SYSTEM DESCRIPTION DOCUMENT

FOR

Remote Targeting System

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Remote Targeting System

Allocated Functions:

F.0.5 \_Perform Remote Targeting System Functions

Specified (untyped) Requirements:

R.0.3 RTS Requirements

R.0.3.2 Inventory



Figure 1 Remote Targeting System Physical Context



Figure 5 Remote Targeting System Physical Context (Structure BDD)

R.0.1 Air Vehicle Requirements



Figure 9 Air Vehicle Requirements Requirements Diagram



Figure 10 Air Vehicle Requirements Requirements Hierarchy Diagram

Refines Higher-Level Requirement:

R.0 System Requirements Document

Refined By Subordinate Requirements:

R.0.1.1 AV Fcnal Requirements

R.0.1.2 AV Input Requirements

R.0.1.3 AV Output Requirements

R.0.1.4 AV Perf Requirements

Specifies:

Component: C.0.4.1 Air Vehicle

R.0.1.1.1 Autonomous landing

Requirement Statement:

The Air Vehicle shall be capable of autonomously landing within XX meters of commanded location.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.5.1.2.1 A/V Auto Land

R.0.1.1.2 Change of flight modes

Requirement Statement:

Upon initiation by the Ground Station, the Air Vehicle shall change flight mode to the commanded mode.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.3.8 Op Initiate launch

Function: F.0.3.9 Op Initiate RTL

Function: F.0.3.10 Op Initiate Self Destruct

Function: F.0.3.11 Op Initiate Surveillance

Function: F.0.5.1.2.2 A/V Begin Surveillance

Function: F.0.5.1.2.3 A/V Conduct BIT

Function: F.0.5.1.2.4 A/V Enter Search Mode

Function: F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

Function: F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)

Function: F.0.5.1.3.6 A/V Rcv Cmd (RTL)

Function: F.0.5.1.3.7 A/V Rcv Cmd (Launch)

Function: F.0.5.1.3.8 A/V Rcv Cmd (BIT)

Function: F.0.5.2.3.3 GS Send Cmd (BIT)

Function: F.0.5.2.3.4 GS Send Cmd (Launch)

Function: F.0.5.2.3.5 GS Send Cmd (RTL)

Function: F.0.5.2.3.6 GS Send cmd (Self Destruct)

Function: F.0.5.2.3.7 GS Send Cmd (Surveillance)

R.0.1.1.3 Comm with GS

Requirement Statement:

The Air Vehicle shall be capable of accepting communication with the Ground Station.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.5.1.3 Perform A/V data comm

Function: F.0.5.1.3.1 A/V Accept connection to GS

Function: F.0.5.1.3.2 A/V Send telemetry

Function: F.0.5.1.3.3 A/V Send MP Loaded

Function: F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

Function: F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)

Function: F.0.5.1.3.6 A/V Rcv Cmd (RTL)

Function: F.0.5.1.3.7 A/V Rcv Cmd (Launch)

Function: F.0.5.1.3.8 A/V Rcv Cmd (BIT)

Function: F.0.5.1.3.9 A/V Load MP

Function: F.0.5.2.3 Provide Data Comm

Function: F.0.5.2.3.1 GS Connect to A/V

Function: F.0.5.2.3.2 GS Receive Telemetry

Function: F.0.5.2.3.3 GS Send Cmd (BIT)

Function: F.0.5.2.3.4 GS Send Cmd (Launch)

Function: F.0.5.2.3.5 GS Send Cmd (RTL)

Function: F.0.5.2.3.6 GS Send cmd (Self Destruct)

Function: F.0.5.2.3.7 GS Send Cmd (Surveillance)

Function: F.0.5.2.3.8 GS Send MP

R.0.1.1.5 Controlled flight

Requirement Statement:

The Air Vehicle shall be capable shall be capable of autonomously establishing and maintaining controlled flight after launch.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.5.1.1 A/V Perform controlled flight

R.0.1.1.6 Function check

Requirement Statement:

Upon initiation by the Ground Station, the Air Vehicle shall perform autonomous function check of all flight critical systems.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.3.7 Op Initiate fcn chk

Function: F.0.5.1.2.3 A/V Conduct BIT

Function: F.0.5.1.3.8 A/V Rcv Cmd (BIT)

Function: F.0.5.2.3.3 GS Send Cmd (BIT)

R.0.1.1.7 Loiter

Requirement Statement:

The Air Vehicle shall autonomously loiter over a target location upon command to Surveillance mode.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.5.1.2.2 A/V Begin Surveillance

Function: F.0.5.1.2.6 A/V Loiter over target

Function: F.0.5.1.4.1 A/V Send Video

Function: F.0.5.1.4.2 A/V Capture Video

Function: F.0.5.2.4 GS Receive Video

R.0.1.1.9 Search

Requirement Statement:

The Air Vehicle shall be capable of executing search patterns defined in Mission Plan.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.5.1.2.4 A/V Enter Search Mode

Function: F.0.5.1.2.5 A/V Follow Search Pattern

Function: F.0.5.1.4.1 A/V Send Video

Function: F.0.5.1.4.2 A/V Capture Video

Function: F.0.5.2.1.1 GS Display Video

Function: F.0.5.2.4 GS Receive Video

R.0.1.1.10 Waypoint navigation

Requirement Statement:

The Air Vehicle shall be capable of GPS waypoint navigation.

Refines Higher-Level Requirement:

R.0.1.1 AV Fcnal Requirements

Basis Of:

Function: F.0.5.1.2.7 A/V Navigate WP

R.0.1.2.1 Flight mode change

Requirement Statement:

The Air Vehicle shall receive commands to change flight modes.

Refines Higher-Level Requirement:

R.0.1.2 AV Input Requirements

Basis Of:

Function: F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

Function: F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)

Function: F.0.5.1.3.6 A/V Rcv Cmd (RTL)

Function: F.0.5.1.3.7 A/V Rcv Cmd (Launch)

Function: F.0.5.1.3.8 A/V Rcv Cmd (BIT)

R.0.1.3.1 Function check results

Requirement Statement:

The Air Vehicle shall transmit results of function check to the Ground Station.

Refines Higher-Level Requirement:

R.0.1.3 AV Output Requirements

Basis Of:

Function: F.0.5.1.3.2 A/V Send telemetry

Function: F.0.5.2.1.2 GS Display telemetry

Function: F.0.5.2.3.2 GS Receive Telemetry

R.0.1.3.2 MP Success

Requirement Statement:

The Air Vehicle shall send receipt of Mission Plan to the Ground Station.

Refines Higher-Level Requirement:

R.0.1.3 AV Output Requirements

Basis Of:

Function: F.0.5.1.3.3 A/V Send MP Loaded

Function: F.0.5.2.1.4 GS Display MP Status

R.0.1.3.3 Telemetry Send

Requirement Statement:

The Air Vehicle shall be capable of sending telemetry from the Ground Station.

Telemetry files shall include all flight critical parameters, vehicle health information, and flight modes.

Refines Higher-Level Requirement:

R.0.1.3 AV Output Requirements

Basis Of:

Function: F.0.5.1.3.2 A/V Send telemetry

Function: F.0.5.2.1.2 GS Display telemetry

Function: F.0.5.2.2.3 GS Store telemetry

Function: F.0.5.2.3.2 GS Receive Telemetry

R.0.1.3.4 Video transmission

Requirement Statement:

The Air Vehicle shall transmit video to the Ground Station(s) during Search and Surveillance modes.

Refines Higher-Level Requirement:

R.0.1.3 AV Output Requirements

Basis Of:

Function: F.0.5.1.4.1 A/V Send Video

Function: F.0.5.1.4.2 A/V Capture Video

Function: F.0.5.2.1.1 GS Display Video

Function: F.0.5.2.4 GS Receive Video

R.0.2 Ground Station Requirements



Figure 11 Ground Station Requirements Requirements Diagram



Figure 12 Ground Station Requirements Requirements Hierarchy Diagram

Refines Higher-Level Requirement:

R.0 System Requirements Document

Refined By Subordinate Requirements:

R.0.2.1 GS Fcnal Requirements

R.0.2.2 GS Input Requirements

R.0.2.3 GS Output Requirements

R.0.2.4 GS Perf Requirments

Specifies:

Component: C.0.4.2 Ground Station

R.0.2.1.1 Comm with AV

Requirement Statement:

The Ground Station shall be capable of establishing communication with the Air Vehicle.

Refines Higher-Level Requirement:

R.0.2.1 GS Fcnal Requirements

Basis Of:

Function: F.0.3.6 Op Initiate comm with vehicle

Function: F.0.5.1.3.1 A/V Accept connection to GS

Function: F.0.5.2.3.1 GS Connect to A/V

R.0.2.1.3 Telemetry Storage

Requirement Statement:

The Ground Station shall store telemetry from the Air Vehicle at all times once communication has been established.

Refines Higher-Level Requirement:

R.0.2.1 GS Fcnal Requirements

Basis Of:

Function: F.0.5.2.2.3 GS Store telemetry

R.0.2.1.4 TLE Calculation

Requirement Statement:

The Ground Station shall calculate target location coordinates while in Surveillance modes.

