CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

National Policy

ORDER 8150.1C
CHG 2

Effective
12/17/2013

SUBJ: Technical Standard Order (TSO) Program

1. Purpose. This change clarifies data retention requirements for foreign applicants and delegates authority to the aircraft certification office (ACO) to approve certain TSO deviations as listed in Appendix H without AIR-100 review.

2. Applicability. This change is distributed to the branch level in the Aircraft Certification Service and the Flight Standards Service; to the branch level in the Aircraft Certification Directorate offices and the regional Flight Standards Divisions; to the Federal Aviation Administration Academy and the Regulatory Support Division; to all Air Carrier; General Aviation, and Flight Standards District Offices; to all International Field Offices, International Area Offices; Aircraft Certification Field Offices; Manufacturing Inspection District and Satellite Offices.

3. Explanation of Changes: This change corrects Appendix references in Section 6-7a. and 6-8a., revises wording in Section 7-4e. and 8-7c., and adds a new Appendix H and moves existing Appendices H to I and I to J.

4. Disposition of Transmittal Paragraph. Retain this transmittal sheet until the directive is cancelled by a new directive.

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Remove Pages	Dated	Insert Pages	Dated
17	05/10/2012	17	12/17/2013
18	03/08/2012	18	12/17/2013
21-22	05/10/2012	21-22	12/17/2013
26	05/10/2012	26	12/17/2013
		APPENDIX H	12/17/2013
APPENDIX H	03/08/2012	APPENDIX I	12/17/2013
APPENDIX ii	03/08/2012	APPENDIX J	12/17/2013

Susan J. M. Cabler
Assitant Manager, Aircraft Engineering Division
Aircraft Certification Service

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CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

National Policy

ORDER
8150.1C
CHG 1

Effective Date
05/10/2012

SUBJ: Technical Standard Order Program

1. Purpose. This change is written to revise some incorrect CFR references.

2. Who this change affects. This change is distributed to the branch level in the Aircraft Certification Service and the Flight Standards Service; to the branch level in the Aircraft Certification Directorate offices and the regional Flight Standards Divisions; to the Federal Aviation Administration Academy and the Regulatory Support Division; to all Air Carrier; General Aviation, and Flight Standards District Offices; to all International Field Offices, International Area Offices; Aircraft Certification Field Offices; Manufacturing Inspection District and Satellite Offices.

3. Explanation of Changes: This change revises several pages that contained incorrect CFR references. The reference to FAA Order 2150.3 in paragraph 5-2.c. was removed. The requirement to visit TSOA holders in paragraph 8-7.f.(1) was changed from "will" to "should." No technical content was changed.

4. Disposition of Transmittal Paragraph. Retain this transmittal sheet until the directive is cancelled by a new directive.

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16-17	03/08/12	16-17	05/10/12
20-22	03/08/12	20-22	05/10/12
24	03/08/12	24	05/10/12
26-27	03/08/12	26-27	05/10/12
Appendix A, Page A-3 and A-4	03/08/12	Appendix A, Page A-3 and A-4	05/10/12
Appendix B, Page B-1 and B-2	03/08/12	Appendix B, Page B-1	05/10/12

Susan J. M. Cabler
Assistant Manager
Aircraft Engineering Division, AIR-100

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER 8150.1C

Effective Date:
03/08/12

SUBJ: Technical Standard Order Program

This order explains how to evaluate and issue technical standard order (TSO) authorizations (TSOAs) and letters of TSO design approval (LODAs) for aviation-related articles.

In it, we, the Federal Aviation Administration (FAA), update and expand our guidance on procedures that FAA personnel follow when issuing a TSOA under Title 14 of the Code of Federal Regulations (14 CFR) 21.611 or a LODA under 14 CFR 21.621.

We designed this order to give FAA personnel a better understanding of their individual and mutual responsibilities and what they should expect from manufacturers.

Susan J. M. Cabler
Assistant Manager
Aircraft Engineering Division

Table of Contents

Chapter 1. General Information ..... **Error! Bookmark not defined.**
1-1. Purpose of This Order. 1
1-2. Audience. 1
1-3. Where Can I Find This Order? 1
1-4. What This Order Cancels. 1
1-5. Explanation of Changes. 1
Chapter 2. The TSO Program 2
2-1. What Is a TSO? 2
2-2. Why Were TSOs Developed? 2
2-3. What Is a TSOA and/or LODA? 2
2-4. What Is a Deviation? 3
2-5. Do We Require TSO Authorizations (TSOA or LODA)? 4
2-6. What Does a TSO Marking on the Article Mean? 4
Chapter 3. FAA Responsibilities 5
3-1. The Roles of FAA offices. 5
Chapter 4. Aircraft Engineering Division (AIR-100) Responsibilities 7
4-1. General Responsibilities. 7
4-2. Develop TSO Performance Standards. 7
4-3. Grant and Deny Deviation Requests. 7
4-4. Maintaining Records. 7
4-5. Withdrawing all TSOAs and LODAs to a Cancelled TSO. 8
Chapter 5. ACO's General Responsibilities 9
5-1. General Responsibilities. 9
5-2. Reports of Noncompliance or Nonconformance For Articles Approved with a TSOA. . 9
5-3. Reports of Noncompliance or Nonconformance For Articles Approved with LODA. . 10
5-4. Process Address Changes. 10
5-5. Processes TSOA/LODA Transfers. 11

Chapter 6. ACO Responsibilities When Processing Applications 13
6-1. Reviewing TSOA Applications. 13
6-2. Reviewing LODA Applications. 14
6-3. Foreign TSOA for U.S. Article Manufacturers. 14
6-4. Evaluating the Technical Data for TSOAs or LODAs. 15
6-5. Managing Design Review and Approval for TSOAs and LODAs. 16
6-6. Considering Service History at Time of TSOA or LODA Application 17
6-7. Issuing a TSOA 17
6-8. Issuing a LODA 18
6-9. Denying a TSOA or LODA Application. 19
Chapter 7. ACO Responsibilities for Deviations 20
7-1. What Is a Deviation? 20
7-2. When Does an Applicant Need a Deviation? 20
7-3. How Does an Applicant Get Approval for a Deviation? 20
7-4. Evaluating Deviation Requests. 20
7-5. Documenting Details of Deviation. 22

Chapter 8. Additional ACO Responsibilities 23
8-1. Incomplete TSO Article or Multiple Function Article. 23
8-2. Non-TSO Function. 23
8-3. Military Avionics. 23
8-4. Design Changes – TSOA. 24
8-5. Design Changes - LODA. 25
8-6. FAA-Imposed Design Change – TSOA and LODA. 25
8-7. Administrative Activity After Issuance of TSOAs and LODAs. 26
Appendix A. Acronyms and Definitions A-1
A-1. Acronyms. A-1
A-2. Definitions and Terms. A-3
Appendix B. Related Publications and How To Get Them B-1
B-1. Code of Federal Regulations (CFR). B-1
B-2. FAA Orders. B-1
B-3. FAA Advisory Circulars. B-1
B-4. RTCA, Inc. Documents. B-2
B-5. SAE Documents. B-2
Appendix C. Sample Letter of TSO Authorization (TSOA) C-1
Appendix D. Sample Letter of TSO Design Approval (LODA) D-1
Appendix E. Accepted Non-TSO Functions E-1
Appendix F. Sample Denial Letter for TSOA/LODA Application F-1
Appendix G. Format and Guidance for the Preparation of a TSO G-1
Appendix H. Administrative Information H-1
H-1. Distribution. H-1
H-2. Suggestions for Improvement. H-1
H-3. Records Management. H-1
H-4. Deviating From This Order. H-1
Appendix I. Sample Directive Feedback Information, FAA Form 1320-19 ..... I-1

Chapter 1. General Information

1-1. Purpose of This Order. We, the Federal Aviation Administration (FAA), wrote this order to provide guidance on evaluating and issuing technical standard order (TSO) authorizations (TSOAs) and letters of TSO design approval (LODAs) for aviation-related articles.

1-2. Audience. All FAA aircraft certification office (ACO) engineers, inspectors in manufacturing inspection district offices (MIDOs) or manufacturing inspection satellite offices (MISOs), and the staffs who manage the TSO program.

1-3. Where Can I Find This Order? You can find this order on the MyFAA Employees website at https://employees.faa.gov/tools_resources/orders_notices/ or FAA's Regulatory and Guidance Library (RGL) website at http://rgl.faa.gov/.

1-4. What This Order Cancels. This order cancels the following FAA orders and policy documents:

a. FAA Order 8150.1B, *Technical Standard Order Program*, May 12, 2002.

b. FAA Order 8150.1b CHG1, *Technical Standard Order Program,* November 23, 2010.

c. Policy PS-AIR100-2005-01, *Military Request for TSO Approval*, August 11, 2005.

d. Policy PS-AIR100-8150.1B, *FAA Order 8150.1B, Technical Standard Order Program, Policy Clarification*, June 17, 2003.

e. Policy PS-AIR110-TSO *Design Approval, Letter of Technical Standard Order Design Approval (LODA) Evidence of Import to the United States*, June 9, 2005.

1-5. Explanation of Changes. This revision incorporates numerous Title 14 of the Code of Federal Regulations (14 CFR) policy and guidance changes since we published FAA Order 8150.1B in 2002. It is a substantial re-write and re-format from the previous version. Users of this order are encouraged to review it in its entirety.

Chapter 2. The TSO Program

2-1. What Is a TSO? A TSO is a minimum performance standard, defined by the FAA, used to evaluate an article. An article can be a material, part, component, process, or appliance. (See 14 CFR 21.1(b)(2).) Each TSO covers a certain type of article. The TSO provides a baseline standard that is intended to support compliance to airworthiness or operational requirements. However, compliance with a TSO cannot assure that the installation of the article with comply with airworthiness requirements. This determination is made during installation. See Advisory Circular (AC) 21-50, *Installation of TSOA Articles and LODA Appliances*, for further information.

2-2. Why Were TSOs Developed?

a. One Solution to Managing Our Limited Resources. Before 1947, we evaluated and approved articles the same way we approved airframes, engines, and propellers. The rapid growth of the aviation industry during the 1930s and early 1940s put an unprecedented demand on our certification resources, so we developed the TSO program that allows:

(1) Us to define standards for common articles,

(2) The manufacturer of an article to show compliance to a specific standard,

(3) Us to accept the manufacturer's statement certifying that they meet the requirements of 14 CFR 21 subpart O and the specific requirements of the applicable TSO,

(4) Us to reduce our involvement in the evaluation and approval process for articles, and

(5) Us to focus limited resources on airframes, engines and propellers.

b. One Way to Standardize Approvals of Components Used on Products. Prior to the TSO program, we used a variety of "standards" to approve the same type of article. So the same article installed on two different airplanes often was approved to two different standards. The TSO program was developed to ensure the adequacy of the standards used to approve articles and to standardize the approvals of those articles.

