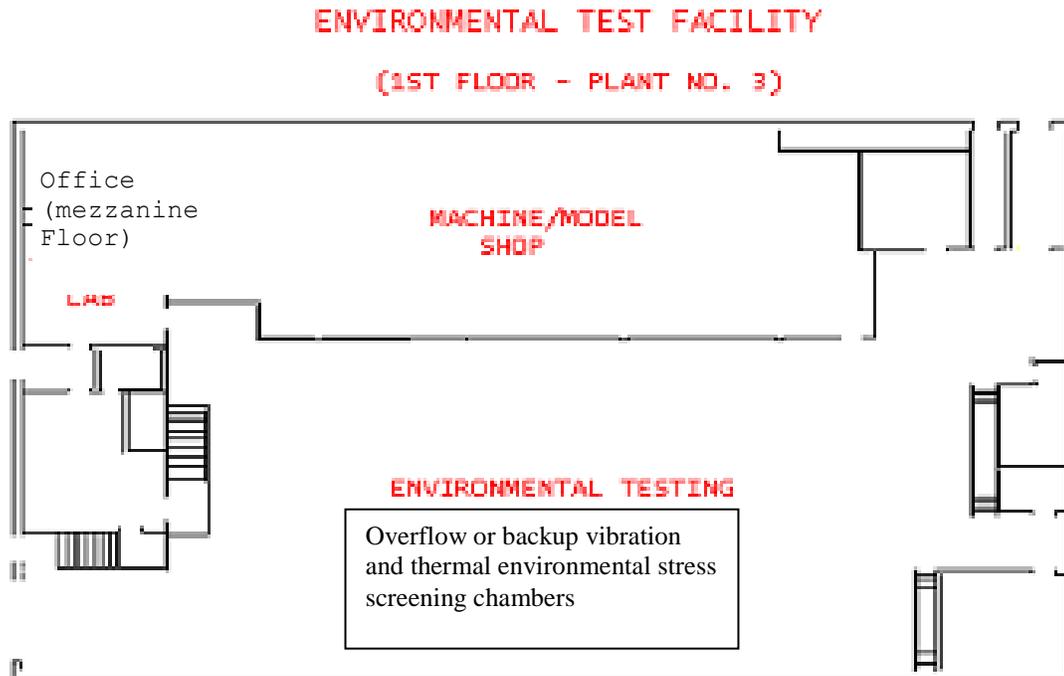


Figure 3: Plant 3, First Floor

1-2.3 Notification of Change in Facilities

14 CFR §21.139, §21.309, §21.609

Astronautics shall notify the FAA in writing within ten days of any change to the manufacturing facilities that may affect the inspection, conformity, or airworthiness of its products or articles in accordance with CFR 21.139 (c).

1-3 Company Organization

14 CFR §21.135, §21.305, and §21.605

A manufacturer that is an applicant for, or a holder of a production certificate, a Parts Manufacturing Approval, or a Technical Standard Order (TSO) authorization, or any combination thereof, "...must provide the FAA with a document describing how its organization will ensure compliance with the provisions of...[the applicable Part 21] subpart. At a minimum, the document must describe assigned responsibilities and delegated authority, and the functional relationship of those responsible for quality to management and other organizational components."

The "Astronautics' Organizational Chart" below was included in compliance with the requirement to describe the functional relationship of those responsible for quality to management and other organizational components.