Refines Higher-Level Requirement:

R.0.2.1 GS Fcnal Requirements

Basis Of:

Function: F.0.5.2.1.3 GS Display target coordinates

Function: F.0.5.2.2.1 GS Calculate target coordinates

R.0.2.2.1 Flight Mode Change

Requirement Statement:

The Operator shall be able to change flight modes through the Ground Station while the Air Vehicle is in flight and in communication with the Ground Station.

Flight modes shall include Launch (entered pre-launch only), Search, Surveillance, and Return-to-Launch (RTL).

Refines Higher-Level Requirement:

R.0.2.2 GS Input Requirements

Basis Of:

Function: F.0.3.8 Op Initiate launch

Function: F.0.3.9 Op Initiate RTL

Function: F.0.3.11 Op Initiate Surveillance

Function: F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

Function: F.0.5.1.3.6 A/V Rcv Cmd (RTL)

Function: F.0.5.1.3.7 A/V Rcv Cmd (Launch)

Function: F.0.5.2.3.4 GS Send Cmd (Launch)

Function: F.0.5.2.3.5 GS Send Cmd (RTL)

Function: F.0.5.2.3.7 GS Send Cmd (Surveillance)

R.0.2.2.2 MP Success Receipt

Requirement Statement:

The Ground Station shall receive indication of successful Mission Plan from the Air Vehicle.

Refines Higher-Level Requirement:

R.0.2.2 GS Input Requirements

Basis Of:

Function: F.0.5.1.3.3 A/V Send MP Loaded

Function: F.0.5.2.1.4 GS Display MP Status

R.0.2.2.4 Telemetry Receipt

Requirement Statement:

The Ground Station shall be capable of receiving telemetry from the Air Vehicle.

Refines Higher-Level Requirement:

R.0.2.2 GS Input Requirements

Basis Of:

Function: F.0.5.1.3.2 A/V Send telemetry

Function: F.0.5.2.1.2 GS Display telemetry

Function: F.0.5.2.3.2 GS Receive Telemetry

R.0.2.2.5 Video Receipt

Requirement Statement:

The Ground Station shall receive video from the Air Vehicle during Search and Surveillance modes.

Refines Higher-Level Requirement:

R.0.2.2 GS Input Requirements

Basis Of:

Function: F.0.5.1.4.1 A/V Send Video

Function: F.0.5.1.4.2 A/V Capture Video

Function: F.0.5.2.1.1 GS Display Video

Function: F.0.5.2.4 GS Receive Video

R.0.2.3.1 Command Transmission

Requirement Statement:

Upon initiation by the Operator, the Ground Station shall transmit commands to change flight modes to the Air Vehicle.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

Function: F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)

Function: F.0.5.1.3.6 A/V Rcv Cmd (RTL)

Function: F.0.5.1.3.7 A/V Rcv Cmd (Launch)

Function: F.0.5.1.3.8 A/V Rcv Cmd (BIT)

Function: F.0.5.2.3.3 GS Send Cmd (BIT)

Function: F.0.5.2.3.4 GS Send Cmd (Launch)

Function: F.0.5.2.3.5 GS Send Cmd (RTL)

Function: F.0.5.2.3.6 GS Send cmd (Self Destruct)

Function: F.0.5.2.3.7 GS Send Cmd (Surveillance)

R.0.2.3.2 Fcn Check Display

Requirement Statement:

The Ground Station shall display results of function check to the Operator.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.5.2.1.2 GS Display telemetry

Function: F.0.5.2.3.2 GS Receive Telemetry

R.0.2.3.3 Fcn Check Initiation

Requirement Statement:

Upon initiation by the Operator, the Ground Station shall initiate function checks with the Air Vehicle.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.3.7 Op Initiate fcn chk

Function: F.0.5.1.2.3 A/V Conduct BIT

Function: F.0.5.1.3.8 A/V Rcv Cmd (BIT)

Function: F.0.5.2.3.3 GS Send Cmd (BIT)

R.0.2.3.4 Flight Status

Requirement Statement:

The Ground Station shall be capable of displaying flight status to the Operator.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.5.1.3.2 A/V Send telemetry

Function: F.0.5.2.1.2 GS Display telemetry

Function: F.0.5.2.3.2 GS Receive Telemetry

R.0.2.3.6 Video Display

Requirement Statement:

The Ground Station shall display received video to the Operator.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.5.2.1.1 GS Display Video

Function: F.0.5.2.4 GS Receive Video

R.0.2.3.7 Telemetry Display

Requirement Statement:

The Ground Station shall be capable of displaying recorded telemetry files from the Air Vehicle.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.5.2.1.2 GS Display telemetry

Function: F.0.5.2.3.2 GS Receive Telemetry

R.0.2.3.8 MP Success Display

Requirement Statement:

The Ground Station shall display indication of successful Mission Plan to the Operator.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.5.1.3.3 A/V Send MP Loaded

Function: F.0.5.2.1.4 GS Display MP Status

Function: F.0.5.2.3.2 GS Receive Telemetry

R.0.2.3.9 TLE Display

Requirement Statement:

During Surveillance mode, the Ground Station shall display target location.

Refines Higher-Level Requirement:

R.0.2.3 GS Output Requirements

Basis Of:

Function: F.0.5.2.1.3 GS Display target coordinates

Function: F.0.5.2.2.1 GS Calculate target coordinates

R.0.2.4.2 GS TLE Accuracy

Requirement Statement:

The calculated target coordinates will be accurate to within XX meters (CEP).

Refines Higher-Level Requirement:

R.0.2.4 GS Perf Requirments

Basis Of:

Function: F.0.5.2.2.1 GS Calculate target coordinates

R.0.3 RTS Requirements



Figure 13 RTS Requirements Requirements Diagram



Figure 14 RTS Requirements Requirements Hierarchy Diagram

Refines Higher-Level Requirement:

R.0 System Requirements Document

Refined By Subordinate Requirements:

R.0.3.1 Command Destruct

R.0.3.2 Inventory

R.0.3.3 MP Plan/Re-plan

R.0.3.4 RTL

Specifies:

Component: C.0.4 Remote Targeting System

R.0.3.2 Inventory

Requirement Statement:

The RTS shall include all necessary ground and flight equipment to successfully execute all required functions.

Refines Higher-Level Requirement:

R.0.3 RTS Requirements

Specifies:

Component: C.0.4 Remote Targeting System

R.0.3.4 RTL

Requirement Statement:

The System shall be capable of executing a Return-to-Launch (RTL) during any portion of mission flight. RTL is interpreted as an egress to a home/rally point followed by autonomous landing.

Refines Higher-Level Requirement:

R.0.3 RTS Requirements

Basis Of:

Function: F.0.5.1.3.6 A/V Rcv Cmd (RTL)

Function: F.0.5.2.3.5 GS Send Cmd (RTL)

Part I - Hierarchical Use Case List

Provide Remote Targeting

Egress and Recovery

Self Destruct <<include>>

Launch and Ingress

Plan Mission <<include>> Use Case

Self Destruct <<include>>

Perform Search

Plan Mission <<include>> Use Case

Self Destruct <<include>>

Perform Setup

Plan Mission <<include>> Use Case

Perform Surveillance

Plan Mission <<include>> Use Case

Self Destruct <<include>>

Part II - Use Case Model

Provide Remote Targeting



Figure 20 Provide Remote Targeting (Use Case Diagram)

Egress and Recovery

Description:

This Use Case covers the RTL actions required to return the vehicle to home location with recovery

Preconditions: Air Vehicle has entered RTL mode

Primary Flow: 1. Air Vehicle maneuvers toward home/recovery point

2. Air Vehicle arrives at home/recovery point

3. Air Vehicle executes auto-land maneuver

4. Operator recovers vehicle

5 end Use Case

Alternate Flow: At any time:

a. If bad vehicle health, Operator enters RTL command on Ground Station

b. Ground Station sends RTL command to Air Vehicle

c. Air Vehicle enters RTL mode

d. end Use Case

At any time:

a. Opertor initiates Plan Mission Use Case

b. Vehicle ingresses to new Search Insertion point

At any time:

a. If vehicle compromise is evident, execute Self Destruct Use Case

Postconditions: Vehicle is safely recovered by Operator

Involves:

C.0.1 GPS

C.0.3 Ground Operator



Launch and Ingress

Description:

This Use Case encompasses launch of the RTS air vehicle and ingress to the search area.