2-3. What Is a TSOA and/or LODA?

a. Definition of TSOA. A TSO authorization is an FAA design and production approval issued to the manufacturer of an article that has been found to meet a specific TSO. A manufacturer is the person who controls the design and quality of the article produced to ensure that it meets the TSO. The manufacturer also must control all the suppliers they use for parts or services in the design and production of the TSO article. (See 14 CFR 21.601(b)(5)). We issue a TSOA only to a United States (U.S.) manufacturer. A TSOA is a design and production approval we issue to a U.S. manufacturer.

(1) When we issue the TSOA, we make a finding that:

(a) The manufacturer's article design meets the applicable TSO, and

(b) The manufacturer has a quality system (QS) that will produce every article to conform to the approved design.

(2) The U. S. is the state of design (SOD) as defined by the International Civil Aviation Organization (ICAO) for a TSOA.

(3) The U. S. is the state of manufacture (SOM) as defined by ICAO for a TSOA.

b. Definition of a LODA. A LODA is a finding by the FAA that a manufacturer's article meets a specific TSO. The manufacturer's ability to manufacture articles that conform to the approved design is overseen by a foreign CAA with whom we have a bilateral agreement. All articles destined for import into the U.S. must be accompanied by a certificate of airworthiness for export as specified in 14 CFR 21.502. When we issue the LODA, we find that:

(1) The manufacturer's article design meets the applicable TSO and,

(2) A CAA, with whom we have a bilateral agreement addressing TSOs, will oversee the manufacturer's quality system (QS) that will produce every article to conform to the approved design.

(3) The manufacturer's country is the SOD as defined by ICAO for a LODA.

(4) The manufacturer's country is the SOM as defined by ICAO for a LODA.

2-4 What Is a Deviation? A deviation is *any* alternative method or criteria used to meet performance criteria specified in the TSO. It is an equivalent level of safety (ELOS) determination in lieu of the TSO requirement.

a. When Does an Applicant Need a Deviation? We require the applicant to propose and get our approval for *any* deviation from the applicable TSO, regardless of the significance of the TSO criteria from which they want to deviate. For example, we require applicants to get a deviation approval even when they propose to use a version of an industry standard later than the one referenced in the specific TSO.

b. How Does an Applicant Get Approval? To get our approval for a deviation, an applicant must show that compensating features or factors create an ELOS to the TSO performance requirement(s) from which they propose to deviate.

2-5. Do We Require TSO Authorizations (TSOA or LODA)? TSOAs and LODAs are not mandatory. TSOAs and LODAs are one way to get an article approved when required by 14 CFR 21.8.

2-6. What Does a TSO Marking on the Article Mean? We don't allow anyone to mark an article stating it meets a specific FAA TSO unless we have issued them a TSOA or LODA.

a. A TSO Marking Made Under a TSOA or LODA Means the:

(1) Article's design meets the FAA TSO for which it is marked.

(2) Article was produced under an approved quality system and conforms to the TSO-approved design.

b. A TSO Marking Made Under a TSOA or LODA *Does Not* Mean the:

(1) Article's design meets airworthiness regulations for the product, or

(2) The installation of the article is approved.

Chapter 3. FAA Responsibilities

3-1. The Roles of FAA offices. Figure 1-1 broadly summarizes the basic role of the FAA offices. It also summarizes the applicant responsibilities as described in AC 21-46. Coordination between the ACO and MIDO ensures that the applicant produces TSO articles according to the approved design. Approving a TSOA application requires the ACO to approve the design and the MIDO to approve the production system. A LODA is an FAA design approval only. Approving a LODA application requires the ACO to approve the design of the foreign manufactured article. The applicable CAA issues the corresponding production approval and oversees the production system.

Figure 1-1. Basic Roles of FAA and Applicant In TSO Process

Applicant:	AIR-100:	ACO:	MIDO:
• Control the design and quality of the article • Show compliance with applicable TSO standard • Set up and maintain a QC system that meets 14 CFR 21 607 or in accordance with bilateral agreement • Provide statement of conformance • Request approval to deviate from TSO • Establish and provide installation instructions, operational limitations, and maintenance instructions • Provide maintenance instruction and installation limitations to ensure the article continues to meet the minimum performance standards (MPS) of the TSO after installed • Mark each article according to 14 CFR 45 15(b) and as specified in the TSO • Report service difficulties according to 14 CFR 21 3	• Administer TSO Program • Develop and issue new TSOs • Monitor existing TSOs for necessary revisions • Cancel obsolete TSOs • Grant/deny deviation requests • Maintain records for TSOs, including canceled TSOs	• Process TSOA applications and LODA applications from an FCAA, if applicable • Recommend approval or denial of deviations to the TSO • Coordinate with MIDO (TSOA) or review bilateral agreement (LODA) before issuing TSO approval • Witness various functions if deemed necessary (See 14 CFR 21 610) • Find that the article design complies with the applicable TSO, and that the applicant can maintain a compliant design when making minor design changes • Send applicant TSOA, LODA, or denial letter • Investigate reports of service difficulties and non-compliances • Submit enforcement reports when holders do not comply with 14 CFR part 21 subpart O	• Verify production system produces articles that conform to the approved design • Approve Quality System • Issue TSOA article production approval letter to ACO • Conduct surveillance at the TSOA holder's and supplier's facilities, both foreign and domestic • Investigate service difficulty reports and nonconformities • Submit enforcement reports when holders do not comply with 14 CFR part 21 subpart O
See applicable TSO and 14 CFR part 21 subpart O, for further details	See chapter 4 for further details	See chapters 5 through 8 for further details	See FAA Order 8120 2 for further details

Chapter 4. Aircraft Engineering Division (AIR-100) Responsibilities

4-1. General Responsibilities. The Aircraft Engineering Division (AIR-100) has the following responsibilities:

a. Administer the TSO program.

b. Provide procedures, policy, and guidance to ensure both effectiveness and uniformity of the TSO program.

c. Develop TSO performance standards.

d. Issue TSOs.

e. Monitor existing TSOs for necessary revisions.

f. Cancel obsolete TSOs, as needed.

g. Grant or deny deviation requests.

h. Maintain records, including canceled TSOs.

4-2. Develop TSO Performance Standards. AIR-100 supports the development of new or revised minimum performance standards (MPS) for materials, parts, processes, or appliances. AIR-100 prepares and issues proposed, revised, and new TSOs using the template in appendix H of this order.

4-3. Grant and Deny Deviation Requests. AIR-100 performs the following functions in granting or denying deviation requests:

a. Reviews ACO's recommendations and data submitted by applicants to substantiate an ELOS to the applicable TSO, and ensuring consistent application of ELOS determinations between projects. See chapter 7 in this order for more information on deviations.

b. Provides final approval to ACOs to grant or deny deviations to TSOs, under 14 CFR 21.618.

4-4. Maintaining Records. AIR-100 does the following:

a. Maintains an index of current and cancelled TSOs and approved manufacturers of TSO articles.

b. Updates the index, as needed, for new TSOs and manufacturers' approvals.

c. As office of primary responsibility (OPR), has the authority to dispose of technical data relating to the TSO or TSO deviations (not any specific TSOA or LODA technical data).

> **Note**: Destruction of TSO data files is not authorized under FAA records disposition schedules without an OPR request for disposition authority. (See FAA Order 1350.15, *Records Organization, Transfer, and Destruction Standa*rds.)

4-5. Withdrawing all TSOAs and LODAs to a Cancelled TSO. In certain circumstances, AIR-100 may determine that all TSOAs and LODAs should be withdrawn when a TSO is cancelled. AIR-100 must publish proposals for withdrawal of all TSOAs and LODAs for public comment. After consultation, if AIR-100 determines that withdrawal is appropriate in order to cease production of articles to the cancelled TSO, they will notify the ACOs to withdraw each holder's approval.

Chapter 5. ACO's General Responsibilities

5-1. General Responsibilities. The ACO located in the geographic area of the applicant has overall responsibility for TSOA and LODA applications. The ACO:

a. Accepts applications.

b. Evaluates the technical data sent in with application.

c. Manages design review and approval.

d. Recommends approval or denial of applicant's deviation requests to AIR-100.

e. Investigates reports of non-compliant articles.

f. Reports TSOAs, LODAs, and future changes to the manufacturer's name or address to the Aircraft Engineering Division (AIR-100).

g. Maintains records.

h. Monitors TSOA holders.

i. Coordinates with the responsible MIDO to ensure the applicant's quality system has been approved prior to issuing a TSOA.

j. Issues or denies TSOAs and LODAs.

5-2. Reports of Noncompliance or Nonconformance For Articles Approved with a TSOA.

a. If an article's design is determined not to comply with the TSO the ACO will instruct the manufacturer to take corrective action to bring the article's design back into compliance with the TSO prior to manufacturing any more articles. The ACO must work with the manufacturer to determine how to address in-service articles that don't meet the TSO. The manufacturer should develop a corrective design if it is a safety issue. However, if it is not a safety issue (warranting AD or SAIB) then no action needs to be taken for the noncompliant articles.

b. If an article doesn't conform to its approved design, the MIDO will instruct the manufacturer to take corrective action to stop marking and shipping articles until they conform to the approved design. The MIDO and ACO must work with the manufacturer to determine how to address in-service articles that don't conform to the approved design. The manufacturer should develop a corrective action plan, including notifying any recipients of nonconforming articles.

c. If the manufacturer doesn't provide design changes or production changes adequate to correct an unsafe article, the ACO must withdraw the TSOA. The ACO will notify the MIDO to coordinate this activity.

5-3. Reports of Noncompliance or Nonconformance For Articles Approved with LODA.

a. The ACO responsible for manufacturers in their geographical area should promptly notify the LODA holder's CAA when the ACO is aware of reports of a TSO article that is:

(1) Experiencing service difficulty,

(2) Being produced and doesn't comply with the applicable TSO, or

(3) Being produced and doesn't conform to the approved design.

b. The ACO will ask the complainant to disclose all the facts, data, names, and places to support the allegation and forward this information to the LODA holder's CAA.

c. The ACO will ask the CAA to provide their findings from the investigation. Depending on the facts and circumstances, the ACO will ask the CAA to mandate additional TSO article testing by the LODA holder to prove compliance with the TSO.

d. When an article creates an unsafe condition, doesn't meet the TSO, or doesn't conform to the design approved under the LODA, the ACO informs the CAA to instruct the manufacturer to take corrective action.

e. If the manufacturer doesn't provide design changes or production changes adequate to correct an unsafe, non-compliant, or non-conforming article, the ACO must withdraw the LODA. See also FAA Order 2150.3.

f. The ACO will instruct manufacturers not to ship non-conforming articles. For example, manufacturers must not ship seats without the cushions. A TSOA holder violates 14 CFR 21.616(c) and a LODA holder violates 14 CFR 21.621, when they ship a non-conforming TSO article.

5-4. Process Address Changes.

a. Articles approved with a TSOA. When a TSOA holder informs the ACO its relocating facilities, the ACO:

(1) Forwards this information immediately to the responsible MIDO.

(2) Informs the TSOA holder not to ship any articles from a new facility until the MIDO has inspected and approved the new facility, and the ACO has reissued their TSOA.

(3) May reissue the TSOA at the same level as the original TSO after the MIDO determines the TSOA holder's quality system meets 14 CFR 21.137 and can produce each article to conform to the approved design.

