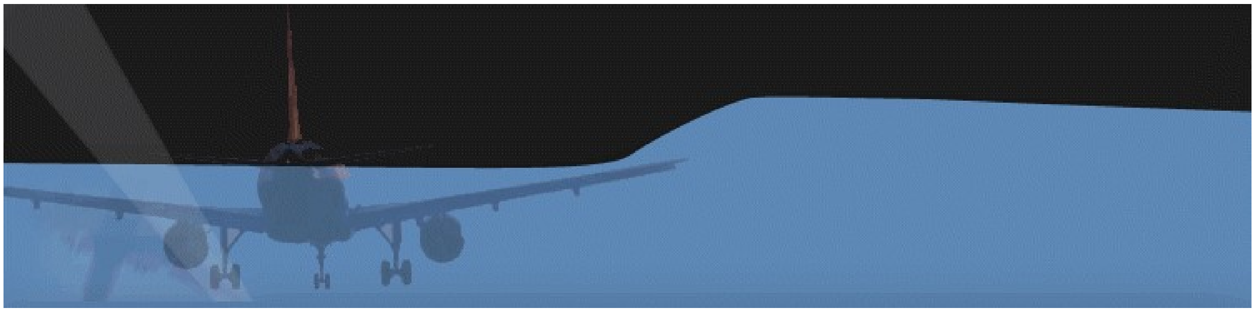

Plan for Software Aspects of Certification

for the

<Company Name> <Program Name>

Document No: <Doc Number>
Revision: -

____ ___________
<Name>, Program Manager Date

____ ___________
<Name>, Technical Project Lead Date

____ ___________
<Name>, Engineer Date

____ ___________
<Name>, Quality Assurance Engineer Date

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REVISIONS			
Rev.	Reason/Description	Requested/ Changed By	Date

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1.0 INTRODUCTION

This is a self-educating template. Note that blue italicized font is instructional text used to educate the user of this template about how to use this template in terms of the intent or types of content required for a section. ***This text should be deleted once this template is turned into a real project document.*** Standard text *provides sample content (and/or example content) that can sometimes be used but must usually be customized for the specific project.*

This PSAC document summarizes the processes used to develop, design, verify and control the applicable software during the planning, development, verification and production phases. References are made to the relevant planning, requirements, design, production, verification and configuration control documents and data. The purpose of this document is to communicate how the pertinent objectives of DO-178C and other certification criteria will be met and reviewed for FAA/EASA (or other) certification/approval.

You need to tailor the content of this PSAC based on the DAL of your project. Refer to Table 5-3 to help you do this. Also, as you are preparing your planning documents from these templates, please utilize the DO-178C supplement tables (i.e., file DO-178C_Supplement-Tables.xlxs, provided with these templates) to ensure you are applying all the appropriate information that is relevant to your project (if it uses the supplements DO-330, DO-331, DO-332, DO-333) into the documentation set. The supplement tables will help you identify where this information goes in the document set.

Note that all the relevant figures in this template set are available for editing and provided in the free "drawio" format as part of this template set.

1.1 Purpose

This Plan for Software Aspects of Certification (PSAC) defines the processes, procedures, methods, and standards to be used and the life cycle data to be produced in order to satisfy the objectives of DO-178C and its pertinent supplements, along with any additional objectives required to satisfy the certification basis of the aircraft. Once approved, this PSAC represents an agreement between the applicant and the customer and/or certification authority.

1.2 Scope

Note that if this project will be using DO-331, 332, 333, this PSAC must describe how both DO-178C and the supplement(s) will be used together, which objectives apply to which software components, and how the planned activities will satisfy all applicable objectives. You can use the DO-178C-Supp-Tables.xlxs spreadsheet to assist with this.

This plan will be used by the customer and/or certification authority to determine if the Software Life cycle Process is commensurate with the rigor required for the level of software being developed. Once approved, it is implemented during the software life cycle development. This Plan for Software Aspects of Certification complies with the documentation requirements of RTCA/DO-178C, Section 11.1.