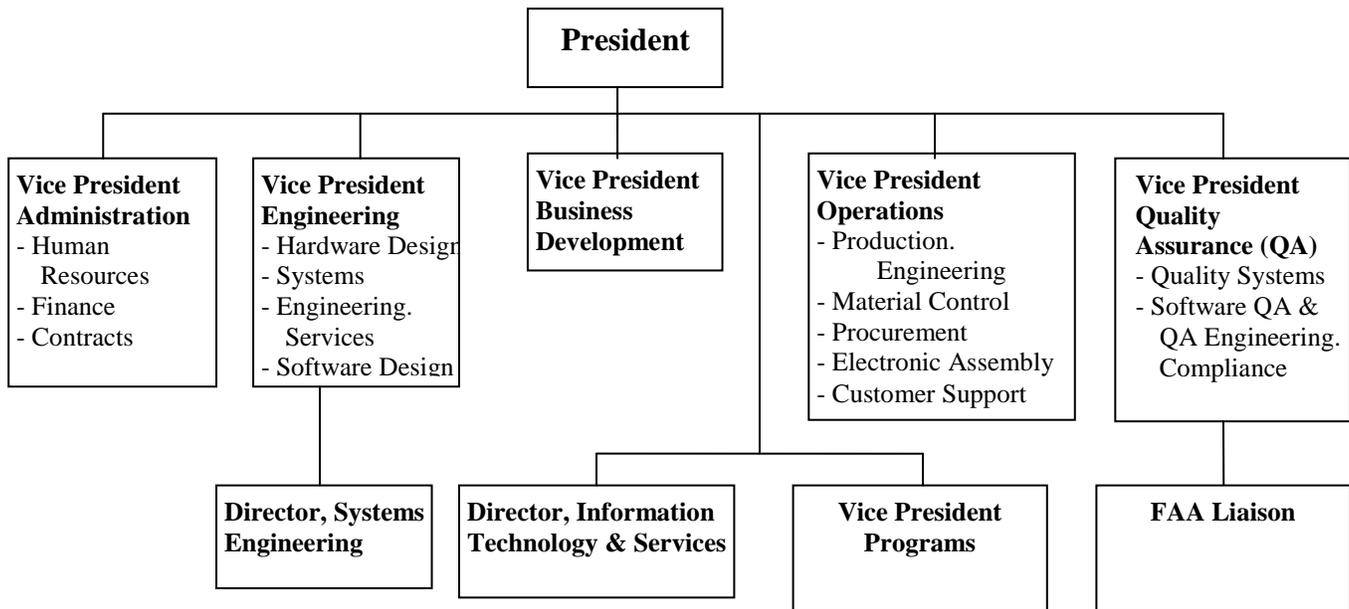


Figure 4: Astronautics' Organizational Chart

1-3.1 Description and Responsibilities

The key responsibilities within Astronautics' quality system for the functions required by 14 CFR Part 21 are distributed as follows.

President

The President reports to Astronautics Corporation's Chief Executive Officer. The President is responsible for the overall manufacturing operations of Astronautics' facilities in Milwaukee, where the primary focus is the design and manufacture of aircraft instruments and systems. The President may delegate duties assigned to any qualified assistant as necessary; however such delegation does not relieve the President of the overall responsibilities. While retaining overall responsibility for manufacturing quality system, at present Astronautics' President has delegated the day to day operations to key vice-presidents, including the Vice President, Operations, the Vice President, Engineering, and the Vice President, Quality Assurance.

For the purposes of this manual, which must "describe assigned responsibilities and delegated authority", the following applies. Note that several responsibilities are shared.

Vice President, Operations

- Document control (e.g. manufacturing procedures, and manufacturing records)
- Supplier control (includes supplier quality and purchasing activities)
- Manufacturing process control (includes the use of FAA approved design data in manufacturing articles)
- Inspection, measuring, and test equipment control (verifying calibrated equipment is used as necessary)
- Nonconforming product and article control (includes disposition determinations & disposal of discarded articles)
- Corrective and preventive actions (as assigned)
- Handling and storage (during manufacturing)
- Control of quality records (e.g. pertaining to manufacturing and purchasing, etc.)

Vice President, Engineering

- Design data control (e.g. design change process, Change Control Board, availability of approved design data, etc.)
- Document control (e.g. design data procedures, and FAA records manufacturing)
- Inspecting and testing (primary responsibility for the generation of acceptance test procedures)
- Inspection, measuring, and test equipment control (verifying calibrated equipment is used as necessary)
- Nonconforming product and article control (includes disposition determinations)
- Corrective and preventive actions (includes procedures or changes to procedures to eliminate causes of a actual or potential nonconformity))
- Handling and storage (during the manufacturing process, e.g. electrostatic discharge issues in production)
- Control of quality records (pertaining to manufacturing)
- In-service feedback
- Quality escapes. (This includes analyzing such escapes and determining appropriate corrective action)

Vice President, Quality Assurance

- Design data control (e.g. design change reviews, Change Control Board, minor change submittals)
- Document control (e.g. development and control of quality manual, and documents in quality department)
- Supplier control (review and approval of suppliers – a supporting role to the Supplier QA in Operations)
- Manufacturing process control (as it pertains to quality department functions)
- Inspecting and testing
- Inspection, measuring, and test equipment control (includes the calibration process)
- Inspection and test status (ensuring inspection and test steps are documented on the date completed)
- Nonconforming product and article control (includes disposition determinations)
- Corrective and preventive actions (includes oversight of the corrective action system)
- Handling and storage (during manufacturing process, including inspection and test)
- Control of quality records (pertaining to the quality department)
- Internal audits
- In-service feedback
- Quality escapes

