System Test Description (STD)

Terma case

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Contents

1 Revision history

Date	Ver. No	Author	Contact	Description
24-Feb-2014	1.0	-	-	Initial version

2 Stakeholders

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3 Scope

3.1 Identification

3.2 System-overview

The goal of the system is to protect the aircraft from enemy incoming missiles by deploying flares and chaffs. It also provides threat information to the information computer, which interacts with the pilot. It is possible for a technician to load the system with chaffs and flares. During the preparation phase before the missions, the system informs the technicians about the current amount of chaffs and flares present on the aircraft.

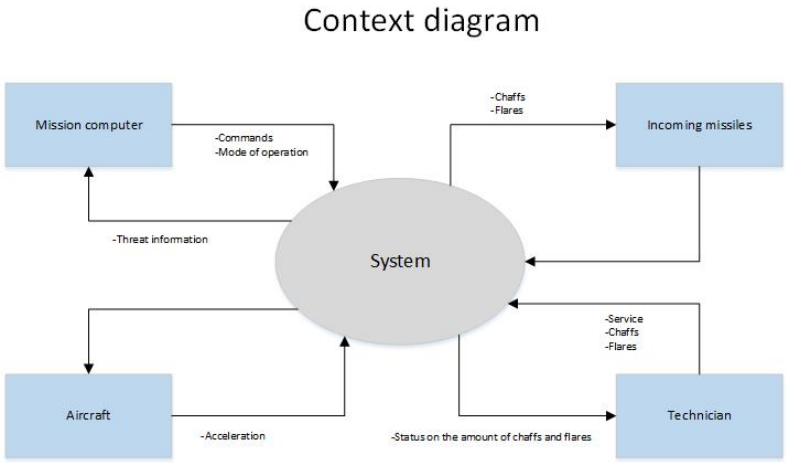

Figure 1: Context diagram

3.3 Document overview

In this document tests are identified as ReqNoXX-T. The XX is a number mapping to the requirement number in the document F-SRS-2014-V1.

4 Referenced documents

5 Test preparations

This section contains the preparations required for all tests.

ReqNo1-T
Requirement: *The system shall comprise at least three modes, manual, semi-automatic and automatic.*
The ability for the pilot to select each mode is tested.

Preparations needed:

- None.

ReqNo2-T
Requirement: *Manual mode shall dispense the program selected by the pilot. The pilot may select payload, and dispense direction as defined by UR-2.*
Manual mode is selected. The operator will then dispense the desired payload in the desired direction. All combinations of payload and direction is tested.

Preparations needed:

- None.

ReqNo3-T

ReqNo4-T

ReqNo5-T
Requirement: *The pod shall include a minimum of eight standard magazines.*
No preparation required.

ReqNo6-T

ReqNo7-T
Requirement: *The cockpit unit shall be able to power ON and OFF the dispensing system and the MWS.*
The MWS and dispenser assembly is turned on and off. In each state the the result is verified.

Preparations needed:

- The system main power source must be turned on.

ReqNo8-T
Requirement: *The system shall be able to dispense a minimum of two payloads within 0.1 sec.*
Using manual mode, the operator tries to dispense two payloads simultaneously. It is measured whether the payloads are dispensed within 0.1 sec.

Preparations needed:

- A stop-watch must be provided.

ReqNo9-T

ReqNo11-T

ReqNo12-T

ReqNo13-T

ReqNo14-T
Requirement: *Threat information will be provided by the Electronics Control Unit (ECU).*
It is tested that threat information is supplied by the ECU when a threat is simulated.

Preparations needed:

- A method for simulating threats must be supplied.
- A method for reading the interface I-IF-MWSCTRL defined in section 6 of F-DDD-2014-V1.

ReqNo15-T
Requirement: *The system shall provide the aircraft mission computer with status information and built-in test results.*
Test-software installed on the mission computer requests status information and built-in test results from the system. The test-software verifies that the received data is correct.

