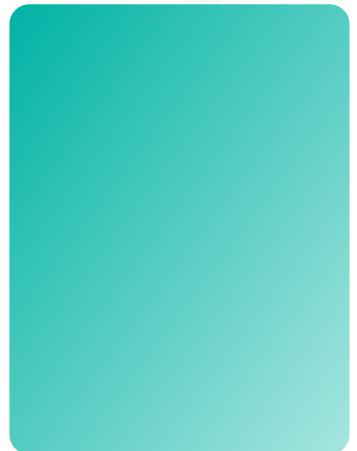


# VBS Close Air Support



VBS4 24.1.1



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The BISim Wiki is the primary resource on VBS4 scripting:

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## PhysX

VBS4 uses the PhysX physics engine. For more information on PhysX visit the Nvidia site.

<https://gameworksdocs.nvidia.com/simulation.html>



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# 1. VBS Close Air Support

VBS Close Air Support provides simulated Close Air Support (CAS) using VBS Plan.

## FEATURE NOTICE

VBS Close Air Support may be subject to additional licensing. For more information, contact [sales@bisimulations.com](mailto:sales@bisimulations.com).

## NOTE

This use case is based on the VBS Close Air Support functionality. For legacy CAS functionality, see Close Air Support in the VBS4 Editor Manual.

The CAS simulation involves the following roles:

- **Instructor** - The Instructor prepares and executes the CAS scenario using VBS Editor and VBS Plan.
- **Joint Terminal Attack Controller (JTAC)** - The JTAC Trainee, also known as Forward Air Controller (FAC), directs the CAS aircraft against an enemy target by communicating the target position and clearance call (Cleared Hot or Abort) to the Instructor using VBS Radio.

For the general VBS Close Air Support simulation workflow, see [VBS Close Air Support Workflow \(on the next page\)](#).

For a walkthrough example of a VBS Close Air Support scenario, see [VBS Close Air Support Example \(on page 13\)](#).

## 2. VBS Close Air Support Workflow

The general VBS Close Air Support simulation workflow is divided into the following parts:

- [VBS Close Air Support Preparation \(below\)](#)
- [VBS Close Air Support Execution \(on page 10\)](#)
- [VBS Close Air Support Assessment \(on page 12\)](#)

### 2.1 VBS Close Air Support Preparation

As the Instructor, create a CAS scenario using VBS Editor.

#### Follow these steps:

1. If required, customize the CAS Unit aircraft and munitions functionality using JSON configuration in:

`\VBS_Installation\Components\VBSChalkboard\config\cas_parameters.json`

See [CAS Unit Parameters \(on page 35\)](#).



#### WARNING

The following considerations apply:

- When modifying `cas_parameters.json`, make sure VBS4 is not running.
- Use the same `cas_parameters.json` on all computers in your VBS4 network (see VBS4 Deployment Options in the VBS4 Deployment Guide). Having different versions of `cas_parameters.json` on the computers in your VBS4 network may lead to unexpected results.

2. Use VBS Editor to create a new Scenario, or edit an existing one.

For more information, see [Scenario Preparation](#).

### 3. Add BLUFOR JTAC units and enemy OPFOR personnel:

Entity	Description
JTAC Unit	Any FAC / JTAC unit. For example: <ul style="list-style-type: none"> <li><b>US USMC Desert &gt; FAC/JTAC - M16A3 ACOG</b></li> <li><b>US USMC Woodland &gt; FAC/JTAC - M16A3 ACOG</b></li> </ul>
Enemy Personnel	Any land / sea enemy personnel used as a CAS target.

Add personnel to the scenario.

For more information on placing units, see [Adding Units in the VBS4 Editor Manual](#).

### 4. Add OPFOR vehicles:

Entity	Description
Enemy Vehicle	Any land / sea enemy vehicle used as a CAS target.

Add vehicles to the scenario.

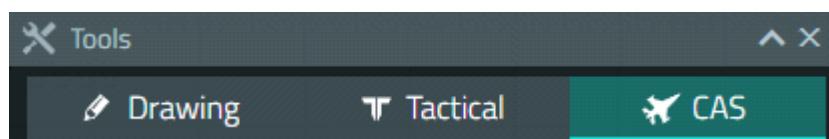
For more information on placing vehicles, see [Adding Vehicles in the VBS4 Editor Manual](#).

### 5. Add OPFOR structures as CAS targets.

For more information, see [Placing and Editing Models in the VBS Geo Manual](#).

### 6. In the VBS4 Toolbar, select **Plan** to switch to VBS Plan.

### 7. In the Tools Panel, open the **CAS** tab, where the CAS tools are located.



8. Add a CAS Unit aircraft, using the instructions in [CAS Units Tool \(on page 30\)](#).
9. Add a No Fly Zone (NFZ), using the instructions in [CAS No Fly Zone \(NFZ\) Tool \(on page 45\)](#).
10. Add a No Fire Area (NFA), using the instructions in [CAS No Fire Area \(NFA\) Tool \(on page 50\)](#).
11. Depending on the aircraft type (fixed-wing or rotary-wing), do any of the following:
  - For fixed-wing CAS aircraft, add Control Points (CPs) and Initial Points (IPs), using the instructions in [CAS Control Point \(CP\) Tool \(on page 55\)](#) and in [CAS Initial Point \(IP\) Tool \(on page 58\)](#).
  - For rotary-wing CAS aircraft, add Holding Areas (HAs) and Battle Positions (BPs), using the instructions in [CAS Holding Area \(HA\) Tool \(on page 61\)](#) and in [CAS Battle Position \(BP\) Tool \(on page 64\)](#).

12. Build the mission to convert the CAS Plan symbols (CAS aircraft, CPs / IPs / HAs / BPs) to mission entities. See [Build Missions \(on page 67\)](#).
13. To use realistic dispersion for CAS munitions, enable the **CAS Dispersion** simulation option.

**NOTE**

**CAS Dispersion** is enabled by default.

For more information, see Simulation Settings in the VBS4 Administrator Manual.

The CAS scenario is prepared. As Instructor, create the CAS Mission Order that uses CAS Unit aircraft, CPs / IPs / HAs / BPs, during scenario execution.

## 2.2 VBS Close Air Support Execution

Once the CAS scenario is prepared by the Instructor, it can be executed by the JTAC player and Instructor.

### Follow these steps:

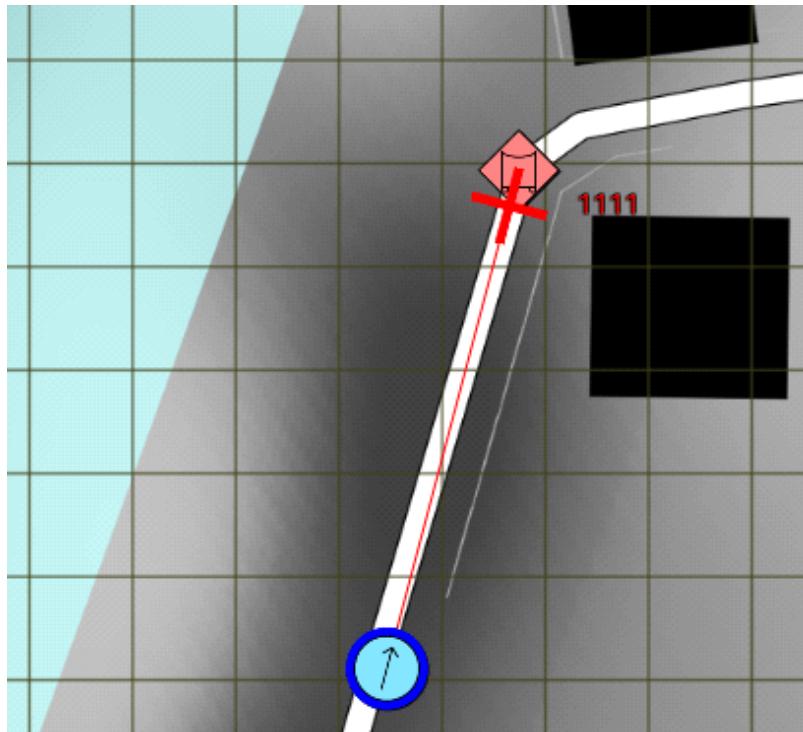
1. As the Instructor, run the CAS scenario in Execute Mode.  
Start the Scenario and open VBS Editor.  
For more information, see [Scenario Execution](#).
2. As a JTAC player, use a Laser Designator to mark the targets and get their Pulse Repetition Frequency (PRF) codes used in the CAS attack.  
For more information, see [Laser Designator \(on page 80\)](#).

