

# What is a TSOA?

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**T**he acronyms TSO and TSOA are quite common in the avionics industry. They are used so commonly that we sometimes forget that those new to the industry (and even some who are long-time industry professionals) do not know what a TSO is.

TSO stands for Technical Standard Order. TSOA stands for Technical Standard Order Authorization. Together these terms help describe a process the FAA uses for approving certain types of components.

### Technical Standard Orders

The Technical Standard Order, or TSO, is a written specification published by the FAA as a minimum performance standard for specified materials, parts and appliances used on civil aircraft. It may specify input and output parameters, operating parameters and other minimum specifications that apply to an article.

The FAA publishes TSOs in order to set uniform standards for articles that will be installed in aircraft. Many TSOs are for avionics articles, like radios, transponders and GPSs.

Copies of TSOs are available on the FAA's website, [www.faa.gov](http://www.faa.gov).

### Technical Standard Order Authorizations

A Technical Standard Order Authorization, or TSOA, is the approval that authorizes a manufacturer to produce a material, part or appliances to a TSO standard. Receiving a TSO authorization is both design and production approval.

In order to obtain a TSOA, the manufacturer must develop an article design that meets the TSO specifications and is airworthy, and must also develop a manufacturing quality system that will assure that each part released from the system meets the approved design requirements. The applicant also specifically certifies that it is in compliance with the standard and the regulations.

In the application for a TSOA, the applicant must certify that the design is in full compliance with the appropriate standards. The FAA evaluates the application to confirm this compliance (the actual level of review varies based on factors like the practice of the reviewing office, and the FAA's past history with the applicant).

The FAA is required to respond to a TSOA application within 30 days of the application. Under current practice, many

offices fail to meet this deadline; however working closely with the local FAA office to support their evaluation of the TSOA application can help speed up the process. Best practices dictate that this close relationship should begin at the beginning of the project—manufacturers shouldn't wait until the completed application is submitted—in order to keep the local FAA offices apprised of the project's parameters and progress.

### Installing a TSOA Article

One difference between TSOAs and most manufacturing approvals is that there is no installation authority inherent in the TSOA. A parts manufacturing approval (PMA) for example provides at least one aviation product (such as an aircraft or engine) into which the PMA'd part can be installed. TSOAs do not provide this sort of installation eligibility because they are meant to reflect standard specifications for articles that can be used in a wide variety of aircraft.

While the theory of TSOAs is that the articles can be used on a wide variety of aircraft, this does not mean that they can be installed willy-nilly anywhere that the installer chooses. As a general rule, the installer needs some

indicia that installation of a new TSOA article into an aircraft will reflect a safe alteration to that aircraft. Because introduction of a new TSOA article into an aircraft is often a major alteration, this often means obtaining FAA approval for the installation. Common methods of major alteration approval include supplemental type certificate (for alterations that are also major changes to the type design) and field approval.

Sometimes, the installation of a TSOA'd article is not a new installation—it is a replacement of an existing article manufactured in compliance with the same TSO standard. If the replacement does not affect airworthiness conditions, then it may represent a minor alteration or a repair (you should check with your AEA member shop to assess whether a particular transaction is a repair or alteration and whether the FAA considers it major or minor).

## Revisions

TSOs are updated from time to time. They usually will receive a letter to reflect their revision level. For example, when TSO C129 was revised, the revised specification was known as TSO C129a.

A subsequent “revision” to a TSO may cancel or withdraw a prior revision level of a TSO. To cancel or withdraw a TSO, the cancellation or withdrawal must be explicit. Some TSO revisions actually do cancel the prior revision level. See, e.g., TSO C127a (stating “All prior revisions to this TSO are no longer effective after

the effective date of this TSO” and thereby affecting the continued use of TSO C127).

Cancellation means that no one can obtain TSOA in the future under that TSO. A regulation may withdraw a TSOA. See, e.g., 14 C.F.R. § 21.603(c) (withdrawing certain TSOs and forbidding any manufacturer to mark an article as compliant with any of those TSOs).

This means that the prior holders of TSOA under that TSO are forbidden from continuing to mark articles under that TSOA; however, the subsequent revision level is not required to cancel or withdraw the prior revision level.

When there is no explicit cancellation or withdrawal of the prior revision level of the TSO, that means that the prior revision level is still a valid TSO. In some cases, the FAA permits the prior revision level of a TSO to co-exist with the current revision level. Part of the reason that earlier versions of TSOs are not automatically cancelled or withdrawn by subsequent revisions is that the changes from one revision level to another might not involve safety issues—so there might be no safety reason for canceling the prior revision level. Under the law, any person may request that the FAA revise or issue a new TSO, for any reason, by simply submitting a description of the revision sought or a description of the new article for which a TSO is requested. Technical Standard Order Index, AC 20-110L 5(c) (October 10, 2000).

The standard of review for such requests is based on

“need,” without regard to specific safety concerns. See Technical Standard Order Procedures, FAA Order 8150.1A paragraph 14 (September 21, 1987).

This need could be a commercial need, such as a desire to specify new standardized functionality into an article or a desire to reflect technological advances being incorporated into modern components. Thus, the publication of a subsequent revision does not mean that the prior version represented an inadequate article or was unsafe—it only means that there was a perception of need for the new TSO revision level.

## Conclusion: Why Are TSOs Important to Pilots?

TSOs represent FAA standardization that reflects standards that the FAA has deemed to be both safe and beneficial. TSOAs reflect FAA approvals of both design and production systems. The design approval half means that the design is in compliance with the FAA's standards. The production approval half means that the company has a quality system in place designed to assure that articles released to the public will be airworthy.

Purchasing a TSO'd article not only helps to assure airworthiness, it also can make the replacement process easier in some cases, by permitting replacement units manufactured under the same TSO to make use of the current configuration as a baseline for examining whether the alteration is minor.

For more information about

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TSOs, you can review these FAA sources:

### Regulations

- 14 CFR section 21.3—Reporting of failures, malfunctions and defects.
- 14 CFR section 21.502—Approval of materials, parts and appliances.
- 14 CFR part 21, Subpart O—Technical Standard Order Authorizations.

### Orders

- Joint Technical Standard Order Authorization for U.S. Article Manufacturers, FAA Order 8110.43.
- Production Approval and Surveillance Procedures FAA Order 8120.2, Chapter 6
- Technical Standard Order Procedures, FAA Order 8150.1
- Marking of Parts Manufacturer Approval and Technical Standard Order Authorization Spare Parts, FAA AIR-200 Policy Memorandum # 92-1 (December 23, 1992)
- Clarification of the Eligibility of Imported Parts for Installation on U.S.-Registered Aircraft, FAA AIR-200 Policy memorandum #2000-01A (June 15, 2000)
- Guidance relating to title 14 Code of Federal Regulations (14 CFR) part 21, Certification Procedures for Products and Parts (part 21), Section 21.603, TSO Marking and Privileges, AIR-200 Policy Memorandum #99-01 (January 7, 1999)
- Implementation of Technical Standard Orders (TSO) for Parts, FAA Notice N8110.73

## Advisory Circulars

- Index of articles (Materials, Parts, Processes and Appliances) Certified Under the Technical Standard Order, AC 20-36
- Substitute Technical Standard Order (TSO) Aircraft Equipment, AC 20-41
- Index of Aviation Technical Standard Orders, AC 20-110 ■