Preconditions: Successful completion of Perform Setup Use Case

GPS Lock

Primary Flow: 1. Operator initiates Launch mode through Ground Station

2. Ground Station changes Air Vehicle mode to Launch

3. Air Vehicle enters Launch mode

4. Air Vehicle transmits telemetry to Ground Sation(s)

5. Ground Station(s) receives and displays flight data

6. Ground Station(s) stores telemetry data

7. Operator launches Air Vehicle

8. Air Vehicle establishes controlled flight

9. Air Vehicle maneuvers toward search area

10. Operator observes flight data on Ground Station

10a. If bad vehicle health, Operator enters RTL command on Ground Station

10b. Ground Station sends RTL command to Air Vehicle

10c. Air Vehicle enters RTL mode

11. Once Air Vehicle arrives at Search Insertion point, it enters Search mode

end Use Case

Alternate Flow: At any time:

a. If bad vehicle health, Operator enters RTL command on Ground Station

b. Ground Station sends RTL command to Air Vehicle

c. Air Vehicle enters RTL mode

d. end Use Case

At any time:

a. Opertor initiates <<include>> Plan Mission Use Case

b. Vehicle ingresses to new Search Insertion point

At any time:

a. If vehicle compromise is evident, execute <<include>> Self Destruct Use Case

Postconditions: Air Vehicle arrives at Search Insertion point and enters Search mode

Involves:

C.0.1 GPS

C.0.3 Ground Operator



Perform Search

Description:

This Use Case covers execution of search pattern s

Preconditions: Air Vehicle arrives at insertion point and has transitioned to Search mode; Mission Plan is loaded

Primary Flow: 1. Air Vehicle transmits telemetry to Ground Sation(s)

2. Ground Station(s) receives and displays flight data

3. Ground Station(s) stores telemetry data

4. Air Vehicle follows search pattern according to Mission Plan

5. Air Vehicle initiates video transmission to Ground Station and Off-Board C2

6. Ground Station(s) receives and displays video transmission

7. Operator and Off-Board C2 monitor video and flight data

8. Target appears in Field-of-View of Air Vehicle sensor

9. Operator or Off-Board C2 identifies target

10. Operator or Off-Board C2 commands change to Surveillance mode

11. Ground Station sends Surveillance mode change

12. Air Vehicle enters Surveillance mode

13. end Use Case

Alternate Flow: At any time:

a. If bad vehicle health, Operator enters RTL command on Ground Station

b. Ground Station sends RTL command to Air Vehicle

c. Air Vehicle enters RTL mode

At any time:

a. Opertor initiates <<include>> Plan Mission Use Case

b. Vehicle ingresses to new Search Insertion point

At any time:

a. If vehicle compromise is evident, execute <<include>> Self Destruct Use Case

Postconditions: Target is identified through video feed, and Air Vehicle transitions to Surveillance mode

Involves:

C.0.1 GPS

C.0.2 Off Board C2 Operator

C.0.5 Target



Perform Setup

Description:

This Use Case covers the setup and mission planning for use of the Remote Targeting System

Preconditions: Tasking received

Search area defined

Desired target(s) specified

Primary Flow: 1. Operator unpacks equipment

2. Operator inventories equipment

2a. If necessary equipment missing - end Use Case

3. Operator assembles equipment

4. Operator initiates connection between Ground Station and Air Vehicle

5. Ground Station sends connect signal to Air Vehicle

6. Air Vehicle makes connection to Ground Station

6a. If connection fails, go to step 4. If fail 3x, end Use Case

7. Air Vehicle begins transmission of telemetry

8. Ground Station displays flight data

9. Ground Station stores telemetry data

10. Operator initiates function checks through Ground Station

11. Ground Station initates function checks on Air Vehicle

12. Air Vehicle performs function checks and send results to Ground Station

13. Ground Station displays results of function checks

14. Operator confirms successful function checks.

14a. If function check unsuccessful go to step 10. If fail 3x, end Use Case.

15. <<Include>> Perform Mission Plan

15a. If Mission Plan unsuccessful, repeat step 15. If fail 3x, end Use Case

end Use Case

Postconditions: System properly configured; mission planning complete; system ready for launch.

Involves:

C.0.3 Ground Operator



Perform Surveillance

Description:

This Use Case covers surveillance activities

Preconditions: Target has been identified and Air Vehicle has entered Surveillance mode

Primary Flow: 1. Air Vehicle transmits telemetry to Ground Sation(s)

2. Ground Station(s) receives and displays flight data

3. Ground Station(s) stores telemetry data

4. Air Vehicle loiters over target

5. Air Vehicle continues video transmission to Ground Station and Off-Board C2

6. Ground Station(s) receives and displays video transmission

7. Operator and Off-Board C2 monitor video and flight data

8. Ground station(s) calculate target coordinates based on video and telemetry

9. Ground station(s) displays target coordinates

10. Operator initiates RTL

11. Ground Station sends RTL command to Air Vehicle

12. Air Vehicle enters RTL mode

Alternate Flow: At any time:

a. If bad vehicle health, Operator enters RTL command on Ground Station

b. Ground Station sends RTL command to Air Vehicle

c. Air Vehicle enters RTL mode

At any time:

a. Opertor initiates <<include>> Plan Mission Use Case

b. Vehicle ingresses to new Search Insertion point

At any time:

a. If vehicle compromise is evident, execute <<include>> Self Destruct Use Case

Postconditions: Air Vehicle is loitering over the target for > 10 minutes and target coordinates are calculated and displayed on Ground Station(s); Air Vehicle enters RTL mode

Involves:

C.0.1 GPS

C.0.2 Off Board C2 Operator

C.0.5 Target



Plan Mission <<include>> Use Case

Description:

This Use Case covers actions associated with planning or replanning a mission. It can be completed either pre-, or post-launch.

Preconditions: Air Vehicle has passed function checks and has established comm with Ground Station(s)

Primary Flow: 1. Operators enters Mission Plan information into Ground Station

2. Ground Station converts Mission Plan to machine language form

3. Operator initiates Write Mission Plan function on Ground Station

3. Ground Station send machine language Mission Plan to Air Vehicle

4. Air Vehicle puts Mission Plan into active memory

5. Air Vehicle sends indication of successful Mission Plan

6. Ground Station displays indication of successful Mission Plan

7. end Use Case

Postconditions: Successful receipt of Mission Plan by Air Vehicle



Self Destruct <<include>>

Description:

This Use Case covers the activities required to perform comman ded self destruct

Preconditions: Vehicle is in flight, away from Operator

Primary Flow: 1. Operator initiates Self Destruct mode on Ground Station

2. Ground Station sends Self Destruct mode change to Air Vehicle

3. Air Vehicle initiates Self Destruct mode

4. Air Vehicle processor sends destruct command to ordnance package

5. Ordnance package detonates

6. Air Vehicle is destroyed

Postconditions: Air Vehicle is successfully destroyed



Part I - Hierarchical Function List

F.0.5 \_Perform Remote Targeting System Functions

F.0.5.1 \_Perform Air Vehicle Functions

F.0.5.1.1 A/V Perform controlled flight

F.0.5.1.2 Perform A/P functions

F.0.5.1.2.1 A/V Auto Land

F.0.5.1.2.2 A/V Begin Surveillance

F.0.5.1.2.3 A/V Conduct BIT

F.0.5.1.2.4 A/V Enter Search Mode

F.0.5.1.2.5 A/V Follow Search Pattern

F.0.5.1.2.6 A/V Loiter over target

F.0.5.1.2.7 A/V Navigate WP

F.0.5.1.2.8 A/V Trigger ordnance

F.0.5.1.3 Perform A/V data comm

F.0.5.1.3.1 A/V Accept connection to GS

F.0.5.1.3.2 A/V Send telemetry

F.0.5.1.3.3 A/V Send MP Loaded

F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)

F.0.5.1.3.6 A/V Rcv Cmd (RTL)

F.0.5.1.3.7 A/V Rcv Cmd (Launch)

F.0.5.1.3.8 A/V Rcv Cmd (BIT)

F.0.5.1.3.9 A/V Load MP

F.0.5.1.4 Provide Video

F.0.5.1.4.1 A/V Send Video

F.0.5.1.4.2 A/V Capture Video

F.0.5.1.5 A/V Detonate

F.0.5.2 \_Perform Ground Station Functions

F.0.5.2.1 Provide I/O

F.0.5.2.1.1 GS Display Video

F.0.5.2.1.2 GS Display telemetry

F.0.5.2.1.3 GS Display target coordinates

F.0.5.2.1.4 GS Display MP Status

F.0.5.2.2 Process

F.0.5.2.2.1 GS Calculate target coordinates

F.0.5.2.2.2 GS Construct MP

F.0.5.2.2.3 GS Store telemetry

F.0.5.2.3 Provide Data Comm

F.0.5.2.3.1 GS Connect to A/V

F.0.5.2.3.2 GS Receive Telemetry

F.0.5.2.3.3 GS Send Cmd (BIT)

F.0.5.2.3.4 GS Send Cmd (Launch)

F.0.5.2.3.5 GS Send Cmd (RTL)

F.0.5.2.3.6 GS Send cmd (Self Destruct)

F.0.5.2.3.7 GS Send Cmd (Surveillance)

F.0.5.2.3.8 GS Send MP

F.0.5.2.4 GS Receive Video

Part II - Behavior Model

F.0.5 \_Perform Remote Targeting System Functions

Allocated To:

C.0.4 Remote Targeting System

F.0.5.1 \_Perform Air Vehicle Functions

Allocated To:

C.0.4.1 Air Vehicle

F.0.5.1.1 A/V Perform controlled flight

Allocated To:

C.0.4.1.2 Aircraft

Based On:

R.0.1.1.5 Controlled flight

| Table 1 F.0.5.1.1 A/V Perform controlled flight Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| GPS Signal | Input To:  F.0.5.1.1 A/V Perform controlled flight  F.0.5.1.2.1 A/V Auto Land  F.0.5.1.2.3 A/V Conduct BIT  F.0.5.1.2.5 A/V Follow Search Pattern  F.0.5.1.2.6 A/V Loiter over target  F.0.5.1.2.7 A/V Navigate WP  Output From:  F.0.1.1 Provide GPS Signals |

F.0.5.1.2 Perform A/P functions

Allocated To:

