

Certification Authorities Software Team (CAST)

Position Paper CAST-23

SOFTWARE PART NUMBERING

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(Rev 1)

NOTE: This position paper has been coordinated among the software specialists of certification authorities from the United States, Europe, and Canada. However, it does not constitute official policy or guidance from any of the authorities. This document is provided for educational and informational purposes only and should be discussed with the appropriate certification authority when considering for actual projects.

Software Part Numbering

1) Purpose

Software part numbers are not always specifically identified in type design data for Type Certificate (TC), Amended TC (ATC), and Supplemental Type Certificate (STC) projects. This lack of identification can make it difficult to evaluate software changes. This paper provides the background, discussion, and CAST position on identifying the specific software part number (including version identification and modification status) in the type design data. This paper also identifies several related issues that may need to be addressed separately.

2) Background

There are a number of issues with software part number identification in type design data for TC, ATC, and STC projects. Some Certification Authority (CA) offices require that the software part numbers be specified in the type design data. However, other CA offices do not require specification of the software part numbers or they allow the software part number to include a “-x” to allow for minor changes to the software (e.g., modification level change).

3) Discussion

The issues of not specifying the software part number and of allowing “-x” for minor modifications are of particular concern for equipment that has Technical Standard Order (TSO) authorization. These TSO authorized parts are often identified in the type design data by only the hardware part number. The software part number is not specified or, if it is, the software part number includes a “-x” to allow for minor changes. These issues are equally applicable to both field-loadable and non field-loadable software.

Major and minor changes to type-certificated products are defined in Federal Aviation Regulations (FAR 21), Joint Airworthiness Regulations (JAR 21), European Aviation Safety Agency (EASA) Part 21. Software changes are most likely to affect reliability, operational characteristics, or other characteristics affecting the airworthiness of the product.

The installer of the TSO authorized equipment seems to be relying on the TSO authorization holder’s assessment that the change to the TSO authorization is minor. However, the definition of change (major/minor) to TSO authorized equipment is somewhat different than the definition of change (major/minor) to type certificated equipment in 14 FAR/JAR/Part 21.93. Per FAR/JAR/Part

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21.611(b), a major change to TSO authorized equipment is a design change that is “extensive enough to require a substantially complete investigation to determine compliance with a TSO”. All other changes are considered minor.

In fact, a minor change (as defined by 21.611) to the TSO authorization could have a major effect on the type-certificated product. It is the TC/ATC/STC applicant and system installer’s responsibility to ensure that the software change does not constitute a major change to the specific installation.

4) Certification Authorities Software Team (CAST) Position

The software part number should specifically be identified in the type design data and all changes should be evaluated for their effect on the type-certificated product. A minor change to the TSO authorization could have a major effect on the installation. While the TSO authorization holder should consider the intended installation when performing a Change Impact Analysis (CIA), the TC/ATC/STC holder also needs to perform a CIA to address the effect of the change on the specific installation.

In order to make the existing guidance more clear, CAST recommends the following change to FAA Order 8110.49, [1], Chapter 11-2(a):

“For TSO authorized equipment, the change impact analysis should identify the intended installation that forms the basis for the analysis. Additionally, the TC/ATC/STC holder should also perform a change impact analysis to address the effects of the change on the specific installation.”¹

CAST also recommends the following change to FAA Advisory Circular 21-40, [2] Chapter 5-2(e):

“Design of equipment or components to be installed, purchased and/or furnished, should be completely defined. If the item is TSO authorized, the nameplate data may be adequate. Other equipment may require a source-control drawing identifying the equipment by manufacturer, part number, drawing number, revision level, or any other necessary data. For equipment that contains software, the software part number(s) should also be specified (e.g., software part numbers with “-x” should not be allowed). Installation instructions for the modification should include all pertinent information provided by the equipment’s manufacturer.”¹

CAST recommends that similar changes be made to JAA and EASA regulations.

¹ Underlines represent recommended changes to the Order or Advisory Circular.

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5) Related Issues

There are several related issues that CAST may need to address separately:

- a) Changes to the software part number are often approved as “deviations” to the design data and approved using FAA Form 337 Field Approval without considering the impact of the software change on the installation.
- b) When equipment is sent back to a TSO authorization holder for repair, the TSO authorization holder often loads the latest version of the software. That is, the authorization holder often replaces the existing version of the software with another, later version. The equipment may then be reinstalled without considering the impact of the software change on the installation.
- c) The points discussed in this paper are typically applicable to non-TSO authorized equipment as well.

These issues require coordination with organizations outside of aircraft certification (for example, with airworthiness authorities, flight standards’ operations and maintenance inspectors, etc.) and should be addressed on a product change, case-by-case basis.

6) References

[1] FAA Order 8110.49, “Software Approval Guidelines,” June 3, 2003.

[2] AC 21-40, “Application Guide for Obtaining a Supplemental Type Certificate”, May 6, 1998.

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