1.3 Definitions

Modify this to include the terms used in your project.

The following table defines the key terms used in this project.

Table 1-1. Definitions

Definition	Meaning
COTS Graphical Processor	Any COTS microcontroller specifically designed for graphical applications. COTS graphical processors for airborne systems are required to have built in mitigation against Hazardous and Misleading information (HMI).
COTS Microcontroller	Any IC which executes software in a specific core area (Central Processing Unit) and implements peripheral hardware elements such as, for example, input/output (I/O), bus controllers… Such a peripheral element may be considered simple (e.g., a UART, A/D, D/A) or complex (e.g., a bus controller).
Highly complex COTS microcontroller	Any microcontroller where at least one of the statements below is true: - more than one Central Processing Unit (CPU) is embedded and they use the same bus (which is not strictly separated or which uses the same single port memory) - several complex interfaces are dependent on each other and exchange data - several internal busses are integrated and are used in a dynamic way (for example, a dynamic bus switch matrix)
Microprocessor	A single Central Processing Unit which executes software and does not contain any additional integrated peripheral hardware element such as a UART, A/D, D/A, bus controller, Time Processing Unit, Memory Management Unit, watchdog, etc.

1.4 Part Number and Nomenclature

Update with your own PN and nomenclature information.

This section includes the Part Number(s) of the software covered by this PSAC.

Table 1-2. Part Number and Nomenclature

Part Number	Nomenclature
PC-XY-1234-56_FS	Flight Software
PC-AB-5678-09_PDI	Parameter Data Item (PDI)

1.5 Deviations, Modifications & Updates

DO-178C acknowledges that from time to time you will want to deviate from the agreed to and approved plans. When this happens a defined method for how these deviations will be communicated and agreed should be defined. This section provides an example concept for how a company could chose to do this. Modify this section with the method you determine best suited *for your company.*

Deviations to this plan once it is approved will be documented in problem reports (PRs) against this PSAC or any other lower level affected plan or standards. This PR will contain the "is" and "was" changes for the deviation to the plan, standard, or process. Deviation PRs will be communicated to the authority responsible for approving the deviation. Deviations that are deemed "significant" will result in an update to this plan and a resubmittal for approval to the certification authority. Significant changes to plans are those that affect tool qualification, design and verification methodologies, and life cycles, such that a different methodology is used.

1.6 Team Members & Organization

List all team members involved in the project, identifying those with signature authority, and provide an organization structure demonstrating independence among the pertinent functions. The text provided describes the typical job descriptions and responsibilities but should be updated to reflect those in your organization who are involved in your program.

The Organization Chart shown in Figure 1-1 depicts the high-level organization involved in this program.