- As the Instructor, use the VBS Editor to observe the laser lines in the 2D View (not available in the 3D View) and laser target markers in 2D and 3D Views.

 **TIP**

You can toggle the visualization of laser lines in the VBS Editor. For more information, see Show / Hide Laser Target Lines in the VBS4 Instructor Manual.

**Image-1: Laser line, cross target marker, and PRF code in the 2D View**



- As a JTAC player, you have the option to:
  - Communicate the CAS target position and clearance call to the Instructor over VBS Radio.  
For more information, see Using VBS Radio in the VBS Radio Manual.
  - Communicate the CAS target position to the Instructor using a CAS 5-Line or 9-Line Form.  
For more information, see Forms in the VBS4 Trainee Manual.
- As the Instructor, add a CAS Mission Order for the specified CAS target, using the instructions in [CAS Mission Order Tool \(on page 85\)](#), with the CAS Unit aircraft and CPs / IPs / HAs / BPs created in [VBS Close Air Support Preparation \(on page 8\)](#).
- As the Instructor, set the clearance call type (Cleared Hot or Abort) in the Available Aircraft Panel, based on the information received from the JTAC, using the instructions in [CAS Available Aircraft Tool \(on page 95\)](#).

The CAS Mission Order executes on the specified target.

## 2.3 VBS Close Air Support Assessment

As an Instructor, if you select **Record AAR** in [VBS Close Air Support Execution \(on page 10\)](#), after the CAS mission finishes executing, you can assess it in the After Action Review (AAR).

### Follow these steps:

1. Open the AAR recording of your CAS mission:
  - a. Select the CAS Battlespace in the Battlespaces List.
  - b. Under **Assess**, highlight the AAR recording and click **Open**.

The AAR recording of the CAS mission loads and the AAR UI opens.

2. Click the **CAS** tab in the AAR.

The CAS AAR UI opens, containing the following elements:

- CAS Event List Panel
- CAS Mission List Panel

3. In **Player Controls**, click **Play** to start the CAS mission playback for assessment.

For more information on the CAS AAR UI, see [VBS Close Air Support \(CAS\) in AAR \(on page 111\)](#).

## 3. VBS Close Air Support Example

The purpose of this example is to create a CAS scenario using VBS Plan and VBS Editor.

The scenario location should consist of a hill overlooking a valley or a plain.

The scenario is divided into Preparation and Execution phases:

- [VBS Close Air Support Example Preparation \(below\)](#)
- [VBS Close Air Support Example Execution \(on page 21\)](#)

### 3.1 VBS Close Air Support Example Preparation

The Preparation phase consists of placing all the VBS Plan and VBS Editor Objects to run the CAS mission.

**Follow these steps:**

1. Start VBS4 with VBS Radio. For more information, see Step 2 of [VBS Close Air Support Preparation \(on page 8\)](#).
2. In the VBS4 Toolbar of the Battlespaces Mode, select the **Battlespaces** tab.

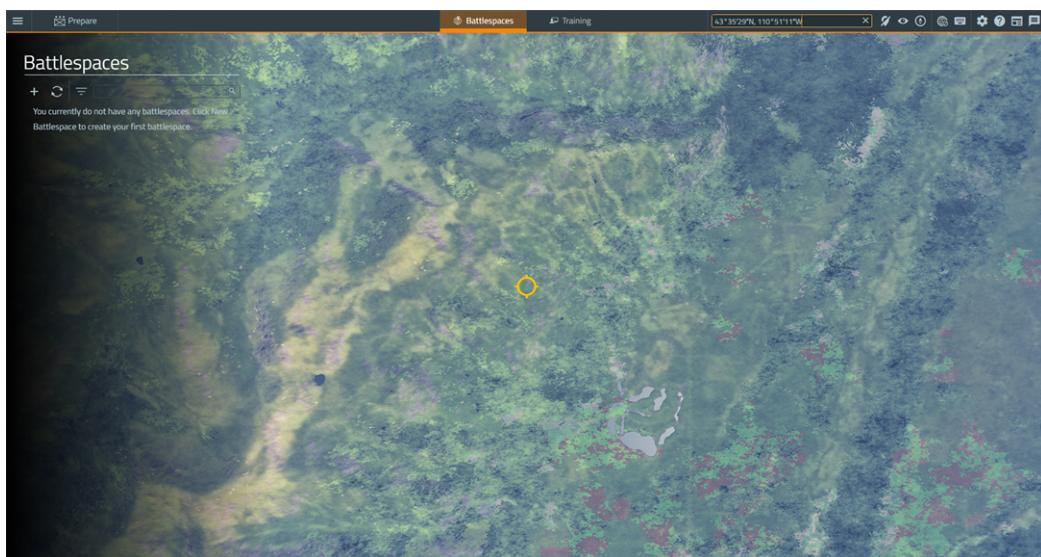
**NOTE**

When starting the VBS4 Admin Client, the Battlespaces tab is selected by default.

3. In the Search Bar of the VBS4 Toolbar, input the coordinates **43°35'29"N, 110°51'11"W**, and then press **Enter**.

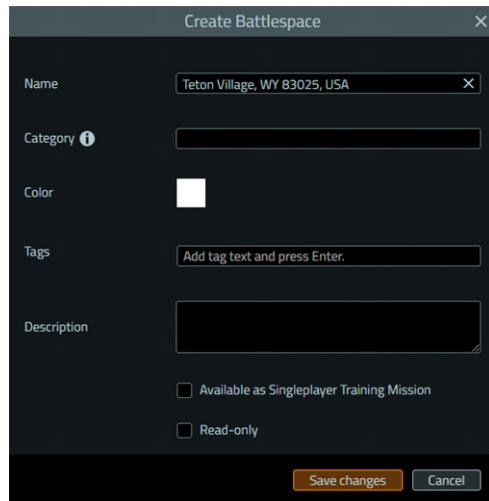
The Whole-Earth Terrain rotates directly above the specified location in the United States.

Use the **Mouse Scroll Wheel** to zoom in to view the area displayed.



4. Click **+ New Battlespace** and click the location of the **yellow circle**.

The Create Battlespace dialog opens, displaying the selected coordinates.

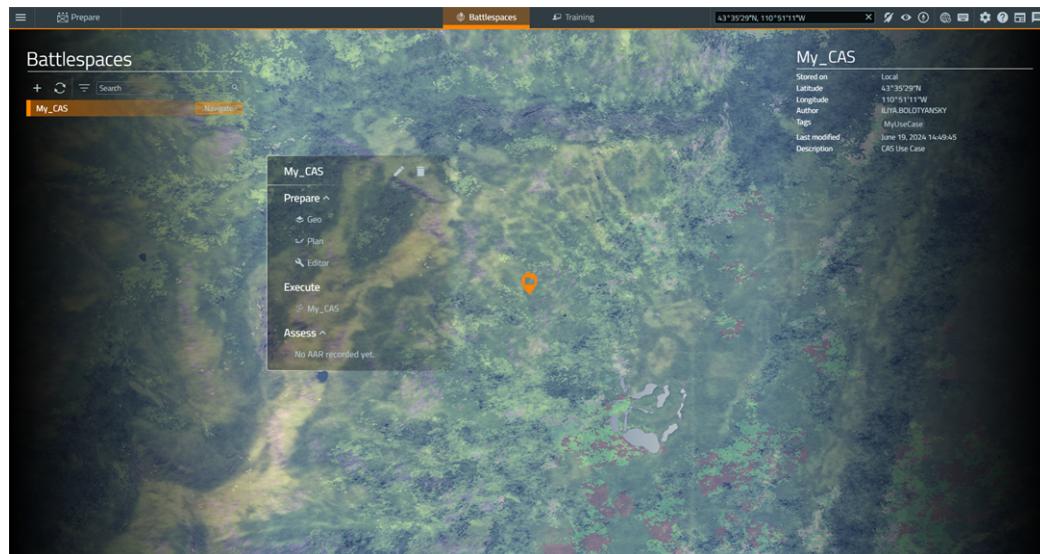


5. Input the following details in the Create Battlespace dialog:

Parameter	Value
Name	My_CAS
Color	Green #36b82c
Tags	MyUseCase
Description	CAS Use Case

