

Engineering Procedure	Title: FSEU SOFTWARE CHANGE CONTROL AND ADMINISTRATION			Document Number: ENG-P-0025	
Unit Issuing: Engineering	Approved by: Engineering Manager	Initial Issue: 29 Oct 2010	Page 1 of 10	Revision: 4 Effective Date: 02/14/24	

PURPOSE

The purpose of this document is to define the requirements and guidelines for modifying and/or commissioning Base Operations and Spaceport Services (BOSS) maintained Industrial Controls Systems (ICS) software source code.

SCOPE AND APPLICABILITY

This document applies to all personnel involved with the modification and/or commissioning of ICS user-configurable source code that control BOSS maintained systems including but not limited to:

- Bridges
- Elevators
- Heating, Ventilating and Air Conditioning (HVAC)
- Ignition Overpressure and Sound Suppression (IOPSS)
- Kennedy Complex Control System (KCCS)
- Low Voltage
- Medium/High Voltage
- Electronic Security Systems (ESS)
- Tornado Area Warning System (TAWS)
- Traffic Signals
- Water/Waste Water

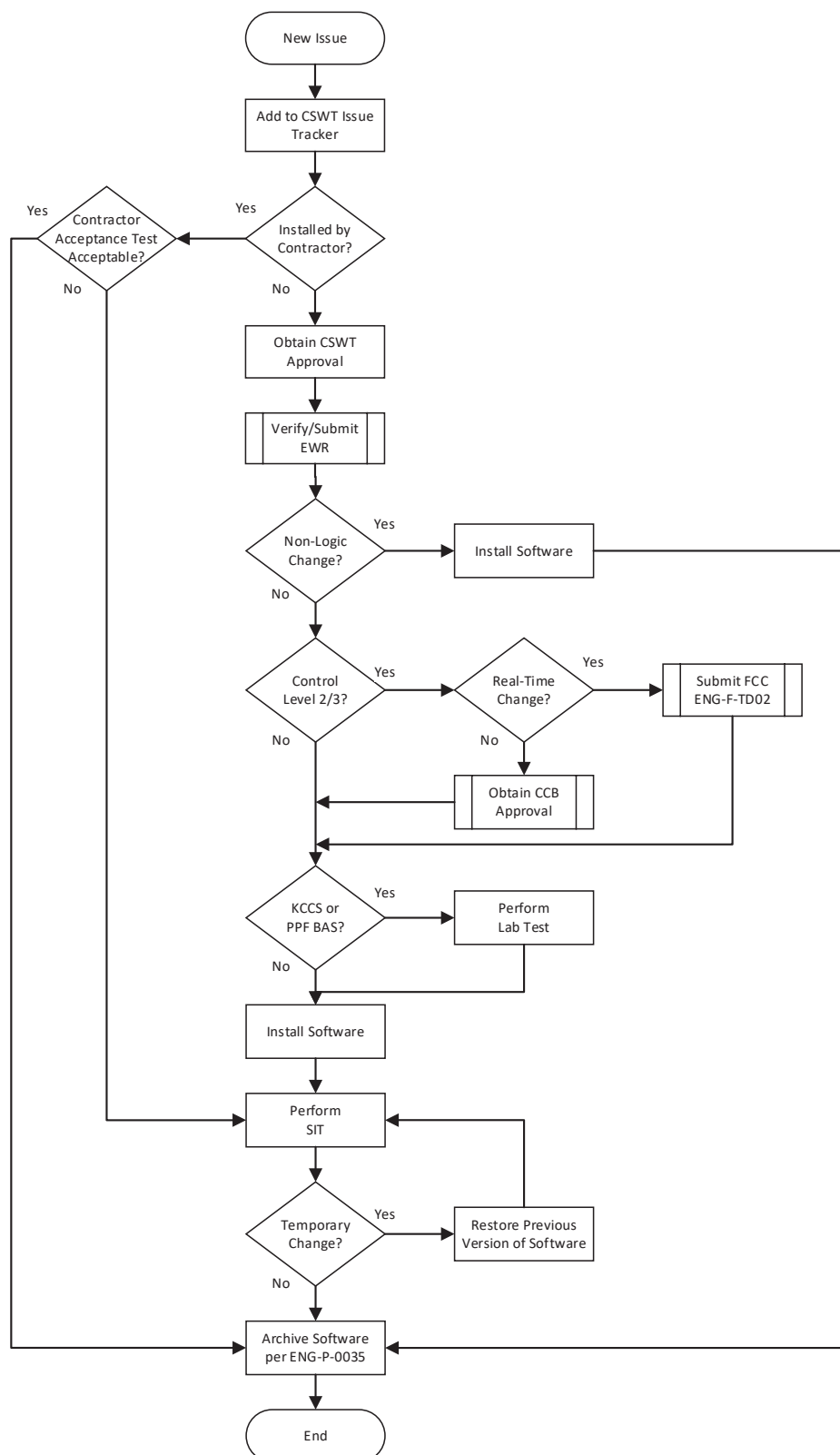
Fire Alarm software modifications and/or commissioning shall be performed in accordance with [PPS-I-0030](#), *Simplex CFMS Change and Software Modification Process*.