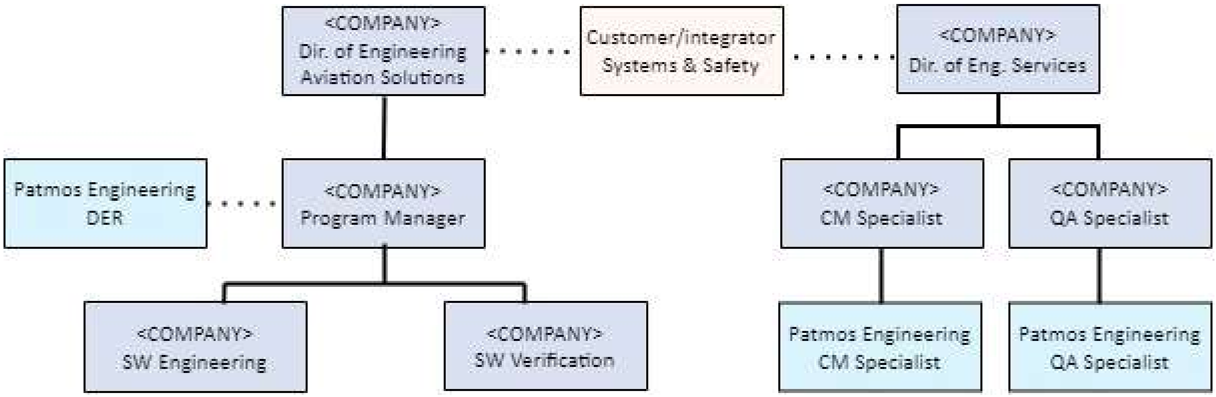

Figure 1-1. Program Organization Chart

The scope of this project is an airborne software module, developed and verified by internal resources from <COMPANY>. The Software Quality Assurance and Configuration Management engineering responsibilities is being handled by a sub-contractor (Patmos Engineering Services).

The following table identifies the team members and their roles. The subsections that follow describe the roles in detail.

Table 1-3. Team Members

Name	Title
Signature Authority:	
<NAME>	Project Manager
<NAME>	Lead Software Engineer

<NAME>	Independent Validation & Verification Engineer
Jane Doe, Patmos Engineering	Quality Assurance Engineer
Team Members:	
<NAME>	Systems Engineer
<NAME>	Reliability & Safety Engineer
<NAME>	Software Design Engineer
John Doe, Patmos Engineering	Configuration Management Engineer
Tammy Reeve, DER, President Patmos Engineering	Certification Authority / FAA Software Designated Engineering Representative

Assigned project personnel will perform the various activities identified in this plan. Key individuals are responsible for tasks assigned based on their respective area of expertise. These include Program Management, Software Engineering, Software Configuration Management, and Software Quality Assurance. Peer Reviews will be used for all Software verification process activities requiring independence.

1.6.1 Program Manager

The Program Manager will support preparation and implementation of various planning, requirements, and design descriptions for the project. Responsibilities include, but are not limited to, the following:

- Chairing the Engineering Review
- Developing and maintaining the project schedule
- Managing all development activities
- Assigning personnel and priorities
- Ensuring readiness for scheduled project reviews
- Resolving all process- and product-related problems/concerns
- Ensuring that the necessary equipment and tools are available for development

1.6.2 Software Engineering

The Software Engineer supports the following tasks:

- Participate in Software requirements reviews
- Participate in Software architectural design reviews
- Participate in code reviews
- Participate in integration reviews
- Process Software Problem Reports, Change Requests, and Initial Baseline Items
- Develop and maintain all trace matrices involving requirements, design, and code
- Provide support for test case and procedure preparation

- Support elemental analysis
- Support requirements coverage analysis

1.6.3 Independent Validation & Verification (IV&V)

The IV&V Engineer performs the following tasks:

- Participate in Software requirements reviews
- Participate in Software architectural design reviews
- Participate in code reviews
- Participate in integration reviews
- Process Software Problem Reports, Change Requests, and Initial Baseline Items
- Verify all trace matrices involving requirements, design, and code
- Create test cases and procedures
- Execute test cases
- Perform elemental analysis
- Perform requirements coverage analysis
- Work with Quality Assurance to ensure verification independence when necessary

Refer to the Software Verification Plan, <doc-ref#>_SVP, for details in terms of how Verification Independence will be established.

1.6.4 Software Configuration Management

The Software Configuration Management Engineer performs the following tasks:

- Problem Reporting System Setup, Maintenance and Reporting:
  Administer and maintain the PRS
- Configuration Management Software Library Setup, Maintenance, and Reporting:
  Set up, configuration, and maintain the code management tool
- Revision Control:
  Ensure that all product releases are reproducible, versioned, dated, and archived
- Software Configuration Index Preparation:
  Ensure that a configuration index is created for the certifiable configuration
- Software Environment Configuration Index Preparation:
  Ensure that an SECI is created for the certifiable configuration
- Data Configuration:
  Configure the Software life-cycle data generated during development and qualification
- Tool and Release Archival:
  Perform backup and archival of all Software life-cycle data
- Release Builds:
  Build release configuration for test and final release
- Archiving and safeguarding the production configuration
- Media recreation to ensure ability to reproduce the development and verification environments, as well as the object code

- Independently build released configuration for verification testing and production
- Load the Software configuration into production software

1.6.5 Software Quality Assurance

The Quality Assurance (QA) Engineer will provide independent review of all verification activities and has review responsibility for related objective evidence. Throughout the development life cycle, the QA engineer will conduct and/or participate in all project reviews and audits. Details of the QA activities are identified in the Software Quality Assurance Plan (SQAP).