(4) Forwards all information regarding name, address, or facility relocation changes to AIR-110 for updating the TSO manufacturer's data on the RGL website.

b. Articles approved with a LODA. When a CAA informs the ACO that one of their manufacturers who holds a LODA is changing their name, relocating facilities, or being acquired by another company in accordance with paragraph 5-5 the ACO:

(1) Verifies the CAA provided written confirmation that the manufacturer's legal status remains unchanged after an acquisition.

(2) Verifies the CAA notified the manufacturer not to mark or ship any articles with the TSO marking until the FAA has reissued the LODA for name changes or facility relocations.

(3) May reissue the LODA at the same level as the original TSO after receiving written confirmation from the CAA that the LODA holder's articles meets the TSO after a name change(s) or facility relocation.

(4) Forwards all information regarding name, address, or facility relocation changes to AIR-110 for updating the TSO manufacturer's data on the RGL website.

5-5. Processes TSOA/LODA Transfers. Transfers may not be made by the TSOA holder, but can be requested and approved by the FAA.

a. What's a transfer? A transfer is the sale or liquidation of a company that holds TSOAs or LODAs which results in the change in the legal status of the company, or the sale of an individual TSOA or LODA from one company to another. For example, the acquisition of a company with a TSOA or LODA by a holding company would be considered a transfer if the acquired company is disbanded or absorbed into the purchasing corporation. In this case the legal entity which received the TSOA or LODA no longer exists and the purchasing corporation would need to reapply for a TSOA or LODA, or request a transfer as described in paragraph 5-5.c. below.

> **Example:** ABC Corporation purchases XYZ Company. XYZ Company holds a TSOA. ABC Corporation plans on disbanding XYZ Company and absorb the assets of XYZ into the ABC Corporation. In this case the legal status of XYZ has changed (i.e. the company no longer exists as a legal entity) and the acquisition of the XYZ Company is considered a transfer.

b. What's not a transfer? A company changing their name or relocating their facilities is not considered a transfer. The acquisition of a company with a TSOA or LODA by a holding company would not be considered a transfer if the acquired company continued to exist as the

same legal entity to which the original TSOA or LODA was issued under the following conditions:

(1) The acquired company retains possession of the TSOA or LODA.

(2) The acquired company must retain the same quality system (TSOA only).

(3) The acquired company must continue to operate at the same location with the same core management for manufacturing and design.

(4) The TSOA holder provides written confirmation that its legal status remains unchanged after an acquisition.

Example: ABC Corporation purchases XYZ Company. XYZ Company holds a TSOA and will continue to operate; under the same name, in the same location, with the same management, and under the same production system. In this case the legal status of XYZ has not changed and is therefore not considered a transfer.

c. If the holder of a TSOA or LODA requests a transfer, the transfer request is sent to AIR-100 with TSOA or LODA transfer request in the subject line. The ACO must include all information provided by the holder to justify the transfer request. Transfer requests are sent to AIR-100 at: TSO-Coordinator@faa.gov. AIR-100 will approve or deny the request, and notify the ACO. If approved, the ACO should complete the transfer using the procedures for an address change (see previous paragraph).

Chapter 6. ACO Responsibilities When Processing Applications

6-1. Reviewing TSOA Applications.

a. An applicant submits a TSOA application to the ACO responsible for the applicant's geographical area, per 14 CFR 21.603. If an ACO receives an application from a manufacturer outside their geographical area, the ACO returns the application to the applicant, or coordinates with the ACO responsible for the applicant's geographical area. When a manufacturer has multiple facilities, the principal facility that controls the design of the article(s) should submit the TSO authorization application. The authorization letter must include addresses for all the applicant's facilities. If manufacturing facilities are in different geographical areas, all applicable MIDOs should be copied in the address line. (See the current version of FAA Order 8120.2, *Production Approval and Certificate Management Procedures.*)

b. The ACO must ensure all applicants requesting a TSOA use, "...the applicable TSO that is effective on the date of application for that article," per 14 CFR 21.603(a)(1). The applicant may request to use an earlier version of a TSO if they were working to meet the earlier version when the new version became effective. The ACO may grant the applicant's request if they apply for TSOA within six months after the effective date of the new version. Otherwise, the ACO will instruct them to ask for an exemption to 14 CFR 21.603(a)(1), as outlined in 14 CFR part 11.

c. The ACO checks incoming applications for completeness. The ACO will notify the applicant in writing of any deficiencies or omissions, as required by 14 CFR 21.603(c). Verify that the application includes:

(1) TSO number for which the approval is requested,

(2) Applicant's name and physical address of the principal manufacturing facility that controls the design and quality of the article,

(3) Statement from the manufacturer certifying that they meet the requirements of 14 CFR 21 subpart O and the specific requirements of the applicable TSO,

(4) Copy of the technical data required by the TSO,

(5) Description of their organization as required by 14 CFR 21.605 and

(6) A manual describing their quality system that meets the requirements of 14 CFR 21.607 as required by 14 CFR 21.608.

d. The ACO coordinates with the appropriate MIDO to evaluate the applicant's QS prior to issuing the TSOA.

6-2. Reviewing LODA Applications.

a. An applicant submits a LODA application through their CAA, per 14 CFR 21.621.

b. The ACO must use the procedures in the applicable bilateral agreement for issuing of a LODA for any country-specific requirements. Implementation procedures may be limited to issuing a LODA only for noncomplex or specific TSOs. A bilateral agreement that recognizes TSOA and LODA before a LODA can be issued. These documents can be found at the following link:
http://www.faa.gov/aircraft/air_cert/international/bilateral_agreements/baa_basa_listing

c. The ACO verifies all applicants requesting a LODA use "...the applicable TSO that is effective on the date of application for that article," per 14 CFR 21.603(a)(1). Sometimes applicants want approval to manufacture an article under an earlier version of a TSO. When this happens, the ACO will instruct the CAA to inform the applicant to ask for an exemption to 14 CFR 21.603(a)(1), as outlined in 14 CFR part 11.

d. The ACO checks incoming applications for completeness. The ACO will notify the applicant's CAA in writing of any deficiencies or omissions, as required by 14 CFR 21.603(c). Verify that the application includes the items required for a TSOA, along with:

(1) TSO number for which the approval is requested,

(2) Applicant's name and physical address of the principal manufacturing facility that controls the design and quality of the article,

(3) A statement from the CAA certifying they have determined the applicant's article meets the FAA's applicable TSO,

(4) Copy of the technical data required by the TSO, and

(5) Evidence that the article will be installed on a U.S. registered aircraft or a U.S. manufactured product. Valid evidence of the customer/operator having U.S. registered aircraft must exist at the time of application.

e. Before making their certifying statement to the FAA, the CAA should review the evidence of import from the applicant. The ACO will notify the CAA that we won't take any action on an application that lacks evidence of import until the applicant meets the criteria or ACO resources permit.

6-3. Foreign TSOA for U.S. Article Manufacturers. The processes for an ACO to follow when assisting a U.S. TSO authorization holder in applying for a CAA equivalent of an FAA TSO or for a foreign manufacturer holding the equivalent of an FAA TSO and applying for a LODA can be found at the following link:
http://www.faa.gov/aircraft/air_cert/international/bilateral_agreements/baa_basa_listing

This site includes each Bilateral Aviation Safety Agreement (BASA) that each CAA entered into and maintains with the FAA. Responsibilities and TSOA/LODA requirements of the applicant, FAA, and the foreign CAA are identified in their respective *Implementation Procedures*.

6-4. Evaluating the Technical Data for TSOAs or LODAs. The ACO may examine the technical data submitted to determine if it substantiates that the article meets the applicable TSO. The ACO consults with AIR-100, FAA directorates, chief scientific and technical advisors (CSTAs), and other ACOs as needed. The ACO will consult with AIR-100 for any interpretations of the TSO. The level of review should consider the experience of the company and the expected use of the article itself. When evaluating the technical data the ACO may check that:

a. Drawings are adequate to define the article.

(1) Review manufacturing procedures and process specifications called out on the drawings that may affect the part's ability to meet the TSO approved design.

(2) Confirm that the TSOA applicant controls all drawings necessary to define the article, including those created and held by suppliers.

b. Verify the applicant submitted all applicable detail drawings and specifications from suppliers needed to control the article design as required by the specific TSO.

c. Confirm applicant has met the part marking requirements in the TSO and § 45.15(b).

d. Verify electronic identification of software and airborne electronic hardware (AEH) part numbers is acceptable and is verifiable through an electronic query, such as an electronic display. See also Order 8110.49 for additional information.

e. Verify substantiating data, like analysis and test reports, are sufficient to meet all the performance criteria in the TSO.

f. In verifying compliance to RTCA /DO-178B, and RTCA/DO-254, use the risk-based strategy outlined in FAA Order 8110.49, *Software Approval Guidelines*, and FAA Order 8110.105, *Simple and Complex Electronic Hardware Approval Guidelines*, to determine the appropriate level of review or oversight for TSOA applications.

g. Review the summary of open problem reports to ensure that sufficient information is provided so that a proper assessment is made for installation or operational impacts by the owner/installer.

h. Verify the installation instructions are adequate to ensure the article will satisfy the MPS when installed.

i. Review applicant's proposed maintenance instructions and installation limitations, as required by the TSO, are adequate. See FAA Order 8110.54, *Instructions for Continued*

Airworthiness Responsibilities, Requirements, and Contents, for further details. If the applicant states that no maintenance instructions or installation limitations are necessary, the ACO will review the applicant's substantiation for that statement.

(1) Send the manual describing the applicant's QS (per 14 CFR 21.608) to the appropriate MIDO.

(2) Verify the applicant has a process for determining major and minor design changes. See chapter 8, paragraphs 8-4 through 8-7 for more information.

(3) Verify the applicant has a service difficulty reporting process that complies with 14 CFR 21.3 for the article.

j. Issue the TSOA letter per paragraph 6-7, if the article complies with the TSO and the MIDO reports the applicant has an acceptable quality system and can produce each article to conform to the approved design. Deny the TSOA per paragraph 6-9, if:

(1) It is determined the manufacturer's article design doesn't comply with the TSO, or

(2) It is determined the manufacturer's article has service history problems as explained in paragraph 6-6, or

(3) The MIDO reports the applicant doesn't have an acceptable quality system or can't produce each article to conform to the approved design.

6-5. Managing Design Review and Approval for TSOAs and LODAs. The rigor and scope of the review of design data depends on the complexity of the TSO article, the experience of the TSO applicant, or both.

a. For applicants experienced in meeting FAA requirements and who have demonstrated technical competence and whose article is of low risk, the ACO may only need to check that the package is complete. The ACO may check drawings, article installation instructions, and article limitations for completeness and adequacy.

b. For new applicants and applicants not experienced in meeting FAA requirements, who haven't demonstrated technical competence or whose article is of significant risk, the ACO may evaluate their data for compliance with the TSO more thoroughly. Someone from the ACO may visit the applicant's facility to determine their competence to make a valid certifying statement to the applicable TSO and 14 CFR, subpart O, and to ensure they adequately conduct any tests required by the TSO.

c. ACOs may use a partnership for safety plan (PSP) to help them manage a TSO project. A PSP is a working agreement between the FAA and the manufacturer that defines the roles, responsibilities, and expectations of both parties. Using a PSP in TSOA applications can help us more efficiently issue a TSOA. A PSP is not mandatory and both the FAA and the applicant must agree to it.