PROCESS

The Control Systems Working Team (CSWT), with oversight from the Controls System Health And Readiness Program (SHARP) team, shall be responsible for the implementation of requirements of this document for the assigned ICS.

The Application Administrator for the controller defined in the Control System Inventory Report on the [CSWT SharePoint](#) site is typically assigned the tasks defined in this procedure. However, all tasks, including development of the software, may be assigned to any individual at the discretion of the CSWT.

An overview of the process is shown in [Figure 1 - ICS Software Change Process](#).

FIGURE 1 - ICS SOFTWARE CHANGE PROCESS

1. TRACKING REQUIREMENTS

1.1. Change Tracking

- 1.1.1. All software changes to ICS shall be tracked on the [CSWT Issue Tracker](#) list on the [CSWT SharePoint site](#).
- 1.1.1.1. Changes that are awaiting funding shall be tracked by the Controls SHARP team.
- 1.1.1.2. All other changes shall be tracked by the responsible CSWT.
- 1.1.2. Tasks related to a software change should be tracked on the [CSWT Tasks](#) list on the [CSWT SharePoint site](#).
- 1.1.2.1. Tasks should be linked to the related item in the CSWT Issue Tracker.

1.2. Approvals

- 1.2.1. All software changes to ICS shall obtain approvals in accordance with the Control Levels defined in [ENG-P-0002](#), *Configuration Management of Facilities/Systems/Equipment/Utilities (FSEU)* as well as the following:
 - 1.2.1.1. All software changes shall be approved by the responsible CSWT.
 - 1.2.1.1.1. The approval may be obtained at a CSWT meeting or via email or telephone.
 - 1.2.1.1.2. The approval shall be indicated on the CSWT Issue in the [CSWT Issue Tracker](#) list.
 - 1.2.1.2. Exceptions defined in the associated Configuration Identification Document (CID) shall be approved in accordance with the Control Level specified.

2. TESTING REQUIREMENTS

2.1. General Testing Requirements

- 2.1.1. All software changes to ICS shall be tested for proper operation prior to completion of the project that directed the change.
- 2.1.2. All software changes to existing KCCS and/or Payload Processing Facilities (PPF) Building Automation System (BAS) ICS shall be tested in the Controls Lab.
 - 2.1.2.1. If the capability to perform testing in the Controls Lab is not available, then the following shall be performed:
 - Verify/Submit an Electronic Work Request (EWR) to provide that capability.
 - Track the EWR as a new issue on the [CSWT Issue Tracker](#) list on the [CSWT SharePoint site](#).
 - Enter the following in the Maximo Work Log on the work order that directed the change: "Laboratory Test not performed. EWR##### submitted to add that capability."