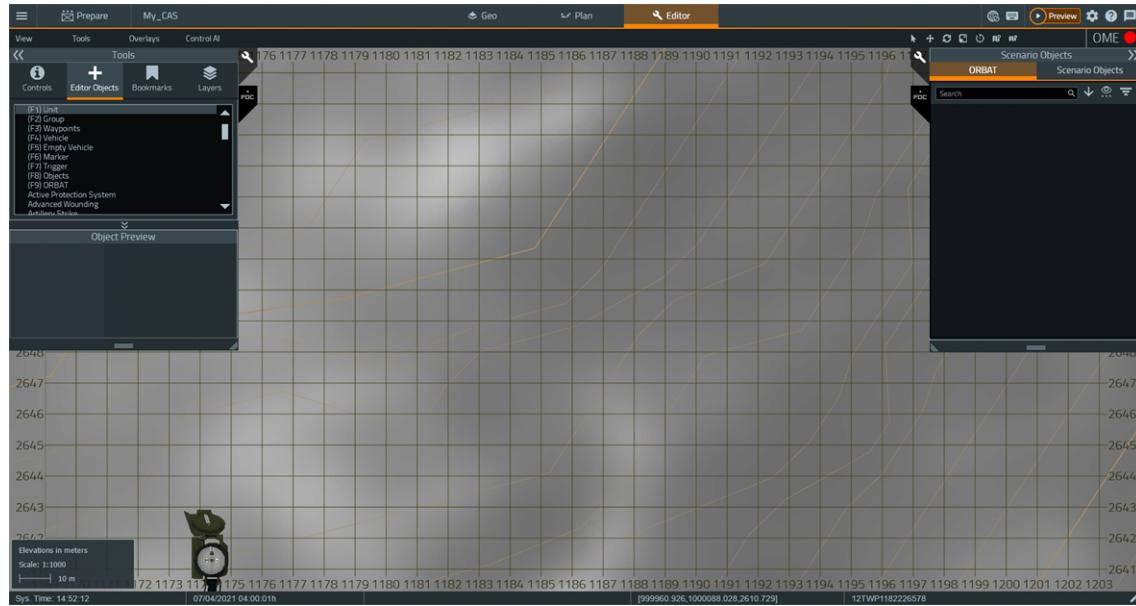
6. Click **Save Changes**.

VBS4 adds the Battlespace to the Battlespaces List.

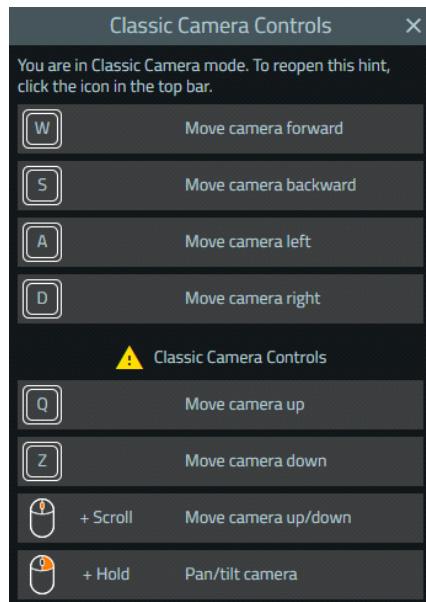


7. Select the newly created **My\_CAS** Battlespace to show a **green** icon added to the Whole-Earth Terrain in the designated location.
8. Under **Prepare > Editor**, click **Create**.

The Battlespace opens in the VBS Editor (Prepare Mode) in the 2D View.

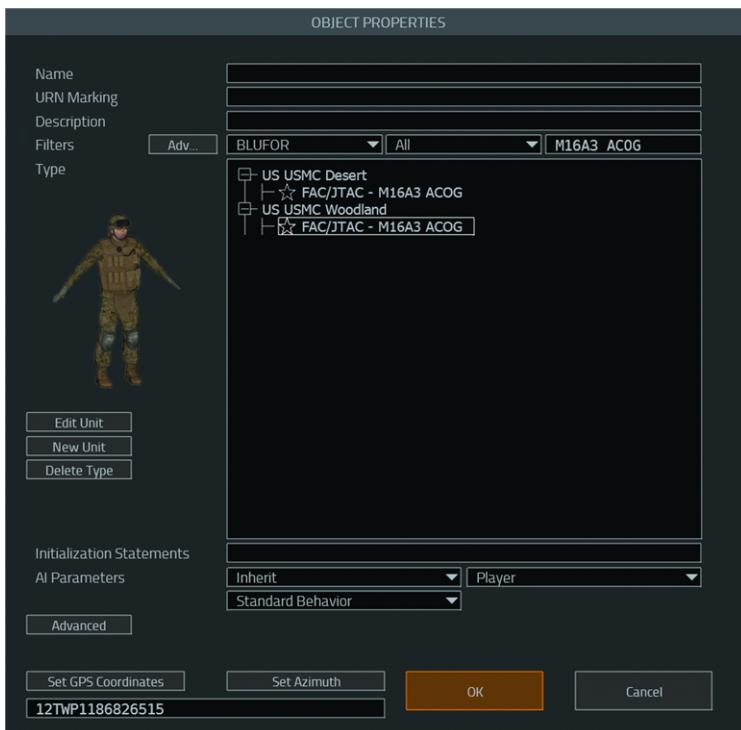


Use the Classic Camera Controls to move the camera:



## 9. Place a JTAC unit:

- a. In the Editor Objects List, select (**F1**) **Unit**.
- b. Double-click a location on the map that is on a hill with a large field of view.  
The Objects Properties dialog opens.
- c. Place a player JTAC unit of the following type: **US USMC Woodland > FAC/JTAC - M16A3 ACOG**



### **i** NOTE

Set the JTAC unit to **Player**, so that it can be selected in the Network Lobby (see Network Lobby in the VBS4 Instructor Manual).

- d. In **URN Marking**, enter: **JTAC**
- e. Click **OK**.

The JTAC unit is placed on the map.

10. Repeat step 9 to place an Instructor unit, with type **VBS Objects > Invisible Spectator (RTE)** and **URN Marking** set to **Admin**, anywhere in the vicinity of the JTAC.

### **i** NOTE

Set the Instructor unit to **Playable**, so that it can be selected in the Network Lobby.

## 11. Place an OPFOR target:

- In the Editor Objects List, select **(F4) Vehicle**.
- Double-click a location on the map that is about 2 km south-east of the JTAC.

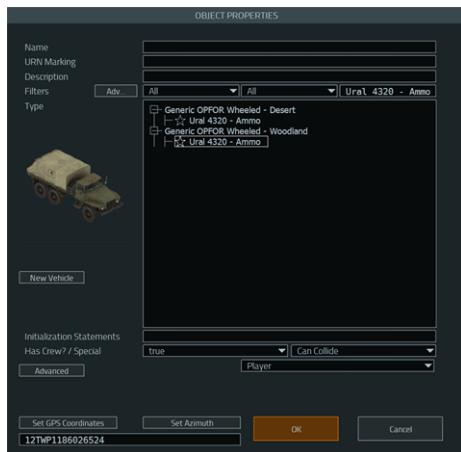
The Objects Properties dialog opens.



### TIP

To measure the distance from the target, in the VBS4 Toolbar, select **Editor** and use the Measure Distance Tool. After measuring the distance, you can delete the distance line, to avoid object cluttering.

- Place an OPFOR vehicle of the following type: **Generic OPFOR Wheeled - Woodland > Ural 4320 - Ammo**

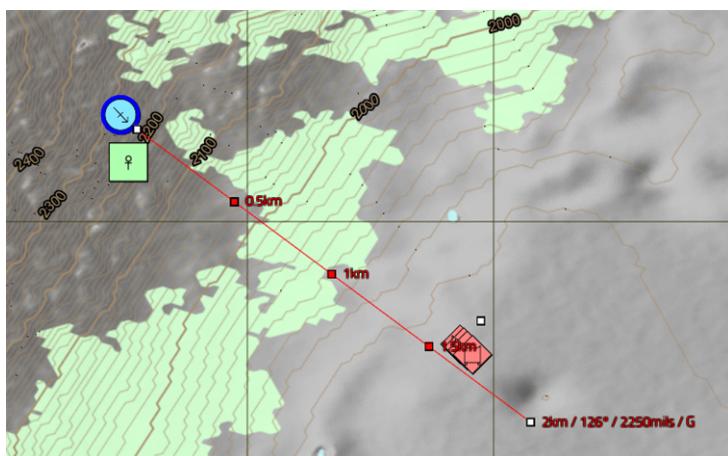


- In **URN Marking**, enter: **OPFOR\_Convoy**

- Click **OK**.