6-6. Considering Service History at Time of TSOA or LODA Application. The ACO should not issue a TSOA for an article that is not in a condition for safe operation. See 14 CFR part 45.10(b). The ACO may review the service history of the article when it is a known derivative of a prior design. The ACO will verify that the prior design is neither subject to an AD nor found as a causal factor in an accident investigation. Also, the ACO must verify the prior design has not been the cause of an airworthiness problem. The ACO will follow the guidelines below if a prior design presents a potentially unsafe condition and the proposed article has a similar design.

6-7. Issuing a TSOA. After the applicant's article has been found to meet the TSO and the applicant meets 14 CFR part 21 subpart O, as explained above in paragraphs 6-1. and 6-4., the ACO will issue a TSOA letter. The TSOA is issued to the principal manufacturing facility that controls the design and quality of the article(s). The ACO will:

a. Prepare the TSOA letter using the sample in appendix C of this order as a guide. The ACO modifies or adds additional details to the TSOA letter as necessary. The original letter is sent to the manufacturer and the ACO keeps a copy for the TSOA master file. If requested, the ACO can send a scanned copy of the letter to the manufacturer, as long as the original is also sent. Notify the MIDO responsible for inspecting and monitoring the manufacturer. Also, the ACO will electronically send a copy of the letter to AIR-110 at 9-AMC-AIR140-Information-Products@faa.gov (Submittals to this email address need to be in Microsoft Word), who adds it to the TSO approval database.

b. The ACO will specifically list in the TSOA letter all pertinent data submitted by the applicant. The letter *must* state:

(1) The FAA authorizes the applicant to identify the article with the applicable TSO marking.

(2) The TSOA is based on the applicant's:

(a) Statement certifying that the applicant meets the requirements of 14 CFR part 21 subpart O.

(b) Statement certifying that the article complies with the TSO in effect on the date of application.

(c) Quality system, which complies with the requirements of 14 CFR 21.607 and has been found satisfactory for production of the article.

(3) The FAA requires the applicant to:

(a) Report failures, malfunctions, or defects, in accordance with 14 CFR 21.3.

(b) Notify the ACO and MIDO of name, address, or proposed ownership changes.

(c) Furnish a copy of the data required by the TSO to the original owner/installer of each article or multiple articles if furnished to one source (for example, operator, type certificate holder, repair station).

(d) Establish a process for the timely submittal of minor design changes, as required by 14 CFR 21.619, to their responsible ACO. (See chapter 8, paragraph 8-4. in this order for more information.)

Note: After a name, address, or ownership change, the TSOA holder may not identify articles with the TSO marking without further FAA approval. (See chapter 5, paragraph 5-5.)

c. The ACO uses FAA Order 8130.2, *Airworthiness Certification of Aircraft and Related Products*, FAA Order 8130.21, *Procedures for Completion and Use of the Authorized Release Certificate*, and FAA Form 8130-3, *Airworthiness Approval Tag*, for information on export airworthiness approval of TSOA approved articles.

6-8. Issuing a LODA. After the applicant's article has been found to meet the TSO and the applicant meets 14 CFR part 21 subpart O, as explained above in paragraphs 6-2 and 6-5, the ACO issues a LODA. The ACO will:

a. Prepare the LODA letter using the sample in appendix D of this order as a guide. Modify or add additional details to the LODA letter as necessary. Give the original letter to the CAA responsible for the manufacturer and the ACO will keep a copy in the LODA master file. If requested, the ACO can send a scanned copy of the letter to the CAA, as long as the original is also sent. Also, electronically send a copy of the letter to AIR-110 at 9-AMC-AIR140-Information-Products@faa.gov (Submittals to this email address need to be in Microsoft Word), who adds it to the TSO approval database.

b. Specifically list in the LODA letter all pertinent data the CAA submitted on behalf of the applicant. The letter *must* state:

(1) The FAA authorizes the applicant to identify the article with the applicable TSO marking.

(2) The LODA is based on:

(a) The CAA's statement certifying the applicant's article meets the FAA's applicable TSO.

(b) The FAA's determination the applicant has complied with the requirements of 14 CFR part 21 subpart O.

(3) The CAA must notify the ACO of any proposed changes to the applicant's name, address, or ownership.

(4) The applicant must furnish the data required by the TSO to the original owner/installer of each article or multiple articles if furnished to one source (for example, operator, type certificate holder, repair station).

c. The CAA of the country of manufacture must issue a Certificate of Airworthiness for Export to accompany each article, as specified in 14 CFR 21.502(a).

6-9. Denying a TSOA or LODA Application. If the ACO can't find compliance, the ACO will send the applicant a denial letter and return the complete data package. For LODA applications, the denial letter is sent to the manufacturer's CAA only. See appendix G for more details. The ACO may adjust the format of the letter as needed, but preserve the information from the sample. The ACO does not send LODA and TSOA denials to AIR-110.

Chapter 7. ACO Responsibilities for Deviations

7-1. What Is a Deviation? A deviation is any alternative method or criteria used to meet the performance criteria specified in the TSO, with compensating features that provide an ELOS, per the provisions outlined in 14 CFR part 21.

7-2. When Does an Applicant Need a Deviation? We require the applicant to propose and get our approval for *any* deviation from the applicable TSO, regardless of the significance of the TSO criteria from which they want to deviate. For example, we require applicants to get a deviation approval even when they propose to use a version of an industry standard later than the one referenced in the specific TSO.

7-3. How Does an Applicant Get Approval for a Deviation? To get our approval for a deviation, an applicant must show that compensating features or factors create an ELOS to the TSO performance requirement(s) from which they propose to deviate.

7-4. Evaluating Deviation Requests. The ACO is responsible for evaluating requests for deviation from a TSO, per 14 CFR 21.618. The ACO evaluates all requests to deviate from the TSO and submits to AIR-100 a recommendation to grant or deny the request.

Note: See paragraph 7-4.e. for deviation requests that AIR-100 has delegated to ACO managers.

a. Deviation Request Acknowledgement. ACOs will acknowledge requests for deviations.

b. Substantiating Data. The ACO ensures an applicant's deviation request includes substantiating data that specifically cover the compensating factors or features. The proposed TSO deviation must clearly establish an ELOS to the TSO requirement. The ACO may return the request when there is insufficient or no supporting data.

c. Recommendation to AIR-100. The ACO evaluates the merit and validity of deviation requests.

(1) The ACO manager (or delegated position) must submit in writing, a recommendation to AIR-100 to grant or deny the request. AIR-100 will accept electronic copies of the signed recommendation. The ACO manager (or delegated position) can send electronic copies to: TSO-Deviations@faa.gov.

(2) The CAA for the LODA applicant doesn't have to send a recommendation to the ACO. If a LODA applicant's deviation request includes a recommendation from the CAA, the ACO must still make their own finding and recommendation to AIR-100, independent of the CAA's recommendation.

d. Notification. ACOs notify applicants of the decision to approve or deny their deviation by doing one of the following:

(1) For TSOA applicants:

(a) Sending a copy of the letter from AIR-100 to the applicant,

(b) Asking AIR-100 to respond directly to the applicant with a copy to the ACO, or

(c) Writing the response to the applicant based on the AIR-100 response.

(2) For LODA applicants:

(a) Sending a copy of the letter from AIR-100 to the applicant's CAA with a cover letter from the ACO,

(b) Asking AIR-100 to respond directly to the applicant's CAA with a copy to the ACO, or

(c) Writing the response to the applicant's CAA based on the AIR-100 response.

(d) In all cases, the ACO notifies the applicant's CAA, and the CAA notifies the applicant.

e. Deviations the ACO Grants Without AIR-100 Approval. The ACO may grant the following types of requests to deviate from a TSO standard without AIR-100 approval:

Note: The applicant must formally request a deviation from the TSO and the deviation must be reviewed and evaluated by the ACO who will either approve or deny the TSO deviation request. If approved it may be documented in a letter to the applicant or referenced in the TSOA Letter. If denied, a copy of the denial correspondence must be retained as part of the TSO data. The letter to the applicant must include all applicable limitations and marking requirements. The deviation may only be applied to the specific TSOA(s) for which the applicant seeks approval to deviate.

(1) Use of a later version of RTCA/DO-160, *Environmental Conditions and Test Procedures for Airborne Equipment,* which has been recognized by the FAA in AC 21-16, than the environmental test conditions specified in the applicable TSO, provided the applicant uses the *entire* later version of the standard and not just a *portion* of it.

Note: If the TSO for electronic equipment contains an appendix with environmental test conditions and test procedures, or references an older industry standard for environmental test conditions other than RTCA/DO-160, it is acceptable to allow deviation to use a version of RTCA/DO-160 recognized by the FAA in AC 21-16.

(2) Use of a later version of RTCA/DO-178, which has been recognized by the FAA in AC 20-115, in lieu of the software design assurance standard specified in the applicable TSO, provided the applicant uses the *entire* later version of the standard and not just a *portion* of it.

Note: The applicant must obtain AIR-100 approval when requesting an alternative method, as defined in RTCA/DO-178B, Section 12.3.

(3) Use of a later version of RTCA/DO-254, which has been recognized by the FAA in AC 20-152, than the hardware design assurance standard specified in the applicable TSO.

(4) Deviations to the TSO article marking requirements to establish one TSO as the primary TSO for an article receiving multiple TSO approvals. In that case, the applicant must:

(a) Mark the primary TSO number on the nameplate. (Marking each individual TSO number on the article's nameplate may be impractical.)

(b) Mark the primary article permanently and legibly with a statement that the remaining TSO marking requirements are in the IM, for example "See Inst Mnl for Addtl TSO approvals and/or markings."

(c) List the other TSOs (and marking requirements for each TSO) in the front section of the IM for the article's primary TSO.

(5) Deviations identified in Appendix H.

7-5. Documenting Details of Deviation. ACOs instruct manufacturers to document the specific details of deviations granted in their manual (installation manual (IM), component maintenance manual (CMM), etc.). This includes any installation limitations or maintenance procedures required to ensure the article continues to meet the MPS of the TSO after installation. This is necessary to alert installers to evaluate the article further for installation or operational limitations affected by the deviations. The ACO will:

a. Ensure manufacturers describe the details of any deviations and document any known functional differences resulting from a deviation.

b. Ensure the TSOA or LODA letter includes a reference to the deviations granted as noted in appendixes C and D of this order.

Chapter 8. Additional ACO Responsibilities

8-1. Incomplete TSO Article or Multiple Function Article. An incomplete TSO article is one that provides a major and independent function that is specified in the TSO. This will generally be a component of the overall system that has a stand-alone function. See AC 21-46.

8-2. Non-TSO Function. Reference FAA Order 8110.4c, Change 4, for information pertaining to non-TSO functions and associated installation evaluation and limitations. For example, equipment specifically designed for public (or military) aircraft may have non-TSO functions which preclude the use of that equipment for civil aircraft.