In addition, the Vice President, Quality Assurance will appoint a person to act as the FAA Liaison. The FAA Liaison will report to the Vice President, Quality Assurance, and will be responsible for the following activities:

FAA Liaison:

- Point of contact with FAA MIDO
 - Maintains the FAA Quality Manual
 - Coordinates FAA approval of revisions to Quality Manual.
 - Responsible for internal audits to ensure manufacturing operations conform to the guidelines of this Quality Manual
 - Is authorized to appoint prospective FAA designee inspectors, e.g. Designated Manufacturing Inspection Representatives (DMIRs):

- If applicable, conducts DMIR inspection functions as an Astronautics designee, as authorized in accordance with the limitations outlined in the DMIR codes in the applicable Certificate of Authority (COA).
- Point of contact with FAA Aircraft Certification Office (ACO)
 - Responsible for the review process of Engineering Changes from an FAA and a QA perspective, and oversees that portion of the approval process via the Astronautics' Change Control Board.
 - Coordinates approval of minor and major changes to FAA approved data.

1-4 Type of Parts and Articles Manufactured under PMA and TSOA

1-4.1 PMA and TSOA Production Standards

14 CFR Part 21, Subpart K and Subpart O, and 14 CFR Part 45

Astronautics was established to manufacture new articles under 14 CFR part 21 regulations, Subpart K, "Approval of Materials, Parts, Processes, and Appliances" and Subpart O, "Technical Standard Order Approvals". As a result, all FAA PMA approved and TSO authorized articles will be manufactured to the standards set forth in the associated Subpart -- K or O respectively -- of Title 14 CFR Part 21.

All FAA PMA approved articles and components, and all TSO authorized articles will be identified and marked under the applicable requirements of Title 14 CFR Part 45, Subpart B, section §45.15.

At this time, Astronautics does not make any parts that are defined as critical parts, so the marking requirements for those are not applicable at this point.

1-4.2 Design and Production Approval – PMA Parts

14 CFR Part 21, Subpart K, §21.219

Astronautics must obtain FAA approval for design changes for Astronautics' FAA replacement and modification articles (PMA parts), as required in 14 CFR Part 21, Subpart K, §21.219 "Design changes". The classification of design changes is defined in that section as well.

Minor changes to the basic design of a PMA may be approved using a method acceptable to the FAA. Astronautics must obtain FAA approval of any major change before including it in the design of an article produced under a PMA. Refer to QDP 3.1.5-1 "Control of TSO, TSOA, and PMA Products".

Note: PMA design changes are generally sent to the local FAA Aircraft Certification Office (ACO) for approval. For Astronautics, that is the Chicago ACO. However, for PMAs covered by a licensing agreement, the design approval for such changes, may be through the aircraft level production approval holder. In any case, changes to the basic design of a PMA are to be approved using a method acceptable to the FAA.

14 CFR Part 45, Subpart B, §45.10(a)

Astronautics manufactures FAA replacement and modification articles, also known as PMA Parts, under Part 21, Subpart K. Such parts are designed and engineered to meet or exceed the applicable airworthiness requirements for the certified product on which the replacement component is to be installed. Astronautics may mark a PMA article in accordance with that subpart only if that article conforms to its FAA approved design, and is in a condition for safe operation, and if that TSO article meets the applicable performance standards. Production of TSOA articles or components shall be governed by this manual.

14 CFR Part 45, Subpart B, §45.15(a) and §45.15(d)

As a manufacturer of a PMA article, Astronautics must permanently and legibly mark each PMA article (1) with the Astronautics' name, trademark, symbol, or other FAA approved identification and part number; and (2) the letters 'FAA-PMA'. Note, as noted in §45.15(d), if the FAA finds a part or article is too small or otherwise impractical to mark with any of the information required by this part, the manufacturer must attach that information to the part or its container.

1-4.3 Design and Production Approval – TSOA Parts

14 CFR Part 21, Subpart O, §21.619

The classification of minor and major design changes by a manufacturer holding a TSO authorization is defined in 14 CFR Part 21, Subpart O, §21.619 "Design changes".