- 2.1.3. For new KCCS and/or PPF BAS ICS installations performed by a contractor, the Contractor Acceptance Test shall be considered the System Integration Test (SIT) in accordance with this document only if all of the following conditions are met:
- The software loaded on the controller is final and will remain unchanged once the system is placed in service.
 - The software loaded on the ICS is provided to BOSS to be archived in accordance with [ENG-P-0035](#), *BOSS Industrial Control Systems Backup Procedure*.
 - The associated console production software has been updated and requires no further changes.
 - The Contractor Acceptance Test was performed with the support of the associated console operator.
- 2.1.3.1. If any of the above conditions are not met, then the KCCS and/or PPF BAS ICS installation Contractor Acceptance Test shall be considered the Laboratory Test in accordance with this document.
- 2.1.3.2. For all other ICS installations, the Contractor Acceptance Test may be considered the SIT at the discretion of the CSWT.
- 2.1.4. A scanned copy of all completed Laboratory and System Integration Tests shall be attached to the Maximo Work Order that directed the software change.

2.2. Laboratory Test Requirements

- 2.2.1. The Laboratory Test shall be written in accordance with [ENG-I-0033](#), *Acceptance, Commissioning and Test Plan Instruction*.
- 2.2.1.1. The Application Administrator for the controller defined in the Control System Inventory Report on the [CSWT SharePoint](#) site shall be involved with the preparation and performance of the Laboratory Test.
- 2.2.1.2. The Lead and Author of the Laboratory Test is typically the Application Administrator. However, if the software was not developed by the Application Administrator, the developer of the software may serve as Lead and/or Author of the Laboratory Test.
- 2.2.2. The Laboratory Test shall be performed on identical equipment to that on which the software will be installed.
- 2.2.2.1. If identical equipment is not available, then the Laboratory Test may be performed using approved simulation equipment and software.

2.2.3. It is acceptable to simulate data in the software as part of the Laboratory Test.

2.2.3.1. A task shall be included at the end of the Laboratory Test to remove all forced/simulated data points.

2.3. System Integration Test (SIT) Requirements

2.3.1. The SIT shall be written in accordance with [ENG-I-0033](#).

2.3.1.1. The Application Administrator for the controller defined in the Control System Inventory Report on the [CSWT SharePoint](#) site shall be involved with the preparation and performance of the SIT.

2.3.1.2. The Lead and Author of the SIT is typically the Application Administrator. However, if the software was not developed by the Application Administrator, the developer of the software may serve as Lead and/or Author of the SIT.

2.3.2. The SIT shall contain tasks that perform the following:

- Schedule, open and close an outage when required (see section [2.3.3](#)).
- Retrieve the existing software version from the controller.
- Load the new software to the controller.
- Test all new functions of the software.
- Restore the existing software version if the test is not completed satisfactorily or if implementing a temporary change.

2.3.3. An outage shall be submitted and approved in accordance with [MSO-P-0002](#), *Outage Procedure*, for the following:

- Changes to ICS that are identified as Operationally Essential in the Operations, Maintenance, Engineering, and User Matrix (OMEU).
- Changes to ICS that provide remote monitoring and/or control capability (e.g. KCCS).

2.3.3.1. An outage may be submitted for any other software change at the discretion of the responsible CSWT.

2.3.4. Resolution of Problems Found During Testing

2.3.4.1. If any problem with the software that was modified is found during the SIT and can be easily changed on-site, then that change shall be made and the failed test steps re-performed.

2.3.4.2. All additional software changes to address new issues found during testing shall be approved in accordance with section [1.2](#) of this document.

2.3.5. Recovery from Failed Test

2.3.5.1. If the SIT cannot be satisfactorily completed due to further software changes required, then the following shall be performed prior to re-performing the SIT:

- Restore the previous version of software.
- Make the necessary changes to the software.

- Satisfactorily perform a new Laboratory Test.
- If necessary, revise the SIT.