8-3. Military Avionics. This paragraph applies only to the FAA's approval of TSOs for military avionics for the U.S. Government. Many times the U.S. Government encounters unique issues when it seeks certification to civil standards of avionics with military functions. TSOs with military functions are coordinated through the FAA's Military Certification Office (MCO), ACE-100M.

a. Separate Functions. If a military piece of avionics performs a civilian function for which there is a TSO, the article may receive a TSO marking. However, if this article also performs one or more other functions that we can not approve for civilian use, the article and all associated documentation are also marked "For Military Use Only". The non-certifiable military function must not affect or interfere with the article's compliance with the TSO.

> **Example:** If a military piece of avionics performs a civilian TCAS function, and a separate non-certifiable military function in the same article, the article may receive a TSO marking for the civilian TCAS function, but must be marked "For Military Use Only" to ensure that the other non-certifiable functions will not be used by non-military operators.

b. Deviations. If a military piece of avionics performs a civilian function for which there is a TSO, the article may receive a TSO marking. However, if this article is granted deviations in accordance with chapter 7 of this order that could not be approved for civilian use, the article and all associated documentation are also marked "For Military Use Only". The article with the deviations must provide an ELOS to the TSO as required in 14 CFR 21.618.

> **Example:** If a military piece of avionics performs a civilian Mode S transponder function, but requires TSO deviations for military features that would not be approved for civilian use, the article may receive a TSO marking for the civilian Mode S function, but must be marked "For Military Use Only" to ensure that the other military features will never be used by non-military operators.

8-4. Design Changes – TSOA.

a. Minor Design Changes. We permit TSOA holders to make minor design changes to their articles without further approval, per 14 CFR 21.619(a).

(1) We encourage the manufacturer and ACO to agree on what constitutes a minor change for a particular TSO article being manufactured and establish a process for minor design changes. Sometimes minor changes may require revalidation of certain TSO requirements, but not a "substantially complete investigation" per 14 CFR 21.619(b).

(2) The ACO and the manufacturer may use a PSP to formalize this agreement with the ACO. AIR-100 and MIDO must approve any PSP agreement, MOU, or MOA to assure standardization of what we accept as a minor change for a given TSO article. As with all TSO data, the manufacturer must maintain and submit to the FAA, on request, minor change substantiation data.

(3) Manufacturers of TSO articles substantiate and document all minor design changes. The ACO and manufacturer must agree on a time frame for minor change data submittal. The ACO may ask TSOA holders to provide revised data or make it available, as agreed on with the ACO. The manufacturer must notify the ACO within the time frame agreed upon between them. The manufacturer's minor change notification letter should state that the new article complies with 14 CFR part 21 subpart O. The manufacturer can send this letter to the ACO by email.

(4) The ACO, as part of accepting minor changes, audits design change data submitted or the "notification of minor change" letter statement, to ensure that the change is really a minor change, as defined in 14 CFR 21.619(b) before sending the manufacturer an acknowledgement for the acceptance of their data.

(5) If a minor design change submittal is not sufficiently or properly substantiated, the ACO will ask the manufacturer to provide more substantiation or other data necessary to justify their claim. This may include the manufacturer retesting the article to show compliance with the TSO standard.

b. Minor Design Changes We Find Major. If an ACO determines that a minor design change submittal is really a major design change, as defined in 14 CFR 21.619(b), the ACO must:

(1) Immediately notify the manufacturer to stop marking and shipping any changed articles. Inform the manufacturer they must reapply for a new TSOA under the TSO currently in effect, as required in 14 CFR 21.619(b). When the manufacturer obtains a new authorization, they may then re-label and ship articles.

(2) Notify the MIDO of the change in type or model number resulting from the major change and the potential for discrepancies in marking, if the manufacturer has already

manufactured and shipped some changed articles.

c. Major Design Change.

(1) Requirements for new TSOA application. As stated in 14 CFR 21.619(b), we require a new TSO application for all major design changes to TSO articles under a TSOA, and

(2) When the Applicable TSO is revised while an application is being evaluated:

(a) The applicant need demonstrate compliance only with the TSO in effect at the time of the original application, not the revised TSO.

(b) The ACO can give up to a 6-month relief period to applicants with pending applications. If the applicant doesn't submit a complete application within this time, they must comply with the most recent TSO version.

8-5. Design Changes - LODA. Design changes to articles that have been issued a LODA are subject to the requirements defined in the applicable bilateral agreement. Generally, when the CAA considers a design change minor, it is approved without any FAA involvement. Design changes the CAA considers major require the LODA holder to apply for a new LODA.

8-6. FAA-Imposed Design Change – TSOA and LODA. When an ACO decides it's necessary to impose a design change on an article to correct an unsafe condition or prevent the use of a noncompliant article, they can:

a. Issue an AD against the article per 14 CFR 39.5.

b. Withdraw the TSOA or LODA per 14 CFR 21.2. Limit the withdrawal to the article(s) in question.

(1) The ACO withdraws the TSOA or LODA when:

(a) There's a unsafe condition.

(b) The article doesn't comply with the TSO.

(c) The article doesn't conform to the TSO-approved design.

(d) The manufacturer doesn't correct the non-compliance or non-conformance.

(2) The ACO:

(a) Coordinates the withdrawal with AIR-100,

(b) Sends a written notice of the withdrawal to the manufacturer, and

(c) Notifies the MIDO of the withdrawal.

8-7. Administrative Activity After Issuance of TSOAs and LODAs.

a. Reporting TSO Authorizations. The ACO will report all new TSOAs, LODAs, and name or address changes to AIR-110, which updates the index of TSO manufacturers. This information may be sent to: 9-AMC-AIR140-Information-Products@faa.gov Submittals to this email address need to be in Microsoft Word.

b. Maintaining Records. The ACO will create and maintain complete and accurate records of the following for each TSOA and LODA:

(1) Authorizations and design approvals granted,

(2) Technical data,

(3) Design change approvals and service difficulty reports,

(4) Relevant service bulletins and airworthiness directives (ADs),

(5) Non-compliance actions, and

(6) Terminations related to each TSO application.

c. Keeping Master File. The issuing ACO creates and maintains a master file. The file contains all data submitted by a TSOA/LODA manufacturer pertaining to their application and TSO approval or disapproval. If the ACO and TSOA holder have an agreement (a PSP, MOU, MOA, or other agreement) covering the master file, a TSOA/LODA holder may retain it. The agreement must have a clause requiring the TSOA holder to provide copies of records from the master file upon request. Expect the manufacturer to submit to the ACO, and keep for their records, one copy of the technical data specified in the "data requirements" paragraph of the applicable TSO. When requested, the responsible ACO will give copies of the technical data to other ACOs and show in the transmittal letter which TSO applies. For LODA applications, if the United States has a bilateral agreement that allows for data retention, the LODA holder may retain the master file, provided they comply with the terms of that applicable bilateral agreement. The ACO must retain a copy of the LODA application letter, any applicable certifying statement by the foreign authority, and the LODA issuance letter.

d. Keeping Adequate TSO-Authorization Records. Each ACO (or the TSOA holder on the ACO's behalf, as allowed above) must keep adequate records. Keeping proper records guarantees continued airworthiness support for TSO articles that remain in service but are no longer in production. When a TSOA holder goes out of business or no longer operates under the provisions of their TSOA, instruct them to send the ACO copies of all required data, per 14 CFR 21.607, and any other technical data the ACO deems necessary. Under FAA Order 1350.15C, *Records Organization, Transfer, and Destruction Standard,* Paragraph 8151, we don't authorize destruction of TSOA records. As the OPR, the ACO has authority to dispose of technical data. Accordingly, under 14 CFR 21.613(b), the ACO must keep these data for as long as approved articles are in service.

e. Freedom of Information Act (FOIA) Requests. All technical data we keep may be subject to FOIA requests. ACOs should keep only that information clearly relevant and necessary to support the TSO Authorization.

f. Monitoring TSOA Holders. The ACO will control and monitor all manufacturers producing articles under a TSOA, including all holders of TSOA's previously issued under 14 CFR part 37. For U.S. TSOA holders with manufacturing facilities outside the U.S., the ACO does this only under agreement with the responsible MIDO and after considering the "undue burden" to the FAA.

(1) The ACO and MIDO should visit all TSOA holders for oversight once every two to three years. This includes evaluations conducted in accordance with FAA Order 8100.7, *Aircraft Certification Systems Evaluation Program (ACSEP)*. During visits, at a minimum, the representative from the ACO may audit the following under the authority granted in 14 CFR 21.610:

(a) Article's compliance to the TSO's requirements.

(b) TSOA holder's compliance with 14 CFR part 21 subpart O.

(c) TSOA holder's COS process.

(d) TSOA holder's design change process.

(e) TSOA holder's change impact analysis process.

(f) TSOA holder's configuration control process.

(g) TSOA holder's quality system (during Aircraft Certification Systems Evaluation Program (ACSEP) evaluation).

(h) TSOA holder's manufacturing processes (during ACSEP evaluation).

(2) If the ACO auditor finds deficiencies they are documented and given to the manufacturer so they can correct the deficiencies. The manufacturer must address and resolve the deficiencies in a timeframe the ACO or MIDO finds acceptable. The ACO or MIDO may consider compliance and enforcement action if appropriate.

Appendix A. Acronyms and Definitions

A-1. Acronyms.

Acronym	Definition
14 CFR	Title 14 of the Code of Federal Regulations
AC	Advisory circular
ACO	Aircraft Certification Office
ACSEP	Aircraft Certification Systems Evaluation Program
AD	Airworthiness Directive
AEH	Airborne Electronic Hardware
AIR-100	Aircraft Engineering Division
AIR-110	Engineering Procedures Branch
AIR-120	Technical Programs and Continued Airworthiness Branch
AIR-200	Production & Airworthiness Division
AIR-40	International Policy Branch
BASA	Bilateral Aviation Safety Agreement
CAA	Civil Aviation Authority
CMM	Component Maintenance Manual
COS	Continued Operational Safety
CSTA	Chief Scientific and Technical Advisor
DER	Designated Engineering Representative
EFIS	Electronic Flight Instrument System
ELOS	Equivalent Level Of Safety
FAA	Federal Aviation Administration
FOIA	Freedom of Information Act
GPS	Global Positioning System
ICAO	International Civil Aviation Organization
IM	Installation Manual

Acronym	Definition
LODA	Letter of TSO Design Approval
MCO	Military Certification Office
MIDO	Manufacturing Inspection District Office
MISO	Manufacturing Inspection Satellite Office
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPS	Minimum Performance Standard
NAA	National Aviation Authority
OPR	Office of Primary Responsibility
P/N	Part Number
PC	Production Certificate
PCSP	Project Specific Certification Plan
PHAC	Plan for Hardware Accomplishment Summary
PMA	Parts Manufacturer Approval
POC	Point of Contact
PSAC	Plan for Software Aspects of Certification
PSP	Partnership for Safety Plan
QS	Quality System
RGL	Regulatory Guidance Library
SAE	Society of Automotive Engineers
SAS	Software Accomplishment Summary
SCI	Software Configuration Index
SOD	State of Design
SOM	State of Manufacture
TC	Type Certificate
TCAS	Traffic Alert and Collision Avoidance System
TSO	Technical Standard Order
TSOA	Technical Standard Order Authorization

Acronym	Definition
U.S.	United States

A-2. Definitions and Terms.