As a manufacturer holding a TSO authorization, Astronautics make minor design changes (any change other than a major change) without further approval by the FAA. In this case, the changed article keeps the original model number (part numbers may be used to identify minor changes) and the manufacturer must forward to the appropriate aircraft certification office, any revised data that are necessary for compliance with § 21.603(b).

Any design change by Astronautics that is extensive enough to require a substantially complete investigation to determine compliance with a TSO is a major change. Before making a major change to an article for which it holds a TSO authorization, Astronautics must assign a new type or model designation to the article and apply for a TSO authorization under § 21.603.

Note: TSOA design changes are sent to the local FAA Aircraft Certification Office (ACO) as required. For Astronautics, that is the Chicago ACO. Refer to QDP 3.1.5-1 "Control of TSO, TSOA, and PMA Products".

14 CFR Part 45, Subpart B, §45.10(b)

Astronautics manufactures articles that are FAA TSO authorization approved, also known as "TSO'd" articles, under Part 21, Subpart O. Such parts are designed and engineered to meet or exceed the applicable airworthiness requirements for the associated TSO or TSOs. Astronautics may mark a TSOA article in accordance with that subpart only if that article conforms to its FAA approved design, and is in a condition for safe operation. Production of TSOA articles or components shall be governed by this manual. Such parts are designed and engineered to meet or exceed the airworthiness requirements applicable to the technical standard orders and the FAA approved design data. Production of TSOA components shall be governed by this manual.

14 CFR Part 45, Subpart B, §45.15(b) and §45.15(d)

As a manufacturer of a TSOA article, Astronautics must permanently and legibly mark (1) each TSO article with the TSO holder's name, trademark, symbol, or other FAA approved identification and part number; and (2) each TSO article, unless otherwise specified in the applicable TSO, with the TSO number and letter of designation, all markings specifically required by the applicable TSO, and either the serial number or the date of manufacture of the article or both.

Note, as noted in §45.15(d), if the FAA finds a part or article is too small or otherwise impractical to mark with any of the information required by this part, the manufacturer must attach that information to the part or its container.

1-4.4 Life Limited or Critical Parts

14 CFR Part 45, Subpart B, §45.15(c)

Astronautics does not make any parts that are defined as ***critical parts*** at this time, so the marking requirements for ***critical parts*** are currently not applicable.

Should Astronautics choose to manufacture such components, its quality system shall be updated to support the manufacturing of such parts in compliance with the requirements.

If Astronautics were to manufacture a ***critical part***, for which a replacement time, inspection interval, or related procedure is specified in the Airworthiness Limitations section of a Astronautics' maintenance manual or Instructions for Continued Airworthiness, then Astronautics must permanently and legibly mark that part with a serial number (or equivalent) unique to that part in addition to meeting the other applicable requirements of 14 CFR 45.

14 CFR Part 45, Subpart B, 45.16

Astronautics does not make any parts that are defined as ***life limited*** parts at this time, so the marking requirements for ***life limited parts*** are currently not applicable.

Should Astronautics choose to manufacture such components, its quality system shall be updated to support the manufacturing of such parts in compliance with the requirements.

If Astronautics were to manufacture a ***life limited part***, when requested by a person required to comply with §43.10 of 14 CFR Part 45, then in that case Astronautics, as a holder of a type certificate or design approval for a life-limited part, must provide marking instructions, or must state that the part cannot be practicably marked without compromising its integrity.

Part 2: Quality Manual Requirements

14 CFR 21, Subpart G, "Production Certificates", sections §21.137(a) through 21.137(n)

As required by 14 CFR Part 21 as of this writing, Astronautics' quality system must include the following 14 items:

- (1) ***Design data control***, as noted in §21.137(a);
- (2) ***Document control***, as noted in §21.137(b);
- (3) ***Supplier control***, as noted in §21.137(c);
- (4) ***Manufacturing process control***, as noted in §21.137(d);
- (5) ***Inspecting and testing***, as noted in §21.137(e);
- (6) ***Inspection, measuring, and test equipment control***, as noted in §21.137(f);
- (7) ***Inspection and test status***, as noted in §21.137(g);
- (8) ***Nonconforming product and article control***, as noted in §21.137(h),
- (9) ***Corrective and preventive actions***, as noted in §21.137(i);
- (10) ***Handling and storage***, as noted in §21.137(j);
- (11) ***Control of quality records***, as noted in §21.137(k);
- (12) ***Internal audits***, as noted in §21.137(l);
- (13) ***In-service feedback***, as noted in §21.137(m); **and**
- (14) ***Quality escapes***, as noted in §21.137(n).