3. POST-MODIFICATION REQUIREMENTS

3.1. Archive Software

- 3.1.1. All software shall be archived in the Industrial Control System Backup Repository (ICSBR) in accordance with [ENG-P-0035](#).

3.2. Training

- 3.2.1. Any software change that affects the operation of a system and/or an HMI screen shall have training provided to operators of that system.
- 3.2.1.1. Training may take any form from that of a simple communication to the operators (e.g. an email summarizing the changes) to a full classroom or onsite training session.
- 3.2.1.1.1. The form of the training required for any change shall be at the discretion of the responsible CSWT.

3.3. Console Certification Questions

- 3.3.1. All software changes that affect the operation of a system monitored by KCCS in the Complex Control Center (CCC) shall have the certification questions for the affected console reviewed, and updated as required, by the Application Administrator.

4. SPECIAL CHANGE REQUIREMENTS

4.1. Real-Time Software Changes

A Real-Time Software Change is any newly identified change that is required within a short timeframe to correct an anomaly.

- 4.1.1. Real-time software changes shall only be performed when there is a mission impact and/or immediate safety concerns.
- 4.1.2. The anomaly that requires the real-time software change shall be documented as a Technical Anomaly Level (TAL) 2/3 in accordance with [ENG-P-0027](#), *Technical Anomaly Event Disposition Process*.
- 4.1.3. Real-time software changes shall be processed as a Field Change in accordance with [ENG-P-0002](#).
- 4.1.3.1. Control Level 1 changes require only CSWT approval (see section [1.2.1.1](#)).
- 4.1.3.2. A Field Change Notice using form [ENG-F-TD02](#), *Field Configuration Change Request Form*, shall be completed with designated approvals prior to implementing any Control Level 2 or 3 changes.
- 4.1.4. Real-time software changes shall be tracked and processed by the CSWT the same as any other change.

4.2. Temporary Changes

Temporary software changes may be necessary to aid troubleshooting an anomaly with the associated system or as a temporary corrective action until the anomaly can be permanently repaired.

- 4.2.1. Temporary software changes shall be approved and implemented in accordance with [ENG-P-0039](#), *Material Review (MR) and Material Review Board (MRB)*.
- 4.2.2. Temporary software changes shall be installed for no more than thirty (30) days.
 - 4.2.2.1. If a temporary change is required to be installed for more than thirty (30) days, it shall be considered a permanent change and the version of the software shall be archived in accordance with [ENG-P-0035](#).
- 4.2.3. Temporary mission-specific software changes shall be processed as a standard software change in accordance with this document.
- 4.2.4. Temporary software changes shall be tracked and processed by the CSWT the same as any other change with the following exception:
 - 4.2.4.1. The version of the software with the temporary change is not required to be archived in the ICSBR.

4.3. Non-Logic Changes

- 4.3.1. Human Machine Interface (HMI) Screen Change
 - 4.3.1.1. Changes to a static feature of an HMI screen do not require formal laboratory test or SIT.
 - 4.3.1.1.1. These screen changes shall be tracked as Control Level 1 in accordance with this document.
 - 4.3.1.2. Changes to a dynamic/active feature of an HMI screen shall be tracked and tested in accordance with this document.
- 4.3.2. Operator Setpoints
 - 4.3.2.1. Setpoints that are allowed to be changed via HMI may be modified at any time with no requirement for testing or change tracking unless required by a separate document.
 - 4.3.2.1.1. If a separate document requires change management of HMI configurable setpoints, then the requirements of this document shall apply.
 - 4.3.2.2. Setpoints that can only be changed by modifying the source code shall be tracked and tested in accordance with the requirements of this document the same as any other software change.
 - 4.3.2.3. Changes to HVAC conditioned space setpoints shall be approved in accordance with [ENG-P-0040](#), *BOSS Temperature & Energy Management Program (TEMP) Program* prior to implementation.