Accepted data is data or analysis the FAA acknowledges and considers valid. The applicant may use accepted data to substantiate compliance with airworthiness regulations, but the FAA doesn't consider it *approved* data.

Aircraft Certification Office (ACO) is a field branch of the FAA Aircraft Certification Service. It administers and secures compliance with agency regulations, programs, standards, and procedures governing the design approval of TSO articles. ACO locations and addresses are in appendix C.

Airworthiness regulations are the regulations identified in 14 CFR parts 23, 25, 27, 29, 31, 33, and 35. The regulations contain standards for specific types of products.

Applicant is a person or organization seeking approval from the FAA.

Compliance is a successful showing that a design meets a set of requirements or standards.

Conformity is establishment that a manufactured article meets the approved design.

Design consists of all drawings and specifications that show the part's configuration and all information on dimensions, tolerances, materials, processes, and procedures necessary to define all part characteristics. A master drawing list is the summary of these drawings and specifications.

Guidance is material the FAA publishes to assist an applicant in complying with regulatory requirements.

Letter of TSO design approval (LODA) is a FAA design approval that we issue only to a foreign manufacturer of an article that we find meets a specific TSO. A LODA is not a production approval and is not installation approval. The geographic ACO is responsible for issuing the LODA to the applicant's civil aviation authority (CAA). See paragraph 2-3b of this order for a more comprehensive definition of a LODA.

Manufacturer of an article is a person who controls the design and quality of an article. (See 14 CFR 21.601(b)(5).

Modifier is the person to whom the FAA grants approval to implement an approved design change to a TSO article.

Part number is a string of alphanumeric characters used to uniquely identify an article's configuration.

Process is a set of interrelated activities performed to produce a prescribed output or article.

Product is an aircraft, aircraft engine, or propeller. (See 14 CFR 21.1(b)(5))

Quality system is an organizational structure with responsibilities, procedures, processes, and resources that implements a management function to determine and enforce quality principles. A quality system encompasses quality assurance and quality control.

Supplier is any person or organization contracted to furnish aviation products, parts, appliances, components, materials, or services to the TSOA holder.

Test is a quantitative procedure to prove performance using stated objective criteria with pass/fail results.

Technical standard order authorization (TSOA) is an FAA design and production approval issued to a U.S. manufacturer of an article that we find meets a specific TSO. The geographic ACO is responsible for issuing the TSOA to the applicant. The TSOA is not installation approval for the article. See paragraph 2-3a of this order for a more comprehensive definition of TSOA.

Appendix B. Related Publications and How To Get Them

B-1. Code of Federal Regulations (CFR). Order 14 CFR sections from the Superintendent of Documents, Government Printing Office, P.O. Box 37154, Pittsburgh, PA 15250-7954. Telephone (202) 512-1800; fax (202) 512-2250. Order on-line at www.gpoaccess.gov/cfr/.

B-2. FAA Orders. View or download the following orders on the MyFAA Employees Website at https://employees.faa.gov/tools_resources/orders_notices/ or FAA's Regulatory and Guidance Library (RGL) at http://rgl.faa.gov/ - Use the latest version:

a. FAA Order 1350.15, *Records Organization, Transfer, and Destruction Standards.*

b. FAA Order 2150.3, *Compliance and Enforcement Program.*

c. FAA Order 8040.1, *Airworthiness Directives.*

d. FAA Order 8100.5, *Aircraft Certification Service Mission, Responsibilities, Relationships, and Programs.*

e. FAA Order 8100.7, *Aircraft Certification Systems Evaluation Program (ACSEP).*

f. FAA Order 8110.54, *Instructions for Continued Airworthiness Responsibilities, Requirements, and Contents.*

g. FAA Order 8120.2, *Production Approval and Certificate Management Procedures.*

B-3. FAA Advisory Circulars. View or download the following AC on the FAA Advisory Circulars website: http://www.faa.gov/regulations_policies/advisory_circulars/ and the FAA's Regulatory and Guidance Library (RGL) at http://rgl.faa.gov/- Use the latest version:

a. AC 21-1, *Production Certificates.*

b. AC 21-46, *Technical Standard Order Program.*

c. AC 21-50, *Installation of TSOA Articles and LODA Appliances.*

d. AC 21-23, *Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products Imported to the United States.*

B-4. RTCA, Inc. Documents. Order RTCA/DO-160, RTCA/DO-178 and RTCA/DO-254 from RTCA, Inc., 1150, 18th Street NW, Suite 910, Washington, D.C. 20036. Telephone

Appendix C. Sample Letter of TSO Authorization (TSOA)

U.S. Department
of Transportation
Federal Aviation Administration

{ACO}
{ACO address}

{Date}

{Name of applicant point of contact (POC)}
{POC's title}
{Name of company}
{Street address}
{City and zip code}

Dear *{Mr. /Mrs. /Ms. name of applicant POC}:*

Subject: TSOA Application *{insert reference number}*

This is in reply to your letter of *{enter date of application}* requesting TSO authorization for your *{insert type of article}*. We accept your statement certifying that your article meets the requirements of TSO-C *{enter applicable TSO number}* and that you meet the requirements of Title 14 Code of Federal Regulations part 21 subpart O. *{Insert the following, if applicable: to include the integrated non-TSO function(s) specified.}* We also accept the data you submitted in support of the non-TSO functions listed in Attachment 1 on a non-interference basis. Effective this date, we authorize you to identify the following *{insert type of article}* with the marking requirements defined in 14 CFR 45.15(b) and in TSO-C *{enter applicable TSO number}*.

{Enter Part/Model} Number	*{Enter type of article}* Description
{List each part number (with open brackets to allow for minor changes) or model number. If both numbers are necessary, use two separate columns.}	*{Enter a basic description of article. Include major features that distinguish this part or model number from other part or model numbers on the list.}*

We consider your quality system, as defined in your quality control manual, *{insert revision level and date of manual}* satisfactory for production of this article at your *{enter location of applicant's manufacturing facility}* facility.

{Include a reference to describe any approved deviations.}

This TSO authorization, issued under 14 CFR 21.611, is effective until surrendered, withdrawn or otherwise terminated under the provisions of 14 CFR 21.613. With notice, we may withdraw this TSO authorization if articles aren't in compliance with the applicable TSO performance standards per 14 CFR 21.2.

You must obtain FAA approval prior to making any changes to the location of your manufacturing facilities pursuant to 14 CFR 21.609(b).

Without further FAA approval, we don't allow manufacturers to mark articles after they change their company's name, address, or ownership. You must notify the ACO and MIDO of name, address, or proposed ownership changes.

Per 14 CFR 21.614, a holder of a TSOA may not transfer it. If you wish to transfer it, you must request a transfer from the FAA.

Send to the office below any design change(s) for this TSO article as outlined in 14 CFR 21.619(a). You should notify us of minor design changes within *{enter agreed timeframe}*. Also, as recipient of this authorization, we require you to report any failure, malfunction, or defect relating to articles produced under this authorization in accordance with the provisions of 14 CFR 21.3.

Please note that technical data the FAA retains may be subject to Freedom of Information Act (FOIA) requests. This office will notify you of any request(s) pertaining to your data and give you the opportunity to protect the data from public disclosure.

If you have any questions regarding this authorization, contact *{enter FAA ACO contact and phone number.}*

Sincerely,

{Name of ACO manager}
{Name of FAA ACO}

cc: AIR-112; *{insert routing symbol of responsible MIDO}*

Accepted Non-TSO Functions

Attachment 1 to *{enter reference number}*

We accept, as valid data, the data supporting the non-TSO functions listed below. **This TSO authorization is not an approval for the non-TSO function(s) or for installation.** You must apply for a separate installation approval so we can determine if the data are applicable and sufficient to show compliance to the airworthiness regulations for the product(s) where the article is installed.

{Enter the appropriate information into the table below.}

Non-TSO Function	Performance Standard	Documentation
P/N ABCD001		
Function #1	*DO-xxxE, Section XX*	*Report # 12xx45 Rev X*
Function #2	*SAE ASXXXB, Para 4*	*Report # 34xxx67 Rev X*
Function #3	*NAS XXXX, Rev xx*	*Doc # 56xx78xx Rev Y*
Model # ABCDEF		
Function #1	*XXXXX Rev x*	*Report XXXX Rev X*
Function #2	*SAE ASXXXB, Para 4*	*Report # 34xxx67 Rev X*
Function #3	*NAS XXXX, Rev xx*	*Doc # 56xx78xx Rev Y*

We accept the data supporting the non-TSO functions listed in the above table with the following conditions:

1. The non-TSO functions do not interfere with the article's compliance with the TSO.

2. *{Enter name of applicant}* controls the design and quality of the article, including the validity of the non-TSO functions' data listed in the above table.

3. *{Enter name of applicant}* evaluates design changes in accordance with 14 CFR 21.619 to ensure the article continues to comply with the TSO.

4. *{Enter name of applicant} evaluates* design changes to confirm the continued validity of the accepted non-TSO functions' data. If the design change affects the accepted non-TSO function, you must obtain approval from the FAA before incorporating the change into your approved design. If the design change does not affect the accepted non-TSO function, you must report it when you report other minor design changes.

Appendix D. Sample Letter of TSO Design Approval (LODA)

U.S. Department
of Transportation
Federal Aviation Administration

{ACO}
{ACO address}

{Date}

{Name of CAA type certification contact}
{Contact title}
{Name of authority}
{Street address}
{City and mail code}
{Country}

Dear *{Mr. /Mrs. /Ms. name of CAA type certification contact}*:

Subject: LODA Application *{insert reference number}*

This is in reply to *{insert applicant's company name}* application dated *{insert date of letter}* for technical standard order (TSO) design approval. We acknowledge our receipt of {enter name of CAA} letter {insert reference number}, dated {insert letter date}, stating that the article complies with the requirements of TSO-C {insert number} and that {enter name of CAA} assumes responsibility for oversight of the production of the article. We accept *{enter name of applicant}* statement certifying, in accordance with 14 CFR 21.621, that the *{enter type of article}* listed below complies with the requirements of TSO-C *{insert number}* and 14 CFR part 21 subpart O. {*Insert the following, if applicable*} We consider the *{insert name of CAA}* certifying statement as certification of the validity of the integrated non-TSO data shown in Attachment 1.

Based on the *{insert name of CAA}* certifying statement, we accept *{enter name of applicant}* TSO design approval to include the *{insert type of article}* listed below for manufacture at *{insert name of applicant}*, located at *{enter complete applicant address}*. {*Insert the following, if applicable*} We also accept the data submitted in support of the non-TSO functions listed in Attachment 1.}

{EnterPart/Model} Number
{List each part number (with open brackets to allow for minor change) or model number. If both numbers are necessary, use two separate columns.}

{Enter type of article} Description
{Enter a basic description of article. Include major features that distinguish this part or model number from other part or model numbers on the list.}

This letter of TSO design approval (LODA), together with the *{enter name of CAA}* certificate of airworthiness for export, authorizes *{enter name of applicant}* to identify *{enter type of article}* with the TSO marking requirements described in 14 CFR 45.15(b) and in TSO-C*{insert number}*. We issue the LODA in accordance with 14 CFR 21.621 governing issuance of TSO design approval for import articles. Each item must be accompanied by a certificate of airworthiness for export issued by the *{enter name of CAA}* or a duly authorized designee/organization (14 CFR 21.502(a)).