2-1 Design Data Control

14 CFR Part 21, section §21.137(a)

Astronautics must have procedures for controlling design data and subsequent changes to ensure that only current, correct, and approved data is used.

Astronautics procedure Configuration Management Procedure (CMP) CMP-001, "Configuration Management System" outlines the process to document and control the design data. Other related documents include:

- CMP-003 Configuration Control Board,
- CMP-004 Configuration Change Control, and
- CMP-008 Engineering Change Order (ECO) Usage Guidelines and Preparation Instructions.

In addition, the process for coordinating and maintaining FAA approvals is outlined in Astronautics procedure:
QDP 3.1.5-1 "Control of TSO, TSOA, and PMA Products".

2-2 Document Control

14 CFR Part 21, section §21.137(b)

Astronautics must have procedures for controlling ***quality system documents*** and data and subsequent changes to ensure that only current, correct, and approved documents and data are used.

Astronautics procedure CMP-019, "Data Management Procedure" outlines the process to control documents. Other related Astronautics procedures include the following:

CMP-024	Document Control
EDP-0006	Documentation Control of Internal Operating Procedures
PDOI 04	Production Document Control
QAP 2003/5	Company Document Control Procedure
QDP 1.1	Quality Assurance Documents

2-3 Supplier Control

14 CFR Part 21, section §21.137(c)

Astronautics must have procedures that --

- (1) Ensure that each *supplier-furnished* product or article conforms to its FAA approved design; and
- (2) Require each supplier to report to the production approval holder if a product or article has been released from that supplier and subsequently found not to conform to the applicable design data.

The primary Astronautics procedure for addressing the first part is Quality Department Procedure QDP 6.1.3-1 Receiving Inspection (note – this is abbreviated as RI).

To address the second part, Astronautics requires suppliers to report if a product or article has been released from that supplier and was subsequently found not to conform to the applicable design data. This requirement is in the "Notification and Flow Downs" document located on the Supplier Resources "Terms and Conditions" page of Astronautics' internet website. At the time of this writing, this website can be found at <http://astronautics.com/index.php?q=content/supplier-resources> with the path "Supplier Resources / Terms and Conditions / Notification and Flow Downs".

2-4 Manufacturing Process Control

14 CFR Part 21, section §21.137(d)

Astronautics must have procedures for controlling manufacturing processes to ensure that each product and article conforms to its FAA approved design.

The following Astronautics procedures address this subject.

PDOI 01	Process Control
PDOI 38	Process Changes

2-5 Inspection and Testing

14 CFR Part 21, section §21.137(e)

Astronautics must have procedures for inspections and tests used to ensure that each product and article conforms to its FAA approved design. These procedures must include the following, as applicable:

- (1) A flight test of each aircraft produced unless that aircraft will be exported as an unassembled aircraft.
- (2) A functional test of each aircraft engine and each propeller produced.

As required in FAA Order 8120.17, if a requirement is not applicable to the company, the requirement is still to be listed in the Quality Manual, noted as not applicable. Astronautics does not manufacture aircraft, aircraft engines, or propellers, so flight tests, function tests of engines, and functional tests of propellers are not applicable to Astronautics.

As for procedures for inspections and tests used to ensure that each product and article conforms to its FAA approved design, the following apply:

For the verification of purchased products and parts:

- QDP 6.1.2-3 First Article Inspection for Procured or Astronautics Built New/Changed Product or Material
- QDP 6.1.3-1 Receiving Inspection

For inspecting and testing activities in-house (after Receiving Inspection):

- QDP 6.2.1-1 In-Process Inspection
- QDP 6.3.2 Final Inspection
- QDP 6.3.3 Final Acceptance Testing
- QDP 6.3.4-2 Final Acceptance Processing

2-6 Inspection, measuring, and test equipment control

14 CFR Part 21, section §21.137(f)

Astronautics must have procedures to ensure calibration and control of all inspection, measuring, and test equipment used in determining conformity of each product and article to its FAA approved design. Each calibration standard must be traceable to a standard acceptable to the FAA.