C.0.4.1.3 Autopilot

F.0.5.1.2.1 A/V Auto Land

Allocated To:

C.0.4.1.3 Autopilot

Based On:

R.0.1.1.1 Autonomous landing

| Table 2 F.0.5.1.2.1 A/V Auto Land Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| GPS Signal | Input To:  F.0.5.1.1 A/V Perform controlled flight  F.0.5.1.2.1 A/V Auto Land  F.0.5.1.2.3 A/V Conduct BIT  F.0.5.1.2.5 A/V Follow Search Pattern  F.0.5.1.2.6 A/V Loiter over target  F.0.5.1.2.7 A/V Navigate WP  Output From:  F.0.1.1 Provide GPS Signals |

F.0.5.1.2.2 A/V Begin Surveillance

Allocated To:

C.0.4.1.3 Autopilot

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.7 Loiter

F.0.5.1.2.3 A/V Conduct BIT

Allocated To:

C.0.4.1.3 Autopilot

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.6 Function check

R.0.2.3.3 Fcn Check Initiation

| Table 3 F.0.5.1.2.3 A/V Conduct BIT Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| BIT Status | Input To:  F.0.3.2 Op Confirm fcn chk  Output From:  F.0.5.1.2.3 A/V Conduct BIT |
| GPS Signal | Input To:  F.0.5.1.1 A/V Perform controlled flight  F.0.5.1.2.1 A/V Auto Land  F.0.5.1.2.3 A/V Conduct BIT  F.0.5.1.2.5 A/V Follow Search Pattern  F.0.5.1.2.6 A/V Loiter over target  F.0.5.1.2.7 A/V Navigate WP  Output From:  F.0.1.1 Provide GPS Signals |

F.0.5.1.2.4 A/V Enter Search Mode

Allocated To:

C.0.4.1.3 Autopilot

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.9 Search

F.0.5.1.2.5 A/V Follow Search Pattern

Allocated To:

C.0.4.1.3 Autopilot

Based On:

R.0.1.1.9 Search

| Table 4 F.0.5.1.2.5 A/V Follow Search Pattern Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| GPS Signal | Input To:  F.0.5.1.1 A/V Perform controlled flight  F.0.5.1.2.1 A/V Auto Land  F.0.5.1.2.3 A/V Conduct BIT  F.0.5.1.2.5 A/V Follow Search Pattern  F.0.5.1.2.6 A/V Loiter over target  F.0.5.1.2.7 A/V Navigate WP  Output From:  F.0.1.1 Provide GPS Signals |

F.0.5.1.2.6 A/V Loiter over target

Allocated To:

C.0.4.1.3 Autopilot

Based On:

R.0.1.1.7 Loiter

| Table 5 F.0.5.1.2.6 A/V Loiter over target Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| GPS Signal | Input To:  F.0.5.1.1 A/V Perform controlled flight  F.0.5.1.2.1 A/V Auto Land  F.0.5.1.2.3 A/V Conduct BIT  F.0.5.1.2.5 A/V Follow Search Pattern  F.0.5.1.2.6 A/V Loiter over target  F.0.5.1.2.7 A/V Navigate WP  Output From:  F.0.1.1 Provide GPS Signals |

F.0.5.1.2.7 A/V Navigate WP

Allocated To:

C.0.4.1.3 Autopilot

Based On:

R.0.1.1.10 Waypoint navigation

| Table 6 F.0.5.1.2.7 A/V Navigate WP Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| GPS Signal | Input To:  F.0.5.1.1 A/V Perform controlled flight  F.0.5.1.2.1 A/V Auto Land  F.0.5.1.2.3 A/V Conduct BIT  F.0.5.1.2.5 A/V Follow Search Pattern  F.0.5.1.2.6 A/V Loiter over target  F.0.5.1.2.7 A/V Navigate WP  Output From:  F.0.1.1 Provide GPS Signals |

F.0.5.1.2.8 A/V Trigger ordnance

Allocated To:

C.0.4.1.3 Autopilot

| Table 7 F.0.5.1.2.8 A/V Trigger ordnance Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Fuze pulse | Triggers Function(s):  F.0.5.1.5 A/V Detonate  Output From:  F.0.5.1.2.8 A/V Trigger ordnance |

F.0.5.1.3 Perform A/V data comm

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.3 Comm with GS

F.0.5.1.3.1 A/V Accept connection to GS

Exits:

Connected

Not Connected

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.3 Comm with GS

R.0.2.1.1 Comm with AV

F.0.5.1.3.2 A/V Send telemetry

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.3 Comm with GS

R.0.1.3.1 Function check results

R.0.1.3.3 Telemetry Send

R.0.2.2.4 Telemetry Receipt

R.0.2.3.4 Flight Status

| Table 8 F.0.5.1.3.2 A/V Send telemetry Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Telemetry | Input To:  F.0.5.2.3.2 GS Receive Telemetry  Output From:  F.0.5.1.3.2 A/V Send telemetry |

F.0.5.1.3.3 A/V Send MP Loaded

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.3 Comm with GS

R.0.1.3.2 MP Success

R.0.2.2.2 MP Success Receipt

R.0.2.3.8 MP Success Display

| Table 9 F.0.5.1.3.3 A/V Send MP Loaded Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| MP Loaded | Input To:  F.0.5.2.1.4 GS Display MP Status  Output From:  F.0.5.1.3.3 A/V Send MP Loaded |

F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.1.2.1 Flight mode change

R.0.2.2.1 Flight Mode Change

R.0.2.3.1 Command Transmission

| Table 10 F.0.5.1.3.4 A/V Rcv Cmd (Surveillance) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (Surveillance) | Input To:  F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)  Output From:  F.0.5.2.3.7 GS Send Cmd (Surveillance) |

F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.1.2.1 Flight mode change

R.0.2.3.1 Command Transmission

| Table 11 F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (Self Destruct) | Input To:  F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)  Output From:  F.0.5.2.3.6 GS Send cmd (Self Destruct) |

F.0.5.1.3.6 A/V Rcv Cmd (RTL)

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.1.2.1 Flight mode change

R.0.2.2.1 Flight Mode Change

R.0.2.3.1 Command Transmission

R.0.3.4 RTL

| Table 12 F.0.5.1.3.6 A/V Rcv Cmd (RTL) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (RTL) | Input To:  F.0.5.1.3.6 A/V Rcv Cmd (RTL)  Output From:  F.0.5.2.3.5 GS Send Cmd (RTL) |

F.0.5.1.3.7 A/V Rcv Cmd (Launch)

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.1.2.1 Flight mode change

R.0.2.2.1 Flight Mode Change

R.0.2.3.1 Command Transmission

| Table 13 F.0.5.1.3.7 A/V Rcv Cmd (Launch) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (Launch) | Input To:  F.0.5.1.3.7 A/V Rcv Cmd (Launch)  Output From:  F.0.5.2.3.4 GS Send Cmd (Launch) |

F.0.5.1.3.8 A/V Rcv Cmd (BIT)

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.1.1.6 Function check

R.0.1.2.1 Flight mode change

R.0.2.3.1 Command Transmission

R.0.2.3.3 Fcn Check Initiation

| Table 14 F.0.5.1.3.8 A/V Rcv Cmd (BIT) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (BIT) | Input To:  F.0.5.1.3.8 A/V Rcv Cmd (BIT)  Output From:  F.0.5.2.3.3 GS Send Cmd (BIT) |

F.0.5.1.3.9 A/V Load MP

Allocated To:

C.0.4.1.1 A/V Data modem

Based On:

R.0.1.1.3 Comm with GS

| Table 15 F.0.5.1.3.9 A/V Load MP Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| MP | Input To:  F.0.5.1.3.9 A/V Load MP  Output From:  F.0.5.2.3.8 GS Send MP |

F.0.5.1.4 Provide Video

Allocated To:

C.0.4.1.5 Video System

F.0.5.1.4.1 A/V Send Video

Allocated To:

C.0.4.1.5 Video System

Based On:

R.0.1.1.7 Loiter

R.0.1.1.9 Search

R.0.1.3.4 Video transmission

R.0.2.2.5 Video Receipt

| Table 16 F.0.5.1.4.1 A/V Send Video Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Video data | Input To:  F.0.5.2.4 GS Receive Video  Output From:  F.0.5.1.4.1 A/V Send Video |

F.0.5.1.4.2 A/V Capture Video

Allocated To:

C.0.4.1.5 Video System

Based On:

R.0.1.1.7 Loiter

R.0.1.1.9 Search

R.0.1.3.4 Video transmission

R.0.2.2.5 Video Receipt

| Table 17 F.0.5.1.4.2 A/V Capture Video Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Tgt Signature | Input To:  F.0.5.1.4.2 A/V Capture Video  Output From:  F.0.4.1 Provide Target Presence |

F.0.5.1.5 A/V Detonate

Allocated To:

C.0.4.1.4 Ordnance pkg

| Table 18 F.0.5.1.5 A/V Detonate Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Fuze pulse | Triggers Function(s):  F.0.5.1.5 A/V Detonate  Output From:  F.0.5.1.2.8 A/V Trigger ordnance |

F.0.5.2 \_Perform Ground Station Functions

Allocated To:

C.0.4.2 Ground Station

F.0.5.2.1 Provide I/O

Allocated To:

C.0.4.2.2 Laptop

F.0.5.2.1.1 GS Display Video

Allocated To:

C.0.4.2.2 Laptop

Based On:

R.0.1.1.9 Search

R.0.1.3.4 Video transmission

R.0.2.2.5 Video Receipt

R.0.2.3.6 Video Display

| Table 19 F.0.5.2.1.1 GS Display Video Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Video Display | Input To:  F.0.3.3 Op Designate target  F.0.3.5 Op ID Target  F.0.3.15 Op Monitor Video  F.0.5.2.1.3 GS Display target coordinates  F.0.5.2.2.1 GS Calculate target coordinates  Output From:  F.0.5.2.1.1 GS Display Video |

F.0.5.2.1.2 GS Display telemetry

Allocated To:

C.0.4.2.2 Laptop

Based On:

R.0.1.3.1 Function check results

R.0.1.3.3 Telemetry Send

R.0.2.2.4 Telemetry Receipt

R.0.2.3.2 Fcn Check Display

R.0.2.3.4 Flight Status

R.0.2.3.7 Telemetry Display

| Table 20 F.0.5.2.1.2 GS Display telemetry Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Flight data | Input To:  F.0.3.14 Op Monitor A/V Health  Output From:  F.0.5.2.1.2 GS Display telemetry |

F.0.5.2.1.3 GS Display target coordinates

Allocated To:

C.0.4.2.2 Laptop

Based On:

R.0.2.1.4 TLE Calculation

R.0.2.3.9 TLE Display

| Table 21 F.0.5.2.1.3 GS Display target coordinates Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Video Display | Input To:  F.0.3.3 Op Designate target  F.0.3.5 Op ID Target  F.0.3.15 Op Monitor Video  F.0.5.2.1.3 GS Display target coordinates  F.0.5.2.2.1 GS Calculate target coordinates  Output From:  F.0.5.2.1.1 GS Display Video |

F.0.5.2.1.4 GS Display MP Status

Allocated To:

C.0.4.2.2 Laptop

Based On:

R.0.1.3.2 MP Success

R.0.2.2.2 MP Success Receipt

R.0.2.3.8 MP Success Display

| Table 22 F.0.5.2.1.4 GS Display MP Status Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| MP Loaded | Input To:  F.0.5.2.1.4 GS Display MP Status  Output From:  F.0.5.1.3.3 A/V Send MP Loaded |

F.0.5.2.2 Process

Allocated To:

C.0.4.2.3 Mission Control Software

F.0.5.2.2.1 GS Calculate target coordinates

Allocated To:

C.0.4.2.4 Video Processing Software

Based On:

R.0.2.1.4 TLE Calculation

R.0.2.3.9 TLE Display

R.0.2.4.2 GS TLE Accuracy

| Table 23 F.0.5.2.2.1 GS Calculate target coordinates Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cursor click | Input To:  F.0.5.2.2.1 GS Calculate target coordinates  Output From:  F.0.3.3 Op Designate target |
| Rcvd telemetry | Input To:  F.0.5.2.2.1 GS Calculate target coordinates  F.0.5.2.2.3 GS Store telemetry  Output From:  F.0.5.2.3.2 GS Receive Telemetry |
| Video Display | Input To:  F.0.3.3 Op Designate target  F.0.3.5 Op ID Target  F.0.3.15 Op Monitor Video  F.0.5.2.1.3 GS Display target coordinates  F.0.5.2.2.1 GS Calculate target coordinates  Output From:  F.0.5.2.1.1 GS Display Video |

F.0.5.2.2.2 GS Construct MP

Allocated To:

C.0.4.2.3 Mission Control Software

F.0.5.2.2.3 GS Store telemetry

Allocated To:

C.0.4.2.3 Mission Control Software

Based On:

R.0.1.3.3 Telemetry Send

R.0.2.1.3 Telemetry Storage

| Table 24 F.0.5.2.2.3 GS Store telemetry Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Rcvd telemetry | Input To:  F.0.5.2.2.1 GS Calculate target coordinates  F.0.5.2.2.3 GS Store telemetry  Output From:  F.0.5.2.3.2 GS Receive Telemetry |

F.0.5.2.3 Provide Data Comm

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.3 Comm with GS

F.0.5.2.3.1 GS Connect to A/V

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.3 Comm with GS

R.0.2.1.1 Comm with AV

F.0.5.2.3.2 GS Receive Telemetry

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.3 Comm with GS

R.0.1.3.1 Function check results

R.0.1.3.3 Telemetry Send

R.0.2.2.4 Telemetry Receipt

R.0.2.3.2 Fcn Check Display

R.0.2.3.4 Flight Status

R.0.2.3.7 Telemetry Display

R.0.2.3.8 MP Success Display

| Table 25 F.0.5.2.3.2 GS Receive Telemetry Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Rcvd telemetry | Input To:  F.0.5.2.2.1 GS Calculate target coordinates  F.0.5.2.2.3 GS Store telemetry  Output From:  F.0.5.2.3.2 GS Receive Telemetry |
| Telemetry | Input To:  F.0.5.2.3.2 GS Receive Telemetry  Output From:  F.0.5.1.3.2 A/V Send telemetry |

F.0.5.2.3.3 GS Send Cmd (BIT)

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.1.1.6 Function check

R.0.2.3.1 Command Transmission

R.0.2.3.3 Fcn Check Initiation

| Table 26 F.0.5.2.3.3 GS Send Cmd (BIT) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (BIT) | Input To:  F.0.5.1.3.8 A/V Rcv Cmd (BIT)  Output From:  F.0.5.2.3.3 GS Send Cmd (BIT) |

F.0.5.2.3.4 GS Send Cmd (Launch)

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.2.2.1 Flight Mode Change

R.0.2.3.1 Command Transmission

| Table 27 F.0.5.2.3.4 GS Send Cmd (Launch) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (Launch) | Input To:  F.0.5.1.3.7 A/V Rcv Cmd (Launch)  Output From:  F.0.5.2.3.4 GS Send Cmd (Launch) |

F.0.5.2.3.5 GS Send Cmd (RTL)

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.2.2.1 Flight Mode Change

R.0.2.3.1 Command Transmission

R.0.3.4 RTL

| Table 28 F.0.5.2.3.5 GS Send Cmd (RTL) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (RTL) | Input To:  F.0.5.1.3.6 A/V Rcv Cmd (RTL)  Output From:  F.0.5.2.3.5 GS Send Cmd (RTL) |

F.0.5.2.3.6 GS Send cmd (Self Destruct)

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.2.3.1 Command Transmission

| Table 29 F.0.5.2.3.6 GS Send cmd (Self Destruct) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (Self Destruct) | Input To:  F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)  Output From:  F.0.5.2.3.6 GS Send cmd (Self Destruct) |

F.0.5.2.3.7 GS Send Cmd (Surveillance)

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.2 Change of flight modes

R.0.1.1.3 Comm with GS

R.0.2.2.1 Flight Mode Change

R.0.2.3.1 Command Transmission

| Table 30 F.0.5.2.3.7 GS Send Cmd (Surveillance) Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Cmd (Surveillance) | Input To:  F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)  Output From:  F.0.5.2.3.7 GS Send Cmd (Surveillance) |

F.0.5.2.3.8 GS Send MP

Allocated To:

C.0.4.2.1 Data Modem

Based On:

R.0.1.1.3 Comm with GS

| Table 31 F.0.5.2.3.8 GS Send MP Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| MP | Input To:  F.0.5.1.3.9 A/V Load MP  Output From:  F.0.5.2.3.8 GS Send MP |

F.0.5.2.4 GS Receive Video

Allocated To:

C.0.4.2.5 Video Receiver

Based On:

R.0.1.1.7 Loiter

R.0.1.1.9 Search

R.0.1.3.4 Video transmission

R.0.2.2.5 Video Receipt

R.0.2.3.6 Video Display

| Table 32 F.0.5.2.4 GS Receive Video Interfacing Items | |
| --- | --- |
| Interfacing Items | Source / Destination |
| Video data | Input To:  F.0.5.2.4 GS Receive Video  Output From:  F.0.5.1.4.1 A/V Send Video |







Part I - Hierarchical Component List

C.0.4 Remote Targeting System

C.0.4.1 Air Vehicle

C.0.4.1.1 A/V Data modem

C.0.4.1.2 Aircraft

C.0.4.1.3 Autopilot

C.0.4.1.4 Ordnance pkg

C.0.4.1.5 Video System

C.0.4.1.6 GPS Receiver

C.0.4.1.7 Power Module

C.0.4.2 Ground Station

C.0.4.2.1 Data Modem

C.0.4.2.2 Laptop

C.0.4.2.3 Mission Control Software

C.0.4.2.4 Video Processing Software

C.0.4.2.5 Video Receiver

Part II - Component Definitions

C.0.4 Remote Targeting System

Built In Higher-Level Component(s):

C.0 System Context

Built From Lower-Level Component(s):

C.0.4.1 Air Vehicle

C.0.4.2 Ground Station



Figure 22 Remote Targeting System (Interface Block Diagram)



Figure 23 Remote Targeting System (Physical Block Diagram)



Figure 24 Remote Targeting System (Structure BDD)



Figure 25 Remote Targeting System (Standard Internal Block Diagram)



Figure 26 Remote Targeting System (Interface Block Diagram (L0))