{Enter name of applicant} must furnish the following statement to the original owner or installer of each article or multiple articles, if furnished to one source:

> The conditions and tests required for TSO approval of this article are minimum performance standards. Those installing this article either on or within a specific type or class of aircraft must determine that the aircraft installation conditions are within the TSO standards which include any accepted integrated non-TSO function standards. TSO articles and any accepted integrated non-TSO function(s) must have separate approval for installation in an aircraft. The article may be installed only according to 14 CFR part 43 or the applicable airworthiness requirements. *{Add the following, when it applies: This is an incomplete system intended to provide the following functions: (List functions.)}*

{Include a summary statement to describe any approved deviations granted under the provisions of 14 CFR 21.618}

This LODA, issued under 14 CFR 21.621, is effective until surrendered, withdrawn, or otherwise terminated by the FAA under the provisions of 14 CFR 21.613. You, as the holder of this LODA, may not transfer it as stated in 14 CFR 21.614. The *{enter name of CAA}* airworthiness certification and production surveillance is essential in establishing and maintaining that this article meets TSO-C *{enter number}*. With notice, we may withdraw this LODA if we find articles are not in compliance with the applicable TSO under the provisions of 14 CFR 21.2.

Without further FAA approval, we don't allow *{enter name of applicant}* to mark articles if the company's name, address, or ownership changes. *{Enter name of applicant}* must notify the FAA through the *{enter name of CAA}* of proposed company name, address, or ownership changes.

Please note that technical data the FAA retains may be subject to Freedom of Information Act (FOIA) requests. This office will notify *{enter name of applicant}* of any request(s) pertaining to their data and give them the opportunity to protect the data from public disclosure.

If you have any questions, please feel free to have your staff contact *{insert name of ACO point of contact and phone number}*.

Sincerely,

{Name of ACO manager}
{Name of FAA ACO}

cc: AIR-112; *{insert routing symbol of responsible MIDO}*

Appendix E. Accepted Non-TSO Functions

Attachment 1 to *{enter reference number}*

We accept, as valid data, the data supporting the non-TSO functions listed below. **This TSO authorization is not an approval for the non-TSO function(s) or for installation.** The installer must apply for a separate installation approval so we can determine if the data are applicable and sufficient to show compliance to the airworthiness regulations for the product(s) where the article is installed.

{Enter the appropriate information into the table below}

Non-TSO Function	Performance Standard	Documentation
P/N ABCD001		
Function #1	*DO-xxxE, Section XX*	*Report # 12xx45 Rev X*
Function #2	*SAE ASXXXB, Para 4*	*Report # 34xxx67 Rev X*
Function #3	*NAS XXXX, Rev xx*	*Doc # 56xx78xx Rev Y*
Model # ABCDEF		
Function #1	*XXXXX Rev x*	*Report XXXX Rev X*
Function #2	*SAE ASXXXB, Para 4*	*Report # 34xxx67 Rev X*
Function #3	*NAS XXXX, Rev xx*	*Doc # 56xx78xx Rev Y*

We accept the data supporting the non-TSO functions listed in the above table with the following conditions:

1. The non-TSO functions do not interfere with the article's compliance with the TSO.

2. *{Enter name of applicant}* controls the design and quality of the article, including the validity of the non-TSO functions' data listed in the above table.

3. Design changes are evaluated in accordance with the applicable bilateral agreement to ensure the article continues to comply with the TSO.

4. Design changes are evaluated to confirm the validity of the accepted non-TSO functions' data. Design changes that don't affect the validity of the non-TSO data as minor changes are addressed as stipulated in the applicable bilateral agreement. *{enter name of applicant}* must submit to this office for acceptance prior to integrating the design change into the article, design changes that affect the validity of the non-TSO data. If we accept the change, *{enter name of applicant}* must notify all recipients of the previous data of the change. If all of the previous recipients of the data can't be identified, *{enter name of applicant}* must change the part number of the article. We require a new installation approval for an article with a new part number.

Appendix F. Sample Denial Letter for TSOA/LODA Application

U.S. Department
of Transportation
Federal Aviation Administration

{ACO}
{ACO address}

{Date}

{Name of applicant point of contact (POC)}
{POC's title}
{Name of company}
{Street address}
{City and mail code}

Dear *{Mr. /Mrs. /Ms. enter name of applicant POC}:*

Subject: {TSOA} or {LODA} Application *{insert reference number}*

This is in reply to your application letter of *{enter date}* requesting *{enter TSO authorization or letter of design approval, as applicable}* for your *{insert type of article}*. We are denying your request for a *{enter TSO authorization or letter of design approval, as applicable}* under TSO-C *{enter TSO number}*.

{In a few sentences provide an explanation for the denial of the TSOA/LODA request}.

Please note that technical data the FAA retains may be subject to Freedom of Information Act (FOIA) requests. This office will notify you of any request(s) pertaining to your data and give you the opportunity to protect the data from public disclosure.

If you have any questions regarding this denial, contact *{enter FAA ACO contact and phone number}*.

Sincerely,

{Name of ACO manager}
{Name of FAA ACO}

cc: AIR-112; *{insert routing symbol of responsible MIDO}*

Appendix G. **Format and Guidance for the Preparation of a TSO**

TSO-C{XXX}

Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C.

Effective
Date: *{mm/dd/yy}*

Technical Standard Order

*{**Note**: Use this template for all TSOs.}* ***Key:*** *Shaded areas may not be applicable to every TSO. Information in parenthesis {italics} requires you to add data, or provides guidance, or both. If a shaded area is applicable to your TSO, fill in the missing information; if not, delete the shaded section from your TSO.*

Subject: ***{Enter title of TSO article}***

1. PURPOSE. This technical standard order (TSO) is for manufacturers applying for a TSO authorization (TSOA) or letter of design approval (LODA). In it, we (the Federal Aviation Administration, (FAA)) tell you what minimum performance standards (MPS) your *{insert type of equipment}* must first meet for approval and identification with the applicable TSO marking.

2. APPLICABILITY. This TSO affects new applications submitted after its effective date. *{Select additional paragraphs if they apply:}*

a. *{For TSO revisions, use the following statement:}* All prior revisions to this TSO are no longer effective. Generally, we will not accept applications for the previous revision after the effective date of this TSO. We may do so, however, up to six months after it, if we know that you were working against the prior MPS before the new change became effective.

b. *{To allow the continued manufacture of previously approved articles, use the following statement:}* *{insert type of equipment}* approved under a previous TSOA may still be manufactured under the provisions of its original approval.

c. *{To stop the manufacture of previously approved articles, FAA staff must withdraw each approval previously issued by publishing a Federal Register notice. After we have withdrawn each approval, you can use the following statement:}* Effective *{enter date}* under Title 14 of the Code of Federal Regulations (14 CFR) § 21.613(a), we are withdrawing each TSOA and LODA that lets the holder identify or mark *{insert type of equipment}* with *{insert applicable versions of TSO}*

3. REQUIREMENTS. New models of *{insert type of equipment}* identified and manufactured on or after the effective date of this TSO must meet the MPS qualification and

documentation requirements in *{insert the applicable statement: appendix 1, if an FAA MPS is used, or cite the applicable SAE, RTCA, etc. document, name, title, date, etc., as modified by appendix 1 of this TSO, when applicable.}*

a. Functionality. This TSO's standards apply to equipment intended to *{state intended function, or refer to a standard or an appendix.}*

b. Failure Condition Classifications. *{Use either (1) through (3) or the alternate (1) and (2). The failure condition classification may need to be tailored for a specific failure condition, example: unannunciated loss of function}*

(1) Failure of the function defined in paragraph **3.a** resulting in *{insert under what conditions as appropriate, example: misleading vertical guidance* is a *{insert appropriate classification: minor, major, hazardous, catastrophic}* failure condition.

(2) Loss of the function defined in paragraph **3.a** is a *{insert appropriate classification: minor, major, hazardous, catastrophic}* failure condition.

(3) Design the system to at least these failure condition classifications.

*{**Alternately** if the article could be designed for various failure condition classifications based on its intended use, then use the following paragraph.}*

There is no standard minimum failure condition classification for this TSO. The failure condition classification appropriate for the equipment will depend on the intended use of the equipment in a specific aircraft. Document the loss of function and malfunction failure condition classification for which the equipment is designed

c. Functional Qualification. *{Choose one of the following statements:}* Demonstrate the required functional performance under the test conditions specified in *{insert reference to section of MPS} {or,}* Demonstrate the required performance under the test conditions in appendix *{insert no.}* of this TSO.

d. Environmental Qualification. *{Choose one of the following statements:}* Demonstrate the required performance under the test conditions specified in *{insert reference to section of MPS}* using standard environmental conditions and test procedures appropriate for airborne equipment. You may use a different standard environmental condition and test procedure than *{insert reference to the RTCA/DO-160 version in the MPS}*, provided the standard is appropriate for the *{insert type of equipment}{or,}* Demonstrate the required performance under the test procedures in appendix *{insert no.}* of this TSO using standard environmental conditions and test procedures appropriate for airborne equipment.

> **Note:** The use of RTCA/DO-160D (with Changes 1 and 2 only, incorporated) or earlier versions is generally not considered appropriate and will require substantiation via the deviation process as discussed in paragraph **3.g** of this TSO.

e. Software Qualification. If the article includes software, develop the software according to RTCA, Inc. document RTCA/DO-178B, *Software Considerations in Airborne Systems and Equipment Certification*, dated December 1, 1992 to at least the software level consistent with the failure condition classification defined in paragraph **3.b** of this TSO.

> **Note**: The certification liaison process objectives will be considered satisfied after FAA review of the applicable life cycle data.

f. Electronic Hardware Qualification. If the article includes complex custom airborne electronic hardware, develop the component according to *RTCA, Inc. Document RTCA/DO-254, Design Assurance Guidance for Airborne Electronic Hardware* to at least the design assurance level consistent with the failure condition classification defined in paragraph **3.b** of this TSO. For custom airborne electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies.

> **Note**: The certification liaison process objectives will be considered satisfied after FAA review of the applicable life cycle data.

g. Deviations. We have provisions for using alternate or equivalent means of compliance to the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation under the provision of 14 CFR § 21.618.

4. MARKING.

a. Mark at least one major component permanently and legibly with all the information in 14 CFR § 45.15(b). The marking must include the serial number.

b. Also, mark the following permanently and legibly, with at least the manufacturer's name, subassembly part number, and the TSO number:

(1) Each component that is easily removable (without hand tools); and,

(2) Each subassembly of the article that you determined may be interchangeable.

c. If the article includes software and/or airborne electronic hardware, then the article part numbering scheme must identify the software and airborne electronic hardware configuration. The part numbering scheme can use separate, unique part numbers for software, hardware, and airborne electronic hardware.

d. You may use electronic part marking to identify software or airborne electronic hardware components by embedding the identification within the hardware component itself (using software) rather than marking it on the equipment nameplate. If electronic marking is used, it must be readily accessible without the use of special tools or equipment.