Preparations needed:

- Test-software for the mission computer must be developed.

ReqNo16-T

ReqNo17-T

ReqNo18-T

ReqNo20-T

ReqNo21-T
Requirement: *Introduction of the system may not compromise the operation of the current weapon systems.*
Current weapon systems are tested with the self-protection suite installed.

Preparations needed:

- All current weapon systems must be available for testing.

ReqNo22-T
Requirement: *The system shall include a hardware implemented safety interlock to prevent dispensing on ground.*
It is assured that the aircraft is touching the ground. Then it is tried to dispense payloads. It is observed whether the system dispenses the payload or not.

Preparations needed:

- None.

ReqNo23-T

ReqNo24-T

ReqNo25-T

ReqNo26-T

ReqNo27-T
Requirement: *The pod structure must be functional when exposed to steady state acceleration levels of 4g forward, 2.5g backward, 22g upward or 10g downward.*
The pod structure is subjected to steady accelerations, and then inspected for damages that may reduce functionality.

Preparations needed:

- A test setup to create the required steady state accelerations must be provided.

ReqNo28-T
Requirement: *The total weight of pod cannot exceed 270 kg.*
The total weight of pod measured is measured using a weighing scale. It is noted whether the weight is above or below 270 kg.

Preparations needed:

- Weighing scale must be provided.

ReqNo29-T

ReqNo41-T

ReqNo30-T

ReqNo31-T

ReqNo35-T
Requirement: *The physical dimensions of the pod cannot exceed 0.5×0.5×5 meter.*
The dimensions of the pod is measured using a measuring tape.

Preparations needed:

- A measuring tape must be provided.

ReqNo36-T
Requirement: *The aircraft has to be loaded with the payloads before take-off.*
The aircraft is loaded with payloads before take-off. In air it is attempted to dispense the payloads. It is checked whether the loaded payloads are dispensed.

Preparations needed:

- None.

ReqNo37-T

ReqNo38-T

ReqNo39-T

ReqNo40-T

6 Test descriptions

This section contains description of the tests.

ReqNo1-T
The ability for the pilot to select each mode is tested. The operator will select each mode(manual, semi-automatic, automatic), using available inputs to the mission computer to confirm that these modes exist.

Inputs:

1. Manual mode.
2. Semi-automatic mode.
3. Automatic mode.

Outputs:

1. Confirmation of manual mode from the system to the mission computer.
2. Confirmation of semi-automatic mode from the system to the mission computer.
3. Confirmation of automatic mode from the system to the mission computer.

Expected result:

- Entering each mode is confirmed by the mission computer.

ReqNo2-T
Manual mode is selected. The operator will then dispense the desired payload in the desired direction. All combinations of payload and direction is tested.

Inputs:

- Manual mode.
- Desired dispensing combination.

Outputs:

- Confirmation of manual mode from the system to the mission computer.
- Chaffs or flares.

Expected result:

- The dispensed payload is either chaff or flare corresponding to the one selected. The payloads are dispensed in every selected direction.

ReqNo3-T

ReqNo4-T

ReqNo5-T
Requirement: *The pod shall include a minimum of eight standard magazines.*
The test official verifies that the pod includes a minimum of eight standard magazines.

ReqNo6-T

ReqNo7-T
Requirement: *The cockpit unit shall be able to power ON and OFF the dispensing system and the MWS.*
The test official turns on the dispenser assembly and the MWS using the mission computer. It is verified that the dispensing assembly and the MWS is on. Similarly turning off the MWS and dispenser assembly is also verified.

Inputs:

1. Switch on
2. Switch off

Outputs:

1. The MWS and dispenser assembly turns on.
2. The MWS and dispenser assembly turns off.

Expected result:

- The MWS and dispenser assembly can be turned on and off.

ReqNo8-T
Using manual mode, the operator tries to dispense two payloads simultaneously. It is measured whether the payloads are dispensed within 0.1 sec.