Software Quality Assurance is responsible for the following verification activities:

- Approve Software life cycle data for transition through the development phases
- Performs and audits verification activities per the SQAP. The audits will include verification test witnessing and spot-checking of the verification environment, in addition to spot-checking the outputs of the verification activities
- Verifies that no conflicts exist between plans and standards
- Maintain checklists for Peer and Transition reviews
- Participate in high-level requirements reviews and Software design reviews
- Participate in code reviews as needed
- Conduct reviews of the outputs of the Integration and Test phase
- Conduct reviews of the test cases, procedures, and results
- Create Software problem reports and validate disposition
- Maintain all trace matrices involving testing
- Functional Analysis – Software Integration Analysis
- Verify Configuration Control

To provide greater robustness of the Software, the following verification activities may be reviewed / witnessed by the QA during verification testing:

- Exercising all state transitions possible during normal operation
- System initialization will be exercised during abnormal conditions
- Determination of possible failure modes of the incoming data
- Execution of out-of-range loop counters
- Verification of power interrupts condition handling
- Exercising built-in test features with emphasis in the area of memory loss/recovery

1.6.5.1 QA and Organizational Independence

The Org Chart of Figure 1-1 shows that the Quality Assurance Organization is independent from Engineering. QA is in fact being performed by a separate company. It also demonstrates that the verification and test activities are performed independently by someone other than the software development engineer.

1.6.6 FAA Software Designated Engineering Representative (Certification

Authority)

A Software Designated Engineering Representative (DER) will be employed to perform reviews and audits in order to find compliance with applicable 14 CFR's (where the FAA has delegated authority). The Software DER's role on this project is summarized below:

- Ensure there is tangible evidence to show that the objectives of DO-178C, other applicable guidance, issue papers, and so forth are satisfied
- Approve or recommend approval of software plans, data, and compliance findings by issuing 8110-3 forms against regulations
- Ensure that the project plans are followed
- Ensure that the processes established are yielding the results desired – i.e., making sure the development, verification, or integral processes are allowing the teams to satisfy the DO-178C objectives
- Work closely with QA to ensure that processes and plans are being followed
- Follow FAA Orders and other applicable FAA policy documents related to the designee system
- Ensure that all open problem reports have been evaluated to not negatively impact safety prior to certification
- Perform routine reviews on projects that he/she will be approving
- Document the review results in writing
- Use the FAA Software Review Job Aid to assist in conducting reviews
- Inform the FAA when reviews are planned and encourage FAA involvement
- Ensure that the project team addresses review findings/observations
- Ensure that the ongoing verification process with project-level peers is being carried out properly
- Prepare the development team for reviews by other designees or the FAA

1.6.7 Signature Authority Explained

"Signature Authority", as used herein, is a project-level approval authority that is composed of the following members at minimum:

- Project Manager
- Software Lead
- Independent Verification Engineer
- Software QA Engineer

Other team members may be required to sign specific documents in addition to this core group, depending on the content of the document. For example, a Configuration Management Specialist is required to sign the Software Configuration Management Plan to acknowledge acceptance of the CM processes defined therein.

1.7 Acronyms and Abbreviations

The following acronyms are used within this DO-178C documentation set.

Add any of your own Acronyms that are pertinent. Its useful to make a note to come back to this section when all the plans and standards are nearing completion to ensure this list is complete.