5. APPLICATION DATA REQUIREMENTS. You must give the FAA aircraft certification office (ACO) manager responsible for your facility a statement of conformance, as specified in 14 CFR § 21.603(a)(1) and one copy each of the following technical data to support your design and production approval. LODA applicants must submit the same data (excluding paragraph **5.g**) through their civil aviation authority.

a. A Manual(s) containing the following:

(1) Operating instructions and article limitations sufficient to describe the equipment's operational capability.

(2) Describe in detail any deviations.

(3) Installation procedures and limitations sufficient to ensure that the *{insert type of equipment}*, when installed according to the installation or operational procedures, still meets this TSO's requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statement:

> "This article meets the minimum performance and quality control standards required by a technical standard order (TSO). Installation of this article requires separate approval."

(4) For each unique configuration of software and airborne electronic hardware, reference the following:

(a) Software part number including revision and design assurance level;

(b) Airborne electronic hardware part number including revision and design assurance level; and,

(c) Functional description.

(5) A summary of the test conditions used for environmental qualifications for each component of the article. For example, a form as described in RTCA/DO-160G, *Environmental Conditions and Test Procedures for Airborne Equipment,* Appendix A.

(6) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of the *{insert type of equipment}*.

(7) List of replaceable components, by part number, that makes up the *{insert type of equipment}*. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair, for the continued airworthiness of *{insert type of equipment.}* Include recommended inspection intervals and service life, as appropriate.

c. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary.

d. If the article includes simple or complex custom airborne electronic hardware: a plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing, and hardware accomplishment summary (or similar document, as applicable).

e. A drawing depicting how the article will be marked with the information required by paragraph **4** of this TSO.

f. Identify functionality or performance contained in the article not evaluated under paragraph **3** of this TSO (that is, non-TSO functions). Non-TSO functions are accepted in parallel with the TSO authorization. For those non-TSO functions to be accepted, you must declare these functions and include the following information with your TSO application:

(1) Description of the non-TSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-TSO function(s) don't interfere with the article's compliance with the requirements of paragraph **3**.

(2) Installation procedures and limitations sufficient to ensure that the non-TSO function(s) meets the declared functions and performance specification(s) described in paragraph **5.f.(1)**.

(3) Instructions for continued performance applicable to the non-TSO function(s) described in paragraph **5.f.(1).**

(4) Interface requirements and applicable installation test procedures to ensure compliance with the performance data defined in paragraph **5.f.(1).**

(5) Test plans, analysis and results, as appropriate, to verify that performance of the hosting TSO article is not affected by the non-TSO function(s).

(6) Test plans, analysis and results, as appropriate, to verify the function and performance of the non-TSO function(s) as described in paragraph **5.f.(1).**

g. The quality system description required by 14 CFR § 21.608, including functional test specifications. The quality system should ensure that you will detect any change to the approved design that could adversely affect compliance with the TSO MPS, and reject the article accordingly. (Not required for LODA applicants.)

h. Material and process specifications list.

i. List of all drawings and processes (including revision level) that define the article's design.

j. Manufacturer's TSO qualification report showing results of testing accomplished according to paragraph **3.c** of this TSO.

{You can add to the above list any other documentation you think essential.}

6. MANUFACTURER DATA REQUIREMENTS. Besides the data given directly to the responsible ACO, have the following technical data available for review by the responsible ACO: *{The following is a standard list of the generally applicable data. The applicability of each item will vary by TSO, and we may require other data.}*

a. Functional qualification specifications for qualifying each production article to ensure compliance with this TSO.

b. Article calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph **3.d** of this TSO.

g. If the article includes software, the appropriate documentation defined in RTCA/DO-178B including all data supporting the applicable objectives in RTCA/DO-178B *Annex A, Process Objectives and Outputs by Software Level.*

h. If the article includes complex custom airborne electronic hardware, the appropriate hardware life cycle data in combination with design assurance level, as defined in RTCA/DO-254, Appendix A, Table A-l. For simple custom airborne electronic hardware, the following data: test cases or procedures, test results, test coverage analysis, tool assessment and qualification data, and configuration management records, including problem reports. *{Use this paragraph if the condition classification (defined in paragraph **3.b** of this TSO) is major, hazardous or catastrophic.}*

i. If the article contains non-TSO function(s), you must also make available items **6.a** through **6.h** as they pertain to the non-TSO function(s).

7. FURNISHED DATA REQUIREMENTS.

a. If furnishing one or more articles manufactured under this TSO to one entity (such as an operator or repair station), provide one copy or on-line access to the data in paragraphs **5.a** and **5.b** of this TSO. *{We generally consider these data the minimums}* Add any other data needed for the proper installation, certification, use, or for continued compliance with the TSO, of the *{insert type of equipment.}*

b. If the article contains declared non-TSO function(s), include one copy of the data in paragraphs **5.f.(1)** through **5.f.(4).**

8. HOW TO GET REFERENCED DOCUMENTS. *{List the title, organization name and address for getting all referenced documents.}*

a. Order RTCA documents from RTCA Inc., 1150 18th Street NW, Suite 910, Washington, D.C. 20036. Telephone (202) 833-9339, fax (202) 833-9434. You can also order copies online at www.rtca.org.

b. Order SAE documents from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Telephone (724) 776-4970, fax (724) 776-0790. You can also order copies online at www.sae.org.

c. Order copies of 14 CFR parts 21 and 45 *{add additional applicable parts}* from the Superintendent of Documents, Government Printing Office, P.O. Box 979050, St. Louis, MO 63197. Telephone (202) 512-1800, fax (202) 512-2250. You can also order copies online at www.access.gpo.gov. Select "Access," then "Online Bookstore." Select "Aviation," then "Code of Federal Regulations."

d. You can find a current list of technical standard orders and advisory circulars on the FAA Internet website Regulatory and Guidance Library at http://rgl.faa.gov/. You will also find the TSO Index of Articles at the same site.

David W. Hempe
Manager
Aircraft Engineering Division

APPENDIX H DEVIATION DELEGATION AUTHORITY TO ACO

H-1. Instructions for Use of this Appendix. This appendix identifies specific TSO deviations that AIR-100 has determined provide an equivalent level of safety (ELOS) for a specific TSO. The ACO is authorized to grant, without further AIR-100 involvement, an applicant's deviation request, provided the request complies with the guidance in this appendix.

H-2. List of Common Acceptable Deviations. This list is comprised of TSO deviations that have been repetitive in nature, reviewed by an ACO, and approved by AIR-100. When used as a tool to determine the equivalency of an individual deviation request, the following TSO deviations may be granted by the appropriate ACO Manager. Once approved, the deviation must be filed with AIR-100 for review and record keeping purposes.

a. TSO-C-39c: 9g Transport Airplane Seats Certified by Static Testing and
TSO-C-127a: Rotocraft, Transport Airplane, and Normal and Utility Airplane Seating Systems

It is acceptable to grant a deviation to the required method for determining the Seat Reference Point (SRP) defined in SAE/AS8049A Figure 1B with one of the SRP determination methods defined in SAE/AS8049B Figure 1B.

LIMITATION: The selected method from SAE/AS8049B Figure 1B must be documented and must be used consistently when evaluating all variations of the seat model or future changes to the seat model design.

b. TSO C-39c: 9g Transport Airplane Seats Certified by Static Testing and
TSO C-127a: Rotocraft, Transport Airplane and Normal and Utility Airplane Seating Systems

For Type A and Type B Transport seats, if an inflatable restraint is included, it is acceptable to grant a deviation to the flammability requirements of the airbag material to meet flammability requirements of 14 CFR, Part 25, Appendix F, Part I (a)(iv) as recognized in multiple FAA special conditions.

Note: Inflatable restraints are a relatively new and novel technology used in commercial aviation. As such, the seat TSO MPS were not developed to specifically address this new technology. Therefore, the installation approval is still subject to the applicable special conditions and certification requirements.

c. TSO C-90: Cargo Pallets, Nets, and Containers (Unit Load Devices)

Common deviation to C-90, C-90a, C-90b, and C-90d Section (b)(2) requirement for weight marking to the nearest pound. It is acceptable to grant a deviation to the marking requirements to read the same as paragraph 4.a.(6) of TSO C-90d which reads:
"The nominal weight of the article in the format: Weight:_____kg (_____lb)".

The one pound tolerance for weight marking of a ULD does not add safety. It is unnecessarily restrictive considering the large differences between the marked ULD weight and actual in-service ULD weight that may exist due to accumulated dirt, moisture and other environmental effects.

Appendix I - Administrative Information

I-1. Distribution. Distribute this order to branch levels in Washington headquarters, the branch levels of the Aircraft Certification Service and the Flight Standards Service; to the branch levels of the regional aircraft certification directorates; all ACOs; to the regional Flight Standards Divisions and to all air carrier, general aviation, and flight standards district offices; to the Federal Aviation Administration Academy and the Regulatory Support Division; to all international field offices and international area offices. Also, distribute this order to all MIDOs and MISOs.

I-2. Suggestions for Improvement. If you find any deficiencies, need clarification, or want to suggest improvements to this order, send a paper or electronic copy of FAA Form 1320-19, Directive Feedback Information, to the Aircraft Certification Service, Administrative Services Branch, AIR-510, Attention: Directives Management Officer. Form 1320-19 is on the last page of this order. You also may send a copy to the Aircraft Engineering Division, AIR-100, Attention: Comments to Order 8150.1C. If you urgently need an interpretation, contact AIR-100 at (202) 385-6330. Always use Form 1320-19 to follow up each conversation.

I-3. Records Management. For guidance on keeping or disposing of records, refer to FAA Orders 0000.1, *FAA Standard Subject Classification System*; 1350.14, *Records Management*; and 1350.15, *Records, Organization, Transfer, and Destruction Standards*, or see your records management officer or directives management officer.

I-4. Deviating From This Order. FAA engineering personnel must follow this order to ensure standardized approvals of TSO articles. The Aircraft Engineering Division (AIR-100) coordinates and dispositions any proposals to deviate from this order. When the FAA staff needs to use or base an approval on different guidance or alternative procedures, they substantiate and document the need, gain concurrence from the appropriate supervisor, and send the request to AIR-100 for concurrence.

Appendix J - Sample Directive Feedback Information, FAA Form 1320-19

U.S. Department
of Transportation
**Federal Aviation
Administration**

Directive Feedback Information

Please submit any written comments or recommendations for improving this directive, or suggest new items or subjects to be added to it. Also, if you find an error, please tell us about it.

Subject: Order 8150.1C _____

To: Directive Management Officer, AIR-510 _____

(Please check all appropriate line items)

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows:
(attach separate sheet if necessary)

☐ In a future change to this directive, please include coverage on the following subject:
(briefly describe what you want added)

☐ Other comments:

☐ I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____

FTS Telephone Number: _____ Routing Symbol: _____

FAA Form 1320–19 (8-89)(Representation)