The primary Astronautics procedures for calibration and control include the following:

- QDP 4.2.1-1 Calibration of Measuring and Test Equipment,
- QDP 6.7.1-2 Calibration Indication

Acceptable calibration standards are outlined in Quality Department Procedure QDP 4.2.1-1 "Calibration of Measuring and Test Equipment", noted above.

QDP 4.2.1-1 states, in part, "Calibration standards, master tools, and master gages will be calibrated and verified by a commercial facility whose reference standards are traceable to the National Institute of Standards and Technology (NIST), or an appropriate international standard. Where no such standard exists, the rationale used for a particular calibration procedure shall be documented, such as the use of a recognized intrinsic standard (e.g. an ice bath or other recognized physical constant) or other measurement standard. Intrinsic standards may be based on well-characterized laws of physics, fundamental constants of nature, invariant properties of materials, etc. As noted in International Standards Organization (ISO) document ISO 10012-1, examples of "other measurement standards" which must be internationally accepted in the field concerned in order to be used as standards are:

- a. suitable reference materials;
- b. consensus measurement standards; or
- c. industry measurements standards."

2-7 Inspection and test status

14 CFR Part 21, section §21.137(g)

14 CFR Part 21, Subpart L

Astronautics must have procedures for documenting the inspection and test status of products and articles supplied or manufactured to the FAA approved design.

The Astronautics procedure during the manufacturing process is QDP 6.7.1-1, "Indication of Inspection Status".

A final inspection shall be performed on all components or assemblies manufactured to FAA approved design data. Materials and parts which are found to be unacceptable shall be dispositioned as outlined in procedures listed in section 2-6 of this document.

If an 8130-3 form is required for a domestic shipment or for an export under 14 CFR Part 21 Subpart L, only FAA approved inspectors (FAA designees) may complete this process, and they may only do so if that inspector has the proper personnel authorization codes listed in his or her Certificate of Authority (COA) letter from the FAA MIDO.

Note: this requirement does not include 8130-3 activities considered to be maintenance activities allowed to be performed by a manufacturer, such as rebuild or alteration functions. Refer to FAA Order 8130.21 for examples and guidance regarding the use of FAA 8130-3 forms by a PAH for approval to return to service after rebuilding, altering, or inspecting. Internal requirements indicate that a person must be authorized by Astronautics' specifically to complete 8130-3s for this type of activity.

2-8 Nonconforming product and article control

14 CFR Part 21, section §21.137(h)

Astronautics must have:

- (1) Procedures to ensure that only products or articles that conform to their FAA approved design are installed on a type-certificated product. These procedures must provide for the identification, documentation, evaluation, segregation, and disposition of nonconforming products and articles. Only authorized individuals may make disposition determinations, and
- (2) Procedures to ensure that discarded articles are rendered unusable.

The Astronautics procedures for the first item include:

- QDP 6.1.3-1 Receiving Inspection,
- QDP 6.5.6-1 Customer Notification Procedure,
- QDP 3.1.5-5 Reporting Failures, Malfunctions and Defects, and
- PDOI 31 Material ID and Discrepancy/ Material Transfer Ticket (MID/MTT) Production Reject Process

Astronautics procedures for the second item include:

- QDP 6.1.3-1 Receiving Inspection,
- QDP 6.5.1-1 Preliminary Review,
- QDP 6.5.2-1 Material Review Board (MRB) Procedure,
- QDP 6.5.6-1 Customer Notification Procedure, and
- QDP 3.1.5-5 Reporting Failures, Malfunctions and Defects, and
- MDOI 80-10 Processing of Scrap

Items that are identified as scrap may be useful in a number of ways, including being sent to Engineering for evaluation in an effort to determine design improvements. As a result, a scrapped item may not need to be discarded. However, any FAA PMA or TSOA article, or any part, component, sub-assembly or assembly intended for an FAA approved article, **which is dispositioned** as a "discarded article" shall be processed by Astronautics in a way to preclude its use as that article. In that case this processing, such as mutilation, shall occur before it leaves Astronautics' facility, or it shall be mutilated by a third party providing such a service to Astronautics under the direction of Astronautics as noted in MDOI 80-10.

2-9 Corrective and preventive actions

14 CFR Part 21, section §21.137(i)

Astronautics must have procedures for implementing corrective and preventive actions to eliminate the causes of an actual or potential nonconformity to the FAA approved design or noncompliance with the approved quality system.