Inputs:

- Manual mode
- Dispensing command

Outputs:

- Confirmation of manual mode from the system to the mission computer.
- Two payloads.

Expected result:

- The two payloads are dispensed within 0.1 sec.

ReqNo9-T

ReqNo11-T

ReqNo12-T

ReqNo13-T

ReqNo14-T
A threat i simulated. By monitoring the interface I-IF-MWSCTRL(defined in section 6 of F-DDD-2014-V), it is then verified, that threat information is provided.

Inputs:

- A simulated threat.

Outputs:

- Threat information

Expected result:

- The threat information is provided by the ECU.

ReqNo15-T
Test-software installed on the mission computer requests status information and built-in test results from the system. The test-software verifies that the received data is correct.

Inputs:

- Command that requests status information and built-in test results.

Outputs:

- Status information
- Built-in test results

Expected result:

- The status information and built-in test results is provided by the system.

ReqNo16-T

ReqNo17-T

ReqNo18-T

ReqNo20-T

ReqNo21-T
Every current weapon system is tested. The test of each weapon system is carried out as described by the test description of that system.

Inputs:

- Appropriate test input for each weapon system.

Outputs:

- Appropriate output of a successful test for each weapon system.

Expected result:

- All weapons systems operate as before the self-protection suite was installed.

ReqNo22-T
It is assured that the aircraft is touching the ground. Then it is tried to dispense payloads. It is observed whether the system dispenses the payload or not.

Inputs:

- Command that makes the system dispense payloads

Outputs:

- A warning signal from the cockpit unit interface.

Expected result:

- The system will not dispense on ground. Instead a warning signal will be provided from the cockpit unit.

ReqNo23-T

ReqNo24-T

ReqNo25-T

ReqNo26-T

ReqNo27-T
Each acceleration level and direction specified in requirement no. 27 of F-SRS-2014-V1 is applied the pod structure. The pod structure is then inspected for damages that may reduce functionality.

Inputs:

- Acceleration levels and directions specified in requirement no. 27 of F-SRS-2014-V1.

Outputs:

- None.

Expected result:

- The pod has no damages that may reduce functionality.

ReqNo28-T
The total weight of pod measured is measured using a weighing scale. It is noted whether the weight is above or below 270 kg.

Inputs:

- None.

Outputs:

- Weight.

Expected result:

- The weight of the pod is below 270 kg.

ReqNo29-T

ReqNo41-T

ReqNo30-T

ReqNo31-T

ReqNo35-T
The dimensions of the pod is measured using a measuring tape.

Inputs:

- None.

Outputs:

- Dimensions.

Expected result:

- The dimensions of the pod does not exceed 0.5×0.5×5 meter.

ReqNo36-T
The aircraft is loaded with payloads before take-off. In air it is attempted to dispense the payloads. It is checked whether the loaded payloads are dispensed.

Inputs:

- Payloads

Outputs:

- Payloads

Expected result:

- The aircraft is able to dispense the payloads that are loaded on the aircraft.

ReqNo37-T

ReqNo38-T

ReqNo39-T

ReqNo40-T

7 Requirements traceability

	Hierarchy level									
	1		2			3				
Components / Requirement No.	Cockpit unit	Pod	Dispenser	MWS	Magazines	Chaffs	Flares	ECU	Sensors	
1	x									
2	x		x		x	x	x			
3	x		x		x	x	x			
4	x		x		x	x	x			
5		x								
6		x								
7	x		x	x				x		
8			x							
9	x		x		x	x	x			
11	x									
12	x			x				x		
13	x			x				x	x	
14	x									
15	x									
16	x									
17	x									
18	x			x				x		
20	x									
21	x	x								
22	x									
23	x		x							
24	x									
25	x									
26					x					
27		x								
28		x								
29		x								
30	x		x							
31				x				x		
35		x								
36		x			x	x	x			
37	x									
38	x	x	x	x	x	x	x	x	x	
39						x	x			
40						x	x			
41		x								

Figure 2: Traceability Matrix

8 Other