Figure 27 Remote Targeting System (Flow Internal Block Diagram)

Performs Function(s):

F.0.5 \_Perform Remote Targeting System Functions

Specified By:

R.0.3 RTS Requirements

R.0.3.2 Inventory

Described By Use Case(s):

Provide Remote Targeting

C.0.4.1 Air Vehicle

Built In Higher-Level Component(s):

C.0.4 Remote Targeting System

Built From Lower-Level Component(s):

C.0.4.1.1 A/V Data modem

C.0.4.1.2 Aircraft

C.0.4.1.3 Autopilot

C.0.4.1.4 Ordnance pkg

C.0.4.1.5 Video System

C.0.4.1.6 GPS Receiver

C.0.4.1.7 Power Module

Joined To Logical Interface:

A/V Datacomm

A/V GPS

A/V Video



Figure 29 Air Vehicle (Interface Block Diagram)



Figure 31 Air Vehicle (Structure BDD)



Figure 32 Air Vehicle (Standard Internal Block Diagram)



Figure 33 Air Vehicle (Interface Block Diagram (L0))

Connected to Physical Link(s):

Command Link

GPS Link

Telemetry Link

Video Link

Performs Function(s):

F.0.5.1 \_Perform Air Vehicle Functions

Specified By:

R.0.1 Air Vehicle Requirements

C.0.4.1.1 A/V Data modem

Built In Higher-Level Component(s):

C.0.4.1 Air Vehicle

Joined To Logical Interface:

AP Modem

Modem Power

Performs Function(s):

F.0.5.1.3 Perform A/V data comm

F.0.5.1.3.1 A/V Accept connection to GS

F.0.5.1.3.2 A/V Send telemetry

F.0.5.1.3.3 A/V Send MP Loaded

F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)

F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)

F.0.5.1.3.6 A/V Rcv Cmd (RTL)

F.0.5.1.3.7 A/V Rcv Cmd (Launch)

F.0.5.1.3.8 A/V Rcv Cmd (BIT)

F.0.5.1.3.9 A/V Load MP

C.0.4.1.2 Aircraft

Built In Higher-Level Component(s):

C.0.4.1 Air Vehicle

Joined To Logical Interface:

AC Power

AP Controls

Performs Function(s):

F.0.5.1.1 A/V Perform controlled flight

C.0.4.1.3 Autopilot

Built In Higher-Level Component(s):

C.0.4.1 Air Vehicle

Joined To Logical Interface:

AP Controls

AP Fuze

AP GPS

AP Modem

AP Power

AP Video Control

Performs Function(s):

F.0.5.1.2 Perform A/P functions

F.0.5.1.2.1 A/V Auto Land

F.0.5.1.2.2 A/V Begin Surveillance

F.0.5.1.2.3 A/V Conduct BIT

F.0.5.1.2.4 A/V Enter Search Mode

F.0.5.1.2.5 A/V Follow Search Pattern

F.0.5.1.2.6 A/V Loiter over target

F.0.5.1.2.7 A/V Navigate WP

F.0.5.1.2.8 A/V Trigger ordnance

C.0.4.1.4 Ordnance pkg

Built In Higher-Level Component(s):

C.0.4.1 Air Vehicle

Joined To Logical Interface:

AP Fuze

Performs Function(s):

F.0.5.1.5 A/V Detonate

C.0.4.1.5 Video System

Built In Higher-Level Component(s):

C.0.4.1 Air Vehicle

Joined To Logical Interface:

AP Video Control

Video Power

Performs Function(s):

F.0.5.1.4 Provide Video

F.0.5.1.4.1 A/V Send Video

F.0.5.1.4.2 A/V Capture Video

C.0.4.1.6 GPS Receiver

Built In Higher-Level Component(s):

C.0.4.1 Air Vehicle

Joined To Logical Interface:

AP GPS

GPS Power

Performs Function(s):

\_Perform GPS Receiver Functions

C.0.4.1.7 Power Module

Built In Higher-Level Component(s):

C.0.4.1 Air Vehicle

Joined To Logical Interface:

AC Power

AP Power

GPS Power

Modem Power

Video Power

Performs Function(s):

\_Perform Power Module Functions

C.0.4.2 Ground Station

Built In Higher-Level Component(s):

C.0.4 Remote Targeting System

Built From Lower-Level Component(s):

C.0.4.2.1 Data Modem

C.0.4.2.2 Laptop

C.0.4.2.3 Mission Control Software

C.0.4.2.4 Video Processing Software

C.0.4.2.5 Video Receiver

Joined To Logical Interface:

A/V Datacomm

A/V Video



Figure 36 Ground Station (Interface Block Diagram)



Figure 38 Ground Station (Structure BDD)



Figure 39 Ground Station (Standard Internal Block Diagram)



Figure 40 Ground Station (Interface Block Diagram (L0))

Connected to Physical Link(s):

Command Link

Telemetry Link

Video Link

Performs Function(s):

F.0.5.2 \_Perform Ground Station Functions

Specified By:

R.0.2 Ground Station Requirements

C.0.4.2.1 Data Modem

Built In Higher-Level Component(s):

C.0.4.2 Ground Station

Joined To Logical Interface:

USB

Performs Function(s):

F.0.5.2.3 Provide Data Comm

F.0.5.2.3.1 GS Connect to A/V

F.0.5.2.3.2 GS Receive Telemetry

F.0.5.2.3.3 GS Send Cmd (BIT)

F.0.5.2.3.4 GS Send Cmd (Launch)

F.0.5.2.3.5 GS Send Cmd (RTL)

F.0.5.2.3.6 GS Send cmd (Self Destruct)

F.0.5.2.3.7 GS Send Cmd (Surveillance)

F.0.5.2.3.8 GS Send MP

C.0.4.2.2 Laptop

Built In Higher-Level Component(s):

C.0.4.2 Ground Station

Joined To Logical Interface:

Computer Video

MP S/W API

USB

Video S/W API

Performs Function(s):

F.0.5.2.1 Provide I/O

F.0.5.2.1.1 GS Display Video

F.0.5.2.1.2 GS Display telemetry

F.0.5.2.1.3 GS Display target coordinates

F.0.5.2.1.4 GS Display MP Status

C.0.4.2.3 Mission Control Software

Built In Higher-Level Component(s):

C.0.4.2 Ground Station

Joined To Logical Interface:

MP S/W API

Performs Function(s):

F.0.5.2.2 Process

F.0.5.2.2.2 GS Construct MP

F.0.5.2.2.3 GS Store telemetry

C.0.4.2.4 Video Processing Software

Built In Higher-Level Component(s):

C.0.4.2 Ground Station

Joined To Logical Interface:

Video S/W API

Performs Function(s):

F.0.5.2.2.1 GS Calculate target coordinates

C.0.4.2.5 Video Receiver

Built In Higher-Level Component(s):

C.0.4.2 Ground Station

Joined To Logical Interface:

Computer Video

Performs Function(s):

F.0.5.2.4 GS Receive Video

Part I - Derived Functional Interfaces

| Table 33 C.0.4.1.1 A/V Data modem External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.1.3.2 A/V Send telemetry | → Telemetry | F.0.5.2.3.2 GS Receive Telemetry  C.0.4.2.1 Data Modem |
| F.0.5.1.3.3 A/V Send MP Loaded | → MP Loaded | F.0.5.2.1.4 GS Display MP Status  C.0.4.2.2 Laptop |
| F.0.5.1.3.4 A/V Rcv Cmd (Surveillance) | ← Cmd (Surveillance) | F.0.5.2.3.7 GS Send Cmd (Surveillance)  C.0.4.2.1 Data Modem |
| F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct) | ← Cmd (Self Destruct) | F.0.5.2.3.6 GS Send cmd (Self Destruct)  C.0.4.2.1 Data Modem |
| F.0.5.1.3.6 A/V Rcv Cmd (RTL) | ← Cmd (RTL) | F.0.5.2.3.5 GS Send Cmd (RTL)  C.0.4.2.1 Data Modem |
| F.0.5.1.3.7 A/V Rcv Cmd (Launch) | ← Cmd (Launch) | F.0.5.2.3.4 GS Send Cmd (Launch)  C.0.4.2.1 Data Modem |
| F.0.5.1.3.8 A/V Rcv Cmd (BIT) | ← Cmd (BIT) | F.0.5.2.3.3 GS Send Cmd (BIT)  C.0.4.2.1 Data Modem |
| F.0.5.1.3.9 A/V Load MP | ← MP | F.0.5.2.3.8 GS Send MP  C.0.4.2.1 Data Modem |

| Table 34 C.0.4.1.2 Aircraft External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.1.1 A/V Perform controlled flight | ← GPS Signal | F.0.1.1 Provide GPS Signals  C.0.1 GPS |