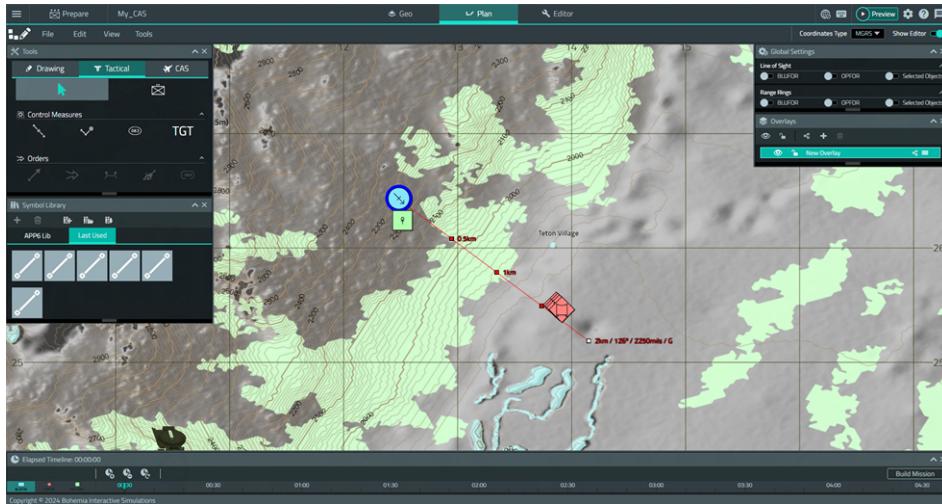
The OPFOR vehicle is placed on the map.

## 12. Repeat step 11 to place three more OPFOR vehicles of the same type.

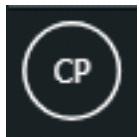


13. In the VBS4 Toolbar, select **Plan**.

The Battlespace opens in VBS Plan (Prepare Mode) in the 2D View.

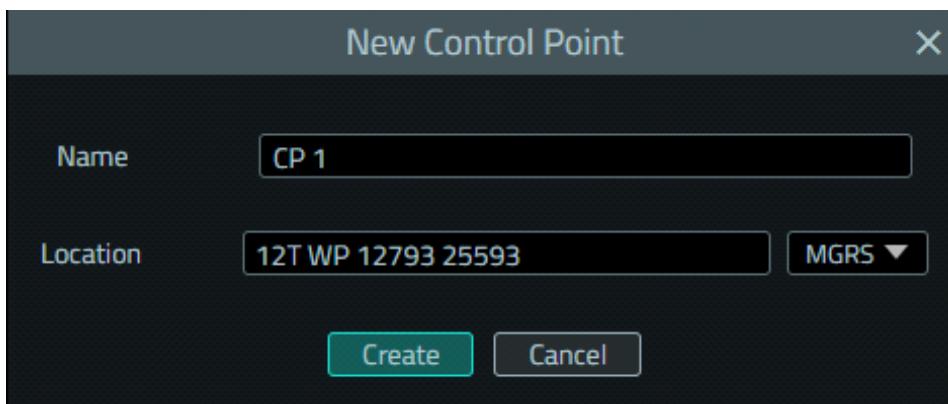


14. In the Tools Panel, select the **CAS** tab and select the **CAS Control Point (CP) Tool**.



15. Click any location on the map to place a CP.

The New Control Point dialog opens.



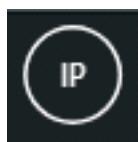
16. In **Name**, enter **CP Alpha**.

17. Click **Create**.

The CP is placed on the map.

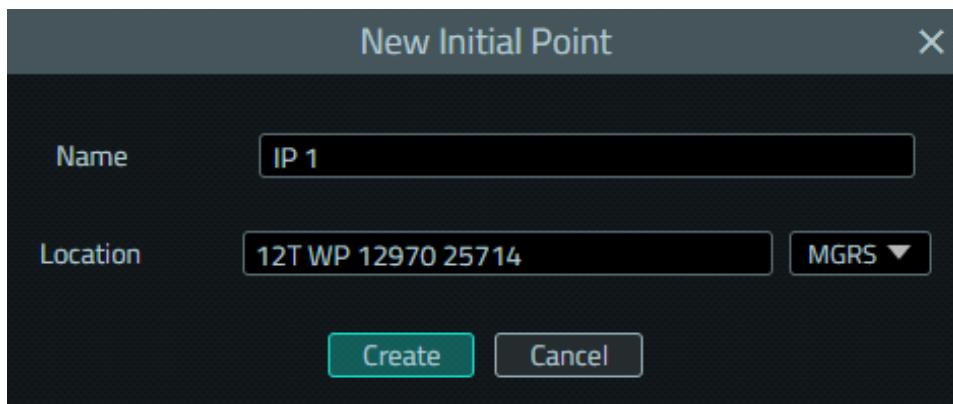
18. Repeat steps 14 - 17 to place another CP with **Name** set to **CP Bravo**.

19. Select the **CAS Initial Point (IP) Tool**.



20. Click any location on the map to place an IP.

The New Initial Point dialog opens.



21. In **Name**, enter **IP Alpha**.

22. Click **Create**.

The IP is placed on the map.

23. Select the **CAS Units Tool**.



The CAS Units table appears (you can drag the bottom-right corner to resize the table).

Units - MIL 2525C				
Affiliation	Type	Subtype	Label	Symbol Preview
AE	Select Affiliation to View Battle Dimension Options	Select Size to view Function ID Options	Select Function ID to view Size Options	SIDC
AU				Unique Designation
CA				Higher Formation
CZ				
Civilian				
FR				
GB				
Generic OPFOR				
IN				
KR				
NL				

24. Set the following:

Column	Value
Affiliation	US
Type	Air Unit
Subtype	A-10A
Label	1 Aircraft
Unique Designation	Alpha

25. Click **Place**.

The CAS Units table disappears.

26. Click any location on the map to place the CAS Unit.

27. Drag the CAS Unit, CPs, and IP so that they are positioned and distanced from each other in the following way:



28. Click **Build Mission**.

The CAS Unit symbol is converted into CAS aircraft mission entities.

The CAS scenario is prepared for execution.

To run the scenario in Preview Mode, press **Scenario Preview (H)**.



### TIP

It is recommended to test the scenario first in Preview Mode, acting both as the Instructor and JTAC Trainee.

**NOTE**

The CAS Scenario is also available as a sample Battlespace in:

`\VBS_Installation\optional\Demo_Scenarios\Battlespaces\`

Compare your scenario to the sample by deploying the sample Battlespace to VBS4.

**Follow these steps:**

- For Online use cases, do the steps in [Copy Battlespace \(below\)](#) on the VBS World Server computer, and then synchronize the Battlespace on the VBS4 Client connected to VBS World Server.
- For Offline use cases, copy the Battlespace from the `\optional\` folder.

**Copy Battlespace**

1. Open the following folder in Windows File Explorer:

`\VBS_Installation\optional\Demo_Scenarios\Battlespaces\`

2. Copy the `UseCase_Name` folders to your local Battlespaces Folder at:

`\Documents\VBS4\Battlespaces\`

Use the Battlespaces List to Filter Battlespaces using **UseCase** as the filter.

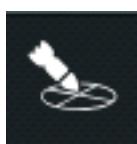
Select the sample Battlespace and select **Prepare > Editor > Open** to review the Scenario.

## 3.2 VBS Close Air Support Example Execution

You can now execute the CAS scenario with two player participants: the Instructor and JTAC Trainee.

**Follow these steps:**

1. As the Instructor, execute the CAS scenario according to Step 1 of [VBS Close Air Support Execution \(on page 10\)](#).
2. In VBS4 Toolbar, select **Plan** to switch to VBS Plan.
3. Select the CAS Unit created in Step 26 of [VBS Close Air Support Example Preparation \(on page 13\)](#).
4. In the **CAS** tab, select the **CAS Mission Order Tool**.