RECORDS

The following records are retained by the organizations listed below:

Record	Responsible Organization	NRRS/Item#	Retention Period
CSWT Issue Tracker	BOSS System Engineering	08/107.0	Destroy/delete between 0 and 30 years after program/project termination. See Note 4
Laboratory Test Procedure	BOSS System Engineering	08/107.0	Destroy/delete between 0 and 30 years after program/project termination. See Note 4
System integration Test (SIT)	BOSS System Engineering	08/107.0	Destroy/delete between 0 and 30 years after program/project termination. See Note 4

ROLES AND RESPONSIBILITIES

BOSS Program Manager: Ensures BOSS compliance to the requirements stated in this procedure. Reviews and approves or disapproves waiver requests written against this standard.

Division Manager: Ensures compliance within the Division to the requirements stated in this procedure.

Department Manager: Ensures compliance at the department level to the requirements stated in this procedure.

Application Administrator: Identifies software changes required for the assigned ICS. Develops or assists development of the software changes and test procedures for the assigned ICS. Participates in the Laboratory and System Integration Tests for the assigned ICS.

Controls SHARP Lead: Tracks all unfunded software changes for all CSWTs. Reassigns software change to the responsible CSWT when the project is funded and ready to be implemented.

CSWT Lead: Tracks all software changes for the assigned CSWT. Assigns the Application Administrator when necessary. Ensures compliance with this document for all software changes that affect ICS assigned to the CSWT.

REFERENCE DOCUMENTS

The following documents are referenced in this procedure:

Document Number	Title
ENG-F-TD02	Field Change Checklist
ENG-P-0002	Configuration Management of Facilities/Systems/Equipment/Utilities (FSEU)
ENG-P-0027	Technical Anomaly Event Disposition Process
ENG-I-0033	Acceptance, Commissioning and Test Plan Instruction
ENG-P-0035	BOSS Industrial Control Systems Backup Procedure
ENG-P-0039	Material Review (MR) and Material Review Board (MRB)
ENG-P-0040	BOSS Temperature & Energy Management Program (TEMP) Program
MSO-P-0002	Outage Procedure
PPS-I-0030	Simplex CFMS Change and Software Modification Process

ACRONYMS

BAS	Building Automation System
BOSS	Base Operations and Spaceport Services
CCC	Complex Control Center
CFMS	Central Fire Monitoring System
CID	Configuration Identification Document
CSWT	Control System Working Team
ESS	Electronic Security Systems
EWR	Electronic Work Request
FSEU	Facilities, Systems, Equipment and Utilities
HMI	Human Machine Interface
HVAC	Heating, Ventilating and Air Conditioning
ICS	Industrial Control System
ICSBR	Industrial Control System Backup Repository
IOPSS	Ignition Overpressure and Sound Suppression
KCCS	Kennedy Complex Control System
MR	Material Review
MRB	Material Review Board
OMEU	Operations, Maintenance, Engineering, and User Matrix
PPF	Payload Processing Facilities
SHARP	System Health And Readiness Program
SIT	System Integration Test
TAL	Technical Anomaly Level
TAWS	Tornado Area Warning System

TEMP Temperature & Energy Management Program

DEFINITIONS

Application Administrator: Individual responsible for the creation, modification and archiving of the source code and/or settings for a particular ICS.

Configuration Identification Document (CID): Document that defines the level of configuration control required to maintain the design intent of the baseline, especially in regard to form, fit, and/or function of the system/equipment.

Industrial Control System (ICS): Microprocessor-based control system with user-configurable source code and/or settings that controls BOSS maintained (i.e. facility) systems.

Source Code: Computer system instructions that control the operation of the ICS, commonly known as software.

REVISION RECORD

The following revisions have been applied to this document:

Revision Number	Change Description	Date
0	Initial Release	10/29/10
1	Complete Revision	11/12/12
2	Complete Revision	11/09/15
3	Updated to BOSS	01/31/20
4	Engineering review. Minor administrative edits	02/14/24

DOCUMENT APPROVALS

2/17/2024

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