| Table 35 C.0.4.1.3 Autopilot External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.1.2.1 A/V Auto Land | ← GPS Signal | F.0.1.1 Provide GPS Signals  C.0.1 GPS |
| F.0.5.1.2.3 A/V Conduct BIT | → BIT Status | F.0.3.2 Op Confirm fcn chk  C.0.3 Ground Operator |
|  | ← GPS Signal | F.0.1.1 Provide GPS Signals  C.0.1 GPS |
| F.0.5.1.2.5 A/V Follow Search Pattern | ← GPS Signal | F.0.1.1 Provide GPS Signals  C.0.1 GPS |
| F.0.5.1.2.6 A/V Loiter over target | ← GPS Signal | F.0.1.1 Provide GPS Signals  C.0.1 GPS |
| F.0.5.1.2.7 A/V Navigate WP | ← GPS Signal | F.0.1.1 Provide GPS Signals  C.0.1 GPS |
| F.0.5.1.2.8 A/V Trigger ordnance | → Fuze pulse | F.0.5.1.5 A/V Detonate  C.0.4.1.4 Ordnance pkg |

| Table 36 C.0.4.1.4 Ordnance pkg External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.1.5 A/V Detonate | ← Fuze pulse | F.0.5.1.2.8 A/V Trigger ordnance  C.0.4.1.3 Autopilot |

| Table 37 C.0.4.1.5 Video System External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.1.4.1 A/V Send Video | → Video data | F.0.5.2.4 GS Receive Video  C.0.4.2.5 Video Receiver |
| F.0.5.1.4.2 A/V Capture Video | ← Tgt Signature | F.0.4.1 Provide Target Presence  C.0.5 Target |

| Table 38 C.0.4.2.1 Data Modem External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.2.3.2 GS Receive Telemetry | → Rcvd telemetry | F.0.5.2.2.1 GS Calculate target coordinates  C.0.4.2.4 Video Processing Software  F.0.5.2.2.3 GS Store telemetry  C.0.4.2.3 Mission Control Software |
|  | ← Telemetry | F.0.5.1.3.2 A/V Send telemetry  C.0.4.1.1 A/V Data modem |
| F.0.5.2.3.3 GS Send Cmd (BIT) | → Cmd (BIT) | F.0.5.1.3.8 A/V Rcv Cmd (BIT)  C.0.4.1.1 A/V Data modem |
| F.0.5.2.3.4 GS Send Cmd (Launch) | → Cmd (Launch) | F.0.5.1.3.7 A/V Rcv Cmd (Launch)  C.0.4.1.1 A/V Data modem |
| F.0.5.2.3.5 GS Send Cmd (RTL) | → Cmd (RTL) | F.0.5.1.3.6 A/V Rcv Cmd (RTL)  C.0.4.1.1 A/V Data modem |
| F.0.5.2.3.6 GS Send cmd (Self Destruct) | → Cmd (Self Destruct) | F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct)  C.0.4.1.1 A/V Data modem |
| F.0.5.2.3.7 GS Send Cmd (Surveillance) | → Cmd (Surveillance) | F.0.5.1.3.4 A/V Rcv Cmd (Surveillance)  C.0.4.1.1 A/V Data modem |
| F.0.5.2.3.8 GS Send MP | → MP | F.0.5.1.3.9 A/V Load MP  C.0.4.1.1 A/V Data modem |

| Table 39 C.0.4.2.2 Laptop External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.2.1.1 GS Display Video | → Video Display | F.0.3.3 Op Designate target  C.0.2 Off Board C2 Operator  F.0.3.5 Op ID Target  C.0.2 Off Board C2 Operator  F.0.3.15 Op Monitor Video  C.0.2 Off Board C2 Operator  F.0.5.2.2.1 GS Calculate target coordinates  C.0.4.2.4 Video Processing Software |
| F.0.5.2.1.2 GS Display telemetry | → Flight data | F.0.3.14 Op Monitor A/V Health  C.0.2 Off Board C2 Operator |
| F.0.5.2.1.4 GS Display MP Status | ← MP Loaded | F.0.5.1.3.3 A/V Send MP Loaded  C.0.4.1.1 A/V Data modem |

| Table 40 C.0.4.2.3 Mission Control Software External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.2.2.3 GS Store telemetry | ← Rcvd telemetry | F.0.5.2.3.2 GS Receive Telemetry  C.0.4.2.1 Data Modem |

| Table 41 C.0.4.2.4 Video Processing Software External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.2.2.1 GS Calculate target coordinates | ← Cursor click | F.0.3.3 Op Designate target  C.0.2 Off Board C2 Operator |
|  | ← Rcvd telemetry | F.0.5.2.3.2 GS Receive Telemetry  C.0.4.2.1 Data Modem |
|  | ← Video Display | F.0.5.2.1.1 GS Display Video  C.0.4.2.2 Laptop |

| Table 42 C.0.4.2.5 Video Receiver External I/O | | |
| --- | --- | --- |
| Functions | Interface Items | Interfacing Elements |
| F.0.5.2.4 GS Receive Video | ← Video data | F.0.5.1.4.1 A/V Send Video  C.0.4.1.5 Video System |

Part II - Logical Interfaces

A/V Datacomm

Physical Links:

Command Link

Telemetry Link

Connecting Elements:

C.0.4.1 Air Vehicle

C.0.4.2 Ground Station

A/V GPS

Physical Links:

GPS Link

Connecting Elements:

C.0.1 GPS

C.0.4.1 Air Vehicle

A/V Video

Physical Links:

Video Link

Connecting Elements:

C.0.4.1 Air Vehicle

C.0.4.2 Ground Station

AC Power

Connecting Elements:

C.0.4.1.2 Aircraft

C.0.4.1.7 Power Module

AP Controls

Connecting Elements:

C.0.4.1.2 Aircraft

C.0.4.1.3 Autopilot

AP Fuze

Connecting Elements:

C.0.4.1.3 Autopilot

C.0.4.1.4 Ordnance pkg

AP GPS

Connecting Elements:

C.0.4.1.3 Autopilot

C.0.4.1.6 GPS Receiver

AP Modem

Connecting Elements:

C.0.4.1.1 A/V Data modem

C.0.4.1.3 Autopilot

AP Power

Connecting Elements:

C.0.4.1.3 Autopilot

C.0.4.1.7 Power Module

AP Video Control

Connecting Elements:

C.0.4.1.3 Autopilot

C.0.4.1.5 Video System

Computer Video

Connecting Elements:

C.0.4.2.2 Laptop

C.0.4.2.5 Video Receiver

GPS Power

Connecting Elements:

C.0.4.1.6 GPS Receiver

C.0.4.1.7 Power Module

Modem Power

Connecting Elements:

C.0.4.1.1 A/V Data modem

C.0.4.1.7 Power Module

MP S/W API

Connecting Elements:

C.0.4.2.2 Laptop

C.0.4.2.3 Mission Control Software

USB

Connecting Elements:

C.0.4.2.1 Data Modem

C.0.4.2.2 Laptop

Video Power

Connecting Elements:

C.0.4.1.5 Video System

C.0.4.1.7 Power Module

Video S/W API

Connecting Elements:

C.0.4.2.2 Laptop

C.0.4.2.4 Video Processing Software

Part III - Physical Interfaces

Command Link

Transmitted Data:

Cmd (BIT)

Cmd (Launch)

Cmd (RTL)

Cmd (Self Destruct)

Cmd (Surveillance)

MP

Connecting Elements:

C.0.4.1 Air Vehicle

C.0.4.2 Ground Station

GPS Link

Transmitted Data:

GPS Signal

Connecting Elements:

C.0.1 GPS

C.0.4.1 Air Vehicle

Telemetry Link

Transmitted Data:

MP Loaded

Telemetry

Connecting Elements:

C.0.4.1 Air Vehicle

C.0.4.2 Ground Station

Video Link

Transmitted Data:

Video data

Connecting Elements:

C.0.4.1 Air Vehicle

C.0.4.2 Ground Station

| Allocated Capabilities/Requirements | Traced From Higher-Level Elements |
| --- | --- |
| **C.0.4 Remote Targeting System (Component)** |  |
| F.0.5.1 \_Perform Air Vehicle Functions (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.2 \_Perform Ground Station Functions (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| R.0.3 RTS Requirements (Requirement) | R.0 System Requirements Document (Requirement) |
| R.0.3.2 Inventory (Requirement) | R.0.3 RTS Requirements (Requirement) |
| **C.0.4.1 Air Vehicle (Component)** |  |
| F.0.5.1.1 A/V Perform controlled flight (Function) | R.0.1.1.5 Controlled flight (Requirement) |
| F.0.5.1.2 Perform A/P functions (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.1.3 Perform A/V data comm (Function) | R.0.1.1.3 Comm with GS (Requirement) |
| F.0.5.1.4 Provide Video (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.1.5 A/V Detonate (Function) | UC7i: Self Destruct (Function)  R.0.3.1 Command Destruct (Requirement)  R.0.1.1.4 Command Destruct execution (Requirement)  C.0 System Context (Component) |
| R.0.1 Air Vehicle Requirements (Requirement) | R.0 System Requirements Document (Requirement) |
| **C.0.4.1.1 A/V Data modem (Component)** |  |
| F.0.5.1.3 Perform A/V data comm (Function) | R.0.1.1.3 Comm with GS (Requirement) |
| F.0.5.1.3.1 A/V Accept connection to GS (Function) | R.0.2.1.1 Comm with AV (Requirement)  R.0.1.1.3 Comm with GS (Requirement) |
| F.0.5.1.3.2 A/V Send telemetry (Function) | R.0.1.3.3 Telemetry Send (Requirement)  R.0.2.2.4 Telemetry Receipt (Requirement)  R.0.2.3.4 Flight Status (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.1.3.1 Function check results (Requirement) |
| F.0.5.1.3.3 A/V Send MP Loaded (Function) | R.0.1.3.2 MP Success (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.2.3.8 MP Success Display (Requirement)  R.0.2.2.2 MP Success Receipt (Requirement) |
| F.0.5.1.3.4 A/V Rcv Cmd (Surveillance) (Function) | R.0.2.2.1 Flight Mode Change (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.1.2.1 Flight mode change (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.1.3.5 A/V Rcv Cmd (Self Destruct) (Function) | R.0.1.1.3 Comm with GS (Requirement)  R.0.1.2.1 Flight mode change (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.1.3.6 A/V Rcv Cmd (RTL) (Function) | R.0.1.1.3 Comm with GS (Requirement)  R.0.1.2.1 Flight mode change (Requirement)  R.0.1.1.2 Change of flight modes (Requirement)  R.0.2.2.1 Flight Mode Change (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.3.4 RTL (Requirement) |
| F.0.5.1.3.7 A/V Rcv Cmd (Launch) (Function) | R.0.2.2.1 Flight Mode Change (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.1.2.1 Flight mode change (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.1.3.8 A/V Rcv Cmd (BIT) (Function) | R.0.1.1.3 Comm with GS (Requirement)  R.0.1.2.1 Flight mode change (Requirement)  R.0.1.1.2 Change of flight modes (Requirement)  R.0.1.1.6 Function check (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.2.3.3 Fcn Check Initiation (Requirement) |
| F.0.5.1.3.9 A/V Load MP (Function) | R.0.1.1.3 Comm with GS (Requirement) |
| **C.0.4.1.2 Aircraft (Component)** |  |
| F.0.5.1.1 A/V Perform controlled flight (Function) | R.0.1.1.5 Controlled flight (Requirement) |
| **C.0.4.1.3 Autopilot (Component)** |  |
| F.0.5.1.2 Perform A/P functions (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.1.2.1 A/V Auto Land (Function) | R.0.1.1.1 Autonomous landing (Requirement) |
| F.0.5.1.2.2 A/V Begin Surveillance (Function) | R.0.1.1.7 Loiter (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.1.2.3 A/V Conduct BIT (Function) | R.0.2.3.3 Fcn Check Initiation (Requirement)  R.0.1.1.6 Function check (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.1.2.4 A/V Enter Search Mode (Function) | R.0.1.1.9 Search (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.1.2.5 A/V Follow Search Pattern (Function) | R.0.1.1.9 Search (Requirement) |
| F.0.5.1.2.6 A/V Loiter over target (Function) | R.0.1.1.7 Loiter (Requirement) |
| F.0.5.1.2.7 A/V Navigate WP (Function) | R.0.1.1.10 Waypoint navigation (Requirement) |
| F.0.5.1.2.8 A/V Trigger ordnance (Function) | UC7i: Self Destruct (Function)  R.0.3.1 Command Destruct (Requirement)  R.0.1.1.4 Command Destruct execution (Requirement)  C.0 System Context (Component) |
| **C.0.4.1.4 Ordnance pkg (Component)** |  |
| F.0.5.1.5 A/V Detonate (Function) | UC7i: Self Destruct (Function)  R.0.3.1 Command Destruct (Requirement)  R.0.1.1.4 Command Destruct execution (Requirement)  C.0 System Context (Component) |
| **C.0.4.1.5 Video System (Component)** |  |
| F.0.5.1.4 Provide Video (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.1.4.1 A/V Send Video (Function) | R.0.1.1.9 Search (Requirement)  R.0.2.2.5 Video Receipt (Requirement)  R.0.1.1.7 Loiter (Requirement)  R.0.1.3.4 Video transmission (Requirement) |
| F.0.5.1.4.2 A/V Capture Video (Function) | R.0.1.1.9 Search (Requirement)  R.0.2.2.5 Video Receipt (Requirement)  R.0.1.1.7 Loiter (Requirement)  R.0.1.3.4 Video transmission (Requirement) |
| **C.0.4.1.6 GPS Receiver (Component)** |  |
| **C.0.4.1.7 Power Module (Component)** |  |
| **C.0.4.2 Ground Station (Component)** |  |
| F.0.5.2.1 Provide I/O (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.2.2 Process (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.2.3 Provide Data Comm (Function) | R.0.1.1.3 Comm with GS (Requirement) |
| F.0.5.2.4 GS Receive Video (Function) | R.0.1.1.9 Search (Requirement)  R.0.2.3.6 Video Display (Requirement)  R.0.2.2.5 Video Receipt (Requirement)  R.0.1.1.7 Loiter (Requirement)  R.0.1.3.4 Video transmission (Requirement) |
| R.0.2 Ground Station Requirements (Requirement) | R.0 System Requirements Document (Requirement) |
| **C.0.4.2.1 Data Modem (Component)** |  |
| F.0.5.2.3 Provide Data Comm (Function) | R.0.1.1.3 Comm with GS (Requirement) |
| F.0.5.2.3.1 GS Connect to A/V (Function) | R.0.2.1.1 Comm with AV (Requirement)  R.0.1.1.3 Comm with GS (Requirement) |
| F.0.5.2.3.2 GS Receive Telemetry (Function) | R.0.2.3.4 Flight Status (Requirement)  R.0.1.3.3 Telemetry Send (Requirement)  R.0.2.2.4 Telemetry Receipt (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.2.3.8 MP Success Display (Requirement)  R.0.2.3.2 Fcn Check Display (Requirement)  R.0.1.3.1 Function check results (Requirement)  R.0.2.3.7 Telemetry Display (Requirement) |
| F.0.5.2.3.3 GS Send Cmd (BIT) (Function) | R.0.2.3.3 Fcn Check Initiation (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.1.1.6 Function check (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.2.3.4 GS Send Cmd (Launch) (Function) | R.0.2.2.1 Flight Mode Change (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.2.3.5 GS Send Cmd (RTL) (Function) | R.0.2.2.1 Flight Mode Change (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.3.4 RTL (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.2.3.6 GS Send cmd (Self Destruct) (Function) | R.0.1.1.3 Comm with GS (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.2.3.7 GS Send Cmd (Surveillance) (Function) | R.0.2.2.1 Flight Mode Change (Requirement)  R.0.1.1.3 Comm with GS (Requirement)  R.0.2.3.1 Command Transmission (Requirement)  R.0.1.1.2 Change of flight modes (Requirement) |
| F.0.5.2.3.8 GS Send MP (Function) | R.0.1.1.3 Comm with GS (Requirement) |
| **C.0.4.2.2 Laptop (Component)** |  |
| F.0.5.2.1 Provide I/O (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.2.1.1 GS Display Video (Function) | R.0.1.1.9 Search (Requirement)  R.0.2.3.6 Video Display (Requirement)  R.0.2.2.5 Video Receipt (Requirement)  R.0.1.3.4 Video transmission (Requirement) |
| F.0.5.2.1.2 GS Display telemetry (Function) | R.0.2.3.4 Flight Status (Requirement)  R.0.1.3.3 Telemetry Send (Requirement)  R.0.2.2.4 Telemetry Receipt (Requirement)  R.0.2.3.2 Fcn Check Display (Requirement)  R.0.2.3.7 Telemetry Display (Requirement)  R.0.1.3.1 Function check results (Requirement) |
| F.0.5.2.1.3 GS Display target coordinates (Function) | R.0.2.1.4 TLE Calculation (Requirement)  R.0.2.3.9 TLE Display (Requirement) |
| F.0.5.2.1.4 GS Display MP Status (Function) | R.0.1.3.2 MP Success (Requirement)  R.0.2.3.8 MP Success Display (Requirement)  R.0.2.2.2 MP Success Receipt (Requirement) |
| **C.0.4.2.3 Mission Control Software (Component)** |  |
| F.0.5.2.2 Process (Function) | F.0 \_Perform System Context Functions (Function)  C.0 System Context (Component) |
| F.0.5.2.2.2 GS Construct MP (Function) | UC6i: Plan Mission (Function)  R.0.1.1.8 Mission re-plan (Requirement)  C.0 System Context (Component)  R.0.2.1.2 MP Preparation (Requirement)  R.0.2.3.5 MP Transmission (Requirement)  R.0.3.3 MP Plan/Re-plan (Requirement)  R.0.1.2.2 MP Receipt (Requirement)  R.0.2.2.3 Operator Mission Planning (Requirement) |
| F.0.5.2.2.3 GS Store telemetry (Function) | R.0.2.1.3 Telemetry Storage (Requirement)  R.0.1.3.3 Telemetry Send (Requirement) |
| **C.0.4.2.4 Video Processing Software (Component)** |  |
| F.0.5.2.2.1 GS Calculate target coordinates (Function) | R.0.2.1.4 TLE Calculation (Requirement)  R.0.2.4.2 GS TLE Accuracy (Requirement)  R.0.2.3.9 TLE Display (Requirement) |
| **C.0.4.2.5 Video Receiver (Component)** |  |
| F.0.5.2.4 GS Receive Video (Function) | R.0.1.1.9 Search (Requirement)  R.0.2.3.6 Video Display (Requirement)  R.0.2.2.5 Video Receipt (Requirement)  R.0.1.1.7 Loiter (Requirement)  R.0.1.3.4 Video transmission (Requirement) |