

JTLS-2016-12737 UAV Turns Into Weapon

Ellen Roland, John Hertz, Robert Montgomery

1.0 Summary of Model Change Request

This Design Plan describes how JTLS-GO will be enhanced to model Unmanned Aerial Vehicles (UAVs) that are flown as expendable aircraft. These UAVs are essentially airborne weapons that are destroyed if they attack a ground target, but return home if no attack occurs.

2.0 Design Summary

2.1 Current Capabilities

Currently, there is no capability for a UAV (or any aircraft type) in JTLS-GO to accomplish a one-way mission. In other words, a UAV cannot launch, fly reconnaissance for a period of time, and then terminate with a self-destructive attack on a ground target, or alternatively return home without attacking any target.

The Harpy is an example of a UAV with this capability. Currently, as a work-around in JTLS, the Harpy is represented as a Surface-to-Surface Missile (SSM) in the JTLS-GO database. This technique allows for only a one-way, non-alterable ballistic flight to the designated target. The missile cannot gather intelligence or loiter along the way. The missile can be interdicted by anti-missile defense systems within an IADS network, or by close-in air defense systems that cover the targeted location.

2.2 Design Approach

An expendable UAV (e.g. Harpy), will be represented as a new aircraft class that models a loitering munition. A new aircraft attribute will indicate whether the UAV can be used as a one-way asset. The UAV will be explicitly flown as an air mission that carries a single weapon. It will be subject to air intercept and ADA engagements while flying. The aircraft will be immediately destroyed after it attacks a ground target. If the UAV mission is not assigned a target to attack, it will return home after its off-station time or upon receiving further orders.

The expendable UAV will be controlled using existing air mission orders. The player will be able to launch the UAV as a Reconnaissance, Offensive Air Support, or a SEAD mission. The Manage Air Mission Tasks order will be used to add, modify, or delete mission tasks. If the player adds a Fire Weapon task, the mission will be destroyed after execution. The mission will be capable of loitering and gathering intelligence information, if it carries the proper ground search sensors.

3.0 Detailed Design

To implement the new expendable UAV capabilities as described above, modifications are necessary in JTLS-GO. Areas impacted include the Combat Events Program (CEP), Scenario Verification Program (SVP), Database Development System (DDS), and the scenario database.

3.1 New Aircraft Attribute

To represent the expendable UAVs, a new aircraft attribute, AC LOITERING MUNITION FLAG, will be added to the aircraft type (class) structure. This attribute will indicate whether the UAV is to be treated as a single-shot, expendable weapon that also flies and maneuvers as an ordinary aircraft. If the attribute value is YES, the UAV will be immediately destroyed when it attacks a ground target as shown in Table 1. All such UAVs will be capable of returning to their launching unit if they do not fire their single weapon.

Table 1. AC LOITERING MUNITION FLAG

ATTRIBUTE VALUE	MEANING
NO	UAV returns to launching unit after attacking ground target
YES	UAV destroyed after attacking ground target UAV has weapon load restrictions

3.2 Weapon Requirements

There are several weapon-related rules that will be enforced for any aircraft type that has an AC LOITERING MUNITION FLAG set to YES. These weapon restrictions are necessary to properly model the behavior of the expendable UAV. All weapon loads assigned to the aircraft type must consist of exactly one targetable weapon – no more no less. The targetable weapon must have a range of zero and be releasable only from altitude zone 1. The weapon cannot be a stand-off (missile) munition.

Table 2 lists the required targetable weapon attribute values.

Table 2. Weapon Rules for Expendable UAVs

WEAPON ATTRIBUTE	RULE
TW MAX FIRE RANGE	Must be zero
TW MIN RELEASE ALTITUDE	Must be zero
TW MAX RELEASE ALTITUDE	AZ MAXIMUM for Altitude Zone 1
TW MISSILE CAPABLE	Must be No

Validity checks will be added to the SVP to enforce these rules. Also, the air mission orders will be modified in the CEP to prevent the player from placing more than one weapon on the mission if the UT LOITERING MUNITION FLAG is set to Yes.

Because the single carried weapon will have a range of zero and must be fired within altitude zone 1, the aircraft will automatically maneuver into that position if given a Fire Weapon task that names the targeted object or coordinates. The player need not micro-manage the UAV into a close-in firing position.

3.3 Interdiction

As an aircraft object, the expendable UAV will be interdictable in the same manner as any other aircraft. The UAV will be vulnerable to air-to-air engagements or air defense systems while orbiting or enroute to the target location. The weapon itself, if TW ADA TARGET TYPE is not equal to NONE, will be vulnerable to a one-time, close-in air defense engagement after it is fired within altitude zone 1.

4.0 Data Changes

4.1 AC LOITERING MUNITION FLAG

- Dimension: Variable – Entity Attribute
- Mode: Text
- Unit of Measure: N/A
- Range: YES or NO
- Default Value: NO
- Definition: This variable is an attribute of the AIRCRAFT CLASS entity. A YES value indicates the aircraft is expendable and is immediately destroyed after it attacks a ground target. If the aircraft does not attack, it is not destroyed and may return home. A NO value indicates the aircraft is reusable and may return home after delivering its weapons on a ground target.
- Relationships: The flag is set to Yes primarily for a one-way, one-use unmanned aircraft.

5.0 Order Changes

For the individual air mission orders, the CEP processing will be modified to validate the weapon load option selected for an expendable UAV. If the AC LOITERING MUNITION FLAG is Yes, and the

player selects a different Existing Load, or specifies a New Load, or alters Weapons Only, the logic will ensure that exactly one weapon is included in the mission load. If not, the order will be rejected with a player message.

6.0 JODA Changes

No JODA Data System parameter, structure, or protocol changes are required to implement this design.

7.0 Test Plan

TBD. Depends on which aspects of the design are changed/approved.

7.1 Test 1 Title

Purpose: *[Describe the specific feature, function, or behavior to be tested or measured.]*

Step 1: Text

Step 2: Text

Expected Results: *[Describe the specific model behavior to be observed.]*

7.2 Test 2 Title

Purpose: *[Describe the specific feature, function, or behavior to be tested or measured.]*

Step 1: Text

Step 2: Text

Expected Results: *[Describe the specific model behavior to be observed.]*