Astronautics procedures for this include:

- ACP10148 Astronautics Corrective Action Procedure,
- ACP10149 Internal Corrective Action Procedure
- ACP10150 Customer Corrective Action Procedure
- ACP10151 Supplier Corrective Action Procedure, and
- ACP10152 Audit Corrective Action Procedure

2-10 Handling and Storage

14 CFR Part 21, section §21.137(j)

Astronautics must have procedures to prevent damage and deterioration of each product and article during handling, storage, preservation, and packaging. Electronic parts are especially susceptible to electrostatic discharge (ESD) and foreign object damage (FOD).

Astronautics procedures for this include:

- QDP 6.4.1 Protecting Product Quality
- PDOI 29 Production Personnel Responsibilities

2-11 Control of Quality Records

14 CFR 21, 21.137(k)

Astronautics must have procedures for **identifying, storing, protecting, retrieving, and retaining** quality records. Astronautics, as a production approval holder, must retain these records for at least five (5) years for the products and articles manufactured under the approval and at least 10 years for critical components identified under § 45.15(c) of 14 CFR Part 45. (Refer to 1-44 above regarding critical parts.)

Astronautics procedures for this include:

- QDP 3.4.1-1 Quality Assurance Records
- QAP 2003/4 Company Quality Records Procedure

2-12 Internal Audits

14 CFR Part 21, section §21.137(l)

Astronautics must have procedures for planning, conducting, and documenting internal audits to ensure compliance with the approved quality system. The procedures must include reporting results of internal audits to the manager responsible for implementing corrective and preventive actions.

Astronautics procedures for this include QDP 2.3.1-3 “Quality Management System Internal Auditing”.

2-13 In-service feedback

14 CFR Part 21, section §21.137(m)

Astronautics must have procedures for receiving and processing feedback on in-service failures, malfunctions, and defects. These procedures must include a process for assisting Astronautics, as the design approval holder, to:

- (1) Address any in-service problem involving design changes; and
- (2) Determine if any changes to the Instructions for Continued Airworthiness are necessary.

Astronautics procedures for this include:

- ACP10150 Customer Corrective Action Procedure
- QDP 3.1.5-5 Reporting Failures, Malfunctions, and Defects

Astronautics will use this in-service feedback to determine if any changes to the Instructions for Continued Airworthiness are necessary.

Note that 14 CFR 21.3 “Reporting of failures, malfunctions and defects” describes occurrences which must be reported to the FAA. Astronautics shall report applicable failures, malfunctions and defects in accordance with this regulation.

2-14 Quality Escapes

14 CFR Part 21, section §21.137(n)

Astronautics must have procedures for identifying, analyzing, and initiating appropriate corrective action for products or articles that have been released from the quality system and that do not conform to the applicable design data or quality system requirements.

The Astronautics procedures for this include:

- QDP 6.5.6-1 Customer Notification Procedure,
- ACP10150 Customer Corrective Action Procedure,

References

General FAA References:

FAA Regulatory and Guidance Library (RGL)	This can be found at found at http://rgl.faa.gov/
Federal Register Final Rule: 14 CFR Parts 1, 21, 43, and 45, dated 10/16/09	This can be found at http://edocket.access.gpo.gov/2009/pdf/E9-24821.pdf

Applicable Parts of Title 14 of the Code of Federal Regulations

Part 1	Definitions and Abbreviations
Part 21	Certification Procedures for Products and Parts
Part 43	Maintenance, Preventive Maintenance, Rebuilding, and Alteration
Part 45	Identification and Registration Marking

FAA Orders

Order 8100.7	Aircraft Certification Systems Evaluation program
Order 8120.2	Production Approval and Certificate Management Procedures
Order 8120.17	Implementation of Changes to the Revised 14 CFR Part 21
Order 8130.21	Procedures for Completion and use of the Authorized Release Certificate, FAA Form 8130-3, Airworthiness Approval Tag
Order 8110.42	Parts Manufacturer Approval Procedures

FAA Advisory Circulars

AC No. 21-42	Transition Document for 14 CFR Parts 1, 21, 43, and 45
AC No. 21-43	Production Under 14 CFR Part 21, Subpart F, G, K, and O
AC No. 21-44	Issuance of Export Airworthiness Approvals Under 14 CFR Part 21 Subpart L