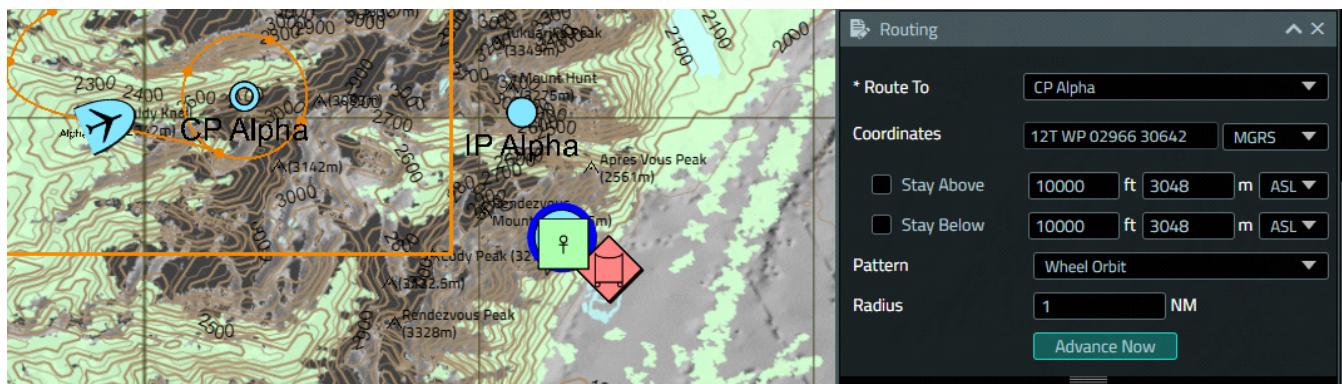


Mission Orders is enabled (prior to CAS Mission Order Tool selection, it is grayed out).

5. In **Routing**, route the CAS Unit to CP Alpha:

- In the **Route To** drop-down, select **CP Alpha**.
- Click **Advance Now**.

The CAS Unit spline (flight trajectory) appears.



6. As the JTAC Trainee, designate the OPFOR targets for the Instructor:

- Press **Binoculars (B)** and observe the OPFOR vehicles.



- As the JTAC Trainee, you have the option to:

- Communicate the CAS target position to the Instructor over VBS Radio.  
For more information, see Using VBS Radio in the VBS Radio Manual.
- Communicate the CAS target position using a CAS 5-Line or 9-Line Form.  
For more information, see Forms in the VBS4 Trainee Manual.

7. As the Instructor, receive the target information from the JTAC Trainee over VBS Radio.

**NOTE**

JTAC Trainees can make mistakes. The purpose of this CAS example scenario is to allow Instructors to incorporate incorrect information provided by the JTAC Trainee. This allows the JTAC Trainee to see the risks and negative consequences.

Specific military doctrine affects how JTAC Trainees call for CAS. The focus of this example is to use the VBS Close Air Support UI, to execute a CAS Mission Order.

8. In **Select Aircraft**, set the following Measures:

- In the **Observer** drop-down, select **JTAC**.
- In the **Initial Point** drop-down, select **IP Alpha**.

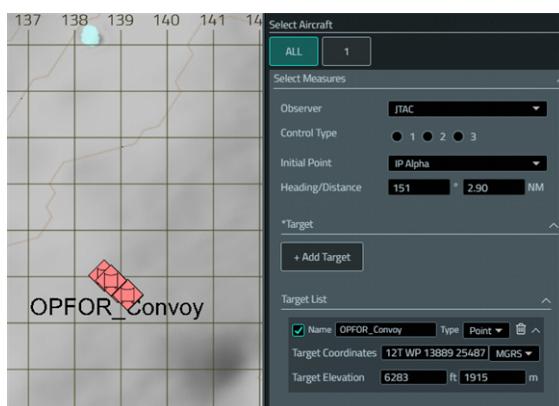
9. In **Select Aircraft**, create a Target:

- a. Click **Add Target** to add a CAS target, based on the target information received from the JTAC Trainee.
- b. Click anywhere close to the OPFOR vehicle symbols on the map.

The New Point Target dialog opens.

- c. Set **Name** to **OPFOR\_Convoy** and click **Create**.

The CAS target is created under **Target List**.



You can edit existing CAS targets under **Target List**:

- Change the target properties in the relevant entries.
- Drag the target marker on the map to relocate the target.
- Click the **Trash** icon to delete the target.



10. In **Select Aircraft**, specify the mission detail:

- In the **Engage** drop-down, select one of the following settings:
  - **Immediate**
  - **Time On Target**
  - **Time To Target**

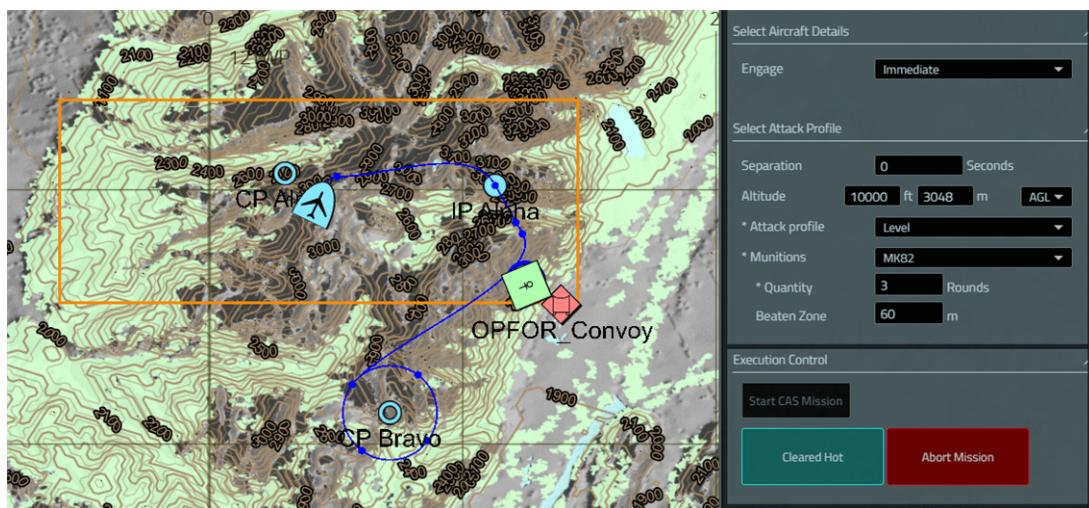
For more information, see [Select Aircraft Details Properties \(on page 93\)](#).

- Fill in the other properties based on the JTAC communication:

Property	Value
<b>Mark Type</b>	None
<b>Friendly Location</b>	NW
<b>Egress Location</b>	CP Bravo
<b>Altitude</b>	10000 ft AGL
<b>Attack Profile</b>	Level
<b>Munitions</b>	MK82
<b>Quantity</b>	Any value between 1 - 4
<b>Beaten Zone</b>	60 m

- Click **Start CAS Mission**.

The CAS Mission Order is created and started, with the **Cleared Hot** and **Abort Mission** buttons becoming enabled.



11. As the JTAC Trainee, when ready, communicate the Cleared Hot to the Instructor over VBS Radio.

12. As the Instructor, click **Cleared Hot**.

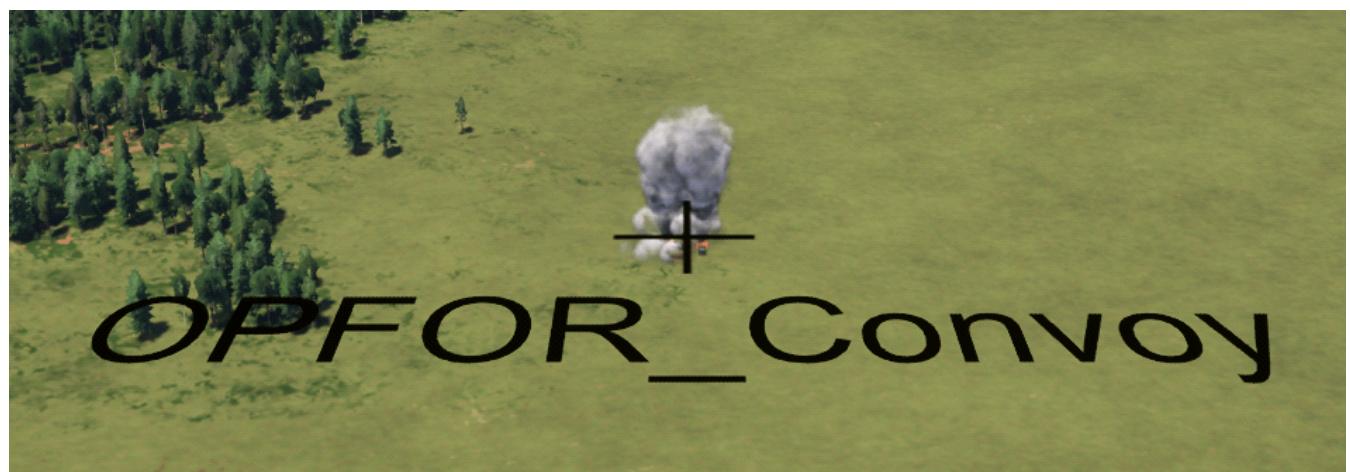
The Mission List shows the **On Mission** status.

The screenshot displays two windows from the VBS4 software. The top window is titled "Air Section Loadout" and contains the following information:  
Name: A-10A-1  
GAU-8 x 1350 Hydra HE x 38 MK82 x 4

The bottom window is titled "Mission List" and shows the following table:

Name	Status	Start Time	End Time
A-10A	On Mission	0:03:49	0:06:00

The Instructor and JTAC Trainee can observe the result of the munitions hitting the target.



The CAS scenario is executed.

## 4. VBS Close Air Support UI Overview

The VBS Close Air Support UI is part of the VBS Plan UI and consists of the following main elements:

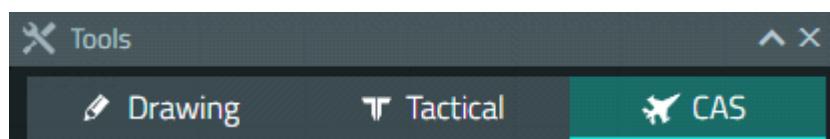
- **CAS Tools Panel (below)**
- **CAS Event and Mission Lists (on page 29)**

**Image-2: VBS Plan UI with CAS tools**



### 4.1 CAS Tools Panel

The VBS Plan Tools Panel contains the **CAS** tab with the CAS tools.



The CAS tools are:

#### General CAS Tools

CAS Tool	Icon	Description
Select		Used to select overlay objects.

CAS Tool	Icon	Description
CAS Units		<p>Used to create CAS MIL-2525C Units.</p> <p>To use the tool, see <a href="#">CAS Units Tool (on page 30)</a>.</p> <p>To customize the CAS aircraft and munitions parameters, see <a href="#">CAS Unit Parameters (on page 35)</a>.</p>

## Control Measure CAS Tools

### Control Measures ▼

Expand Control Measures (expanded by default):

CAS Tool	Icon	Description
Control Point (CP)		<p>Use the Control Point (CP) Tool for fixed-wing aircraft to:</p> <ul style="list-style-type: none"> <li>Define Holding Areas (HAs).</li> <li>Define egress points.</li> <li>Check-in with designated JTAC.</li> <li>Maneuver prior to moving to the Initial Point (IP) (see <a href="#">CAS Initial Point (IP) Tool (on page 58)</a>).</li> </ul> <p>To use the tool, see <a href="#">CAS Control Point (CP) Tool (on page 55)</a>.</p>
Initial Point (IP)		<p>Used by fixed-wing aircraft as the starting point for maneuvering to the target.</p> <p>To use the tool, see <a href="#">CAS Initial Point (IP) Tool (on page 58)</a>.</p>
Holding Area (HA)		<p>Used by rotary-wing aircraft check-ins and CAS briefing prior to moving to the Battle Position (BP).</p> <p>To use the tool, see <a href="#">CAS Holding Area (HA) Tool (on page 61)</a>.</p>
Battle Position (BP)		<p>Used by rotary-wing aircraft to define the point where attacks on the target commence.</p> <p>To use the tool, see <a href="#">CAS Battle Position (BP) Tool (on page 64)</a>.</p>
No Fly Zone (NFZ)		<p>Used to specify where aircraft flight is restricted.</p> <p>To use the tool, see <a href="#">CAS No Fly Zone (NFZ) Tool (on page 45)</a>.</p>
No Fire Area (NFA)		<p>Used to specify where aircraft cannot fire munitions.</p> <p>To use the tool, see <a href="#">CAS No Fire Area (NFA) Tool (on page 50)</a>.</p>

## Available Aircraft CAS Tool

Name	Status	Controls
A-10A	N/A	<input type="button" value="CH"/> <input type="button" value="Abort"/>
A-10A-1	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>
A-10A-2	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>
A-10A-3	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>
A-10A-4	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>
F-16C	N/A	<input type="button" value="CH"/> <input type="button" value="Abort"/>
F-16C-1	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>
F-16C-2	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>
F-16C-3	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>
F-16C-4	On hold	<input type="button" value="CH"/> <input type="button" value="Abort"/>

Expand **Available Aircraft** (expanded by default). The tool allows you to:

- Observe CAS aircraft status at CAS mission runtime.
- Control individual CAS aircraft at CAS mission runtime using Cleared Hot (CH) / Abort functions.
- Show / hide CAS aircraft splines (trajectories) and REDs (Risk-Estimate Distances).

For more information, see [CAS Available Aircraft Tool \(on page 95\)](#).

## CAS Order Tools

Expand **Orders** (expanded by default):



### WARNING

If no CAS Unit object is selected, the CAS Order Tools are disabled. For information on how to create a CAS Unit object, see the [CAS Units Tool \(on page 30\)](#).

CAS Tool	Icon	Description
CAS Mission Order		Used to create a CAS Mission Order for a CAS Unit object (see <a href="#">CAS Units Tool (on page 30)</a> ). To use the tool, see <a href="#">CAS Mission Order Tool (on page 85)</a> .



### NOTE

When CAS Mission Orders execute, the [CAS Mission List Panel \(on page 100\)](#) and [CAS Event List Panel \(on page 97\)](#) populate with CAS mission- and event-related information.

## 4.2 CAS Event and Mission Lists

The Event List Panel shows the CAS events that happened during the CAS mission.

The Event List Panel is available in the Preview / Execute / Assess Modes.

In Assess Mode, CAS Events are added to the AAR Timeline (see AAR Playback and the User Interface in the VBS4 AAR Manual).

Type	Description	Designation	Time
✓	Mission created	A-10A-1	0:04:32
✓	Egressing	A-10A-1	0:09:26
✓	Off Dry	A-10A-1	0:09:26
⚠	No Cleared Hot Given	A-10A-1	0:09:26
⚠	Not Able to Fire	A-10A-1	0:09:26

For more information, see [CAS Event List Panel \(on page 97\)](#).

The Mission List shows all the CAS missions performed by individual aircraft in the CAS Unit.

The Mission List Panel is available in the Preview / Execute / Assess Modes.

Name	Status	Start Time	End Time
A-10A	On Mission	0:04:32	0:06:45

For more information, see [CAS Mission List Panel \(on page 100\)](#).

## 5. CAS Units Tool

You can create CAS aircraft units on the map, represented by the CAS Unit Object, and give them CAS Orders (see [CAS Mission Order Tool \(on page 85\)](#)) to execute.

To customize the CAS aircraft and munitions parameters, see [CAS Unit Parameters \(on page 35\)](#).



### NOTE

It is not possible to use the ORBAT Editor (see [ORBAT Editor in the VBS4 Editor Manual](#)) to create custom air ORBATS.

Do any of the following:

- [Create a CAS Unit Object \(on the next page\)](#)
- [Modify a CAS Unit Object \(on page 33\)](#)

### NOTE

When the mission is built (see [Build Missions \(on page 67\)](#)), CAS Unit Objects are converted to VBS4 Control AI personnel and aircraft entities.

When the mission runs, the built VBS4 AI personnel and aircraft entities execute CAS Orders (see [CAS Mission Order Tool \(on page 85\)](#)), using CAS Control Measures (see [CAS Initial Point \(IP\) Tool \(on page 58\)](#), [CAS Control Point \(CP\) Tool \(on page 55\)](#), [CAS Holding Area \(HA\) Tool \(on page 61\)](#), [CAS Battle Position \(BP\) Tool \(on page 64\)](#), [CAS No Fly Zone \(NFZ\) Tool \(on page 45\)](#), [CAS No Fire Area \(NFA\) Tool \(on page 50\)](#)), some of which represent waypoints.

Rebuilding a mission resets the VBS4 entities based on their CAS Objects representations.

### WARNING

The following applies to CAS Units: if you build a mission, go back to the VBS Plan, and delete the CAS Objects representing the CAS Unit mission entities, the latter are not removed and have to be deleted manually in the Editor. Also, if you make any changes to CAS Unit mission entities represented by CAS Objects in the Editor, rebuilding a mission in the VBS Plan resets any of those changes.

## 5.1 Create a CAS Unit Object

You can create a CAS Unit object based on the MIL-STD-2525C doctrine, visible in 2D / 3D.

### NOTE

In a group command structure, only the highest echelon symbology is displayed.

**Follow these steps:**

1. In the [CAS Tools Panel](#) (on page 26), click the **CAS Units Tool**.



### NOTE

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see View Menu Options in the VBS Plan Manual) to show all the VBS Plan UI panels.

### NOTE

To stop drawing the object, press **Esc**. This removes the object from the map.

The CAS Units table appears (you can drag the bottom-right corner to resize the table).

Affiliation	Type	Subtype	Label	Symbol Preview
CZ	Air Unit	A-10A	1 Aircraft	
Civilian	Armored Brigade Co...	A-10C	2 Aircraft	
FR	Ground Unit	AC-130H	4 Aircraft	
GB	Infantry Brigade Co...	AC-130U		
IN		AC-130W		
KR		AH-1W		
NL		AH-1W + UH-1Y		
NZ		AH-1Z		
SE		AH-12 + UH-1Y		
US		AH-64A		
		AH-6J		

New ORBAT    Edit ORBAT    Place    Cancel

2. Select the CAS Unit **Affiliation**, **Type**, **Subtype**, **Label**, based on the available values in each column.

**TIP**

To create a new ORBAT or edit the ORBAT of the currently selected CAS Unit in the ORBAT Editor (see the VBS4 Editor Manual), click **New ORBAT** or **Edit ORBAT**, respectively.

**NOTE**

None of the CAS ORBATS can be edited.

3. Click **Place**.

The CAS Units table disappears.

4. Click a position on the map to place the CAS Unit.

The CAS Unit object is created on the map and is added to the Available Aircraft Panel (see [CAS Available Aircraft Tool \(on page 95\)](#)).

5. To be able to preview your mission, as described in the VBS Plan Workflow (see VBS Plan Overview in the VBS Plan Manual), you need to have at least one playable unit in the mission, and build the mission:

**WARNING**

The following considerations apply:

- A mission that does not have at least one playable unit, and is not built, cannot be previewed.

To add a playable unit in VBS Editor, see [Adding Units in the VBS4 Editor Manual](#).

- Rebuilding a mission overrides any changes made to the built CAS Unit entities in the VBS Editor (Prepare Mode).

For how to build a mission, see [Build Missions \(on page 67\)](#).

6. To assign aircraft routing and CAS Orders to the CAS Unit, see [CAS Mission Order Tool \(on page 85\)](#).

To modify the CAS Unit object, see [Modify a CAS Unit Object \(on the next page\)](#).

## 5.2 Modify a CAS Unit Object

You can modify an existing CAS Unit object.

Click the **Select Tool**.

### NOTE

The Select Tool has the following considerations:

- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see [Managing Overlays](#) in the VBS Plan Manual.

Select the object by clicking it.

A bounding box appears around the CAS Unit object.

### NOTE

The bounding-box points are disabled, as it is not possible to use them to resize a CAS Unit object.

You can do any of the following:

- Drag the object to relocate it to a different position on the map.
- Change the default CAS Unit loadout in **Air Section Loadout**:

### NOTE

For information on how to configure aircraft loadouts, see [Loadouts](#) in [CAS Unit Parameters](#) (on page 35).

- For all the aircraft in the CAS Unit, select one of the available loadouts in the **Air Section** drop-down.
- For a specific CAS Unit aircraft, select one of the available loadouts from the drop-down next to the specific CAS Unit aircraft.
- Change the CAS Unit clearance call type (Cleared Hot or Abort) using the **Available Aircraft Panel**. For more information, see [CAS Available Aircraft Tool](#) (on page 95).
- To assign aircraft routing and CAS Orders to the CAS Unit, see [CAS Mission Order Tool](#) (on page 85).
- Modify the [Specific Properties](#) (on the next page).

- Delete the object by pressing **Delete**.

**NOTE**

Associated Editor objects are automatically deleted when you rebuild the mission (see [Build Missions \(on page 67\)](#)), if you do not delete them manually.

The CAS Unit object is modified.

## 5.3 CAS Unit Properties

Set the following CAS Unit properties.

### 5.3.1 Specific Properties

**NOTE**

All the Unit Properties, apart from **Name**, can only be set in Prepare Mode, while **Name** can also be set in Preview / Execute Mode.

Specific Property	Description
<b>Name</b>	Tactical / CAS Unit name.  <b>NOTE</b> The <b>Playable Unit</b> checkbox controls whether the Tactical Unit is playable in Execute Mode.
<b>Unique Designation</b>	Text modifier for units, equipment, and installations, which uniquely identifies a particular symbol or track number.
<b>Location</b>	Location based on the <b>Coordinates Type</b> (see Plan Toolbar in the VBS Plan Manual).

# 6. CAS Unit Parameters

You can modify some of the CAS Unit (see [CAS Units Tool \(on page 30\)](#)) parameters to change the aircraft and munitions functionality.

The modification is done using a JSON file, called `cas_parameters.json`, located in:

`\VBS_Installation\Components\VBSChalkboard\config\`

## WARNING

The following considerations apply:

- When modifying `cas_parameters.json`, make sure VBS4 is not running.
- Use the same `cas_parameters.json` on all computers in your VBS4 network (see VBS4 Deployment Options in the VBS4 Deployment Guide). Having different versions of `cas_parameters.json` on the computers in your VBS4 network may lead to unexpected results.

The CAS Unit parameters are divided into the following sections:

- [Loadouts \(below\)](#)
- [Munitions \(on the next page\)](#)
- [Dispersion \(on page 39\)](#)
- [Aircraft \(on page 42\)](#)

## 6.1 Loadouts

You can configure aircraft loadouts and then assign these loadouts to specific aircraft.

Loadouts are specified in the `Loadouts` JSON object:

```
"Loadouts": {  
    "Loadout Name 1": {  
        "Munition Type Name 1": Munition Quantity,  
        "Munition Type Name 2": Munition Quantity,  
        ...  
    },  
    "Loadout Name 2": {  
        ...  
    },  
    ...  
}
```

**TIP**

Set the munition quantity to -1 for unlimited munitions.

**WARNING**

When the scenario executes, there is no way to rearm an aircraft with a limited munitions supply.

Each loadout can contain several munition types. To specify munition types, see [Munitions \(below\)](#).

Also, aircraft can have multiple loadouts. See [Aircraft \(on page 42\)](#).

**Example:**

```
"Loadouts": {  
    "ARH default loadout": {  
        "Hydra HE": 14, "AGM-114K": 8, "30M M781": 450  
    },  
    "ARH loadout 2": {  
        "AGM-114K": 16, "30M M781": 450  
    }  
}
```

See the [Munitions \(below\)](#) example for definitions of some munition types used in this example.

## 6.2 Munitions

You can configure munition types and then assign these types to specific aircraft.

Munition types are defined in the [AmmoTypes](#) JSON object:

```
"AmmoTypes": {  
    "Munition Type Name 1": {  
        "class": "Munition Class Name",  
        "simulationType": "Simulation Type Name",  
        "weaponLock": "Target-Locking Type Name (for Guided Munitions)",  
        "RiskEstimateDistances": {  
            "lethalRange": Lethal Range (Meters),  
            "indirectHitRange": Indirect Hit Range (Meters)  
        },  
        "minAttackRange": Minimum Attack Range (Meters),  
        "optimalAttackRange": Optimal Attack Range (Meters),  
        "rateOfFire": Number of seconds between each shot,  
        "shotSpeed":  
            Munition Muzzle Speed (Meters per Second) (increment to the aircraft velocity),  
    }  
}
```

```

    "logAllImpacts": Log ALL Munition Impacts? (true or false),
    "dispersion": Dispersion Interpolation Table Name"
},
"Munition Type Name 2": {
    ...
},
...
}

```

The following **AmmoTypes > Munition Type Name** parameters require special attention:

Parameter	Description
<b>class</b>	Represents an existing munition configuration class in VBS4. For more information on munition classes, see Ammunition Configuration in the VBS Developer Reference.
<b>simulationType</b>	Represents an existing munition simulation type, which can be: <ul style="list-style-type: none"> <li><b>bomb</b> - Unguided bomb simulation.</li> <li><b>cannon</b> - Cannon (such as a machine gun) simulation.</li> <li><b>rocket</b> - Unguided rocket simulation.</li> <li><b>missile</b> - Guided missile simulation.</li> <li><b>sensor</b> - Sensor (such as an optic sensor) simulation.</li> </ul> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <b>NOTE</b>            This simulation type requires only the definition of the <b>class</b> and <b>simulationType</b> parameters. No other <b>AmmoTypes &gt; Munition Type Name</b> parameters are required.         </div>
<b>weaponLock</b>	Represents the guided-munition target-locking type, which can be: <ul style="list-style-type: none"> <li><b>IR</b> - Infrared (IR) target locking.</li> <li><b>PRF</b> - Pulse Repetition Frequency (PRF) target locking.</li> <li><b>GPS</b> - Global Positioning System (GPS) target locking.</li> </ul> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <b>NOTE</b>            Only applies to <b>simulationType &gt; missile</b> or <b>bomb</b> munitions.         </div>
<b>logAllImpacts</b>	The value of this parameter can be: <ul style="list-style-type: none"> <li><b>true</b> - Logs every munition impact as a <b>Munition Impact</b> event in the <b>CAS Event List Panel</b> (on page 97).</li> <li><b>false</b> - Only logs the first munition impact as a <b>Munition Impact</b> event in the <b>CAS Event List Panel</b> (on page 97).</li> </ul>

Parameter	Description
<code>dispersion</code>	The name of a Dispersion Interpolation Table (DIT). To define a DIT, see <a href="#">Dispersion (on the next page)</a> .

Once munition types are defined, they can be used in the `Loadouts` JSON (see [Loadouts \(on page 35\)](#)).

#### Example:

```
"AmmoTypes": {  
    "AGM-114K": {  
        "class": "vbs2_ammo_M_Hellfire_AGM114K",  
        "simulationType": "missile",  
        "weaponLock": "PRF",  
        "RiskEstimateDistances": {  
            "lethalRange": 40,  
            "indirectHitRange": 110  
        },  
        "minAttackRange": 2000.0,  
        "optimalAttackRange": 9000.0,  
        "rateOfFire": 1,  
        "shotSpeed": 700,  
        "logAllImpacts": true,  
        "dispersion": "Missile9"  
    }  
    "30M M781": {  
        "class": "vbs2_ammo_B_30mm_SAPHEI",  
        "simulationType": "cannon",  
        "RiskEstimateDistances": {  
            "lethalRange": 35,  
            "indirectHitRange": 125  
        },  
        "minAttackRange": 2000.0,  
        "optimalAttackRange": 4000.0,  
        "rateOfFire": 0.25,  
        "shotSpeed": 700,  
        "logAllImpacts": true,  
        "dispersion": "Large"  
    }  
}
```

For the `Missile9` and `Large` DIT definitions, see the [Dispersion \(on the next page\)](#) example.

## 6.3 Dispersion

You can configure dispersion for specific CAS munitions, for all aircraft armed with these munitions to use. Dispersion allows projectiles to miss targets by a certain margin of error. To control the margin of error, Dispersion Interpolation Tables (DITs) are used

### **NOTE**

To enable / disable the CAS dispersion specified in `cas_parameters.json`, see **CAS Dispersion** in the Simulation Settings in the VBS4 Administrator Manual. Disabling dispersion is equivalent to setting it to 0.

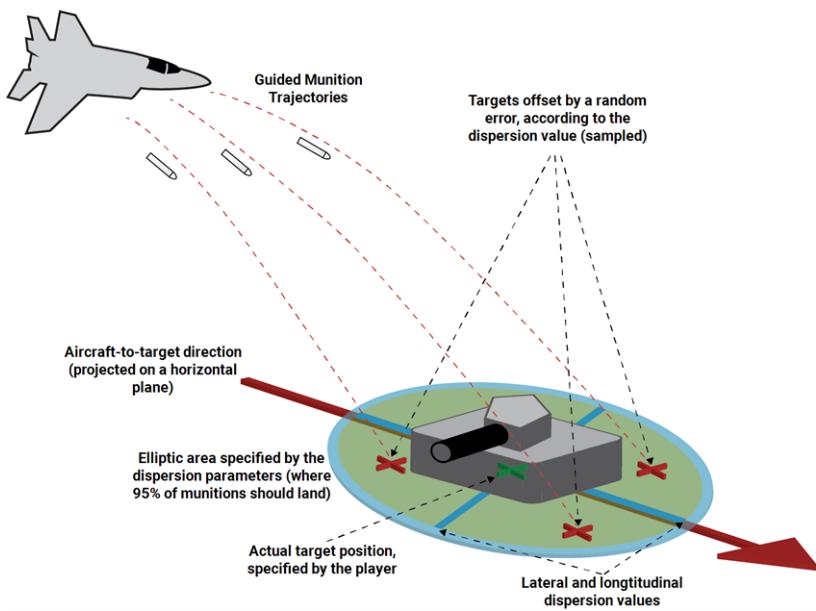
### Dispersion Interpolation Table (DIT)

The dispersion behavior is simulated by offsetting the target position by a random error vector, which allows you to directly control the expected size of the error vector, and achieve predictable dispersion.

The dispersion behavior is defined by lateral and longitudinal values (distances). The longitudinal value corresponds to the variance of the error vector along the aircraft-to-target direction, while the lateral value to the horizontal orthogonal direction. This means that the lateral dispersion value specifies half of the width of the area, where 95% of shots land, and the longitudinal dispersion value specifies half of the length of the area, where 95% of shots land.

The error vector lies in the horizontal plane (in the 3D space). It is picked at random with normal distribution. The parameters of the normal distribution are set in such way that (statistically) 95% of the picked vectors lie inside an ellipse with the dimensions specified by the DIT (the lateral value is used for the semi-minor axis of the ellipse, while the longitudinal value for the semi-major axis).

### Image-3: Guided munition dispersion example



The DIT is used to look up specific dispersion values (lateral and longitudinal) for specific situations. The JSON parameters to look up the values are:

- **distance** - Straight-line distance (in meters) from the aircraft to its target. A DIT can contain several distance values.
  - **diveAngle** - Dive angle (in degrees) that creates the slope of the line connecting the aircraft to its target. A DIT can contain several dive-angle values.

## NOTE

The following considerations apply:

- Dive angle depends on the aircraft and target positions, not the aircraft speed. The DIT consists of lines with dive angles, and one or more of the distance values for each dive angle. Dispersion values are looked up / interpolated based on the actual distance and dive angle.
  - If a DIT line consists only of one entry for distance, this value is used for every distance. If the DIT consists only of one line, this line is used for every dive-angle value. DIT lines do not necessarily need to be in ascending order, nor do they need to have the same number of entries.
  - If the actual distance / dive angle is outside the range specified in the DIT, then the closest available distance / dive angle in the DIT to the actual distance / dive angle is used. For example, if the actual distance is 20000m, and the closest distance in the DIT is 1000m, then 1000m is used. Similarly, if the DIT contains 45- and 60-degree dive angles, while the actual dive angle is 0 degrees, then the 45-degree dive angle is used.

You can create new DITs to use for specific munitions. DITs are defined in the

**AmmoDispersionTypes** JSON object:

```
"AmmoDispersionTypes": {  
    "DIT Name 1": [  
        {  
            "diveAngle": Dive Angle Value (Degrees),  
            "dispersions": [  
                {  
                    "distance": Distance Value (Meters),  
                    "lateral": Semi-Major Axis Value (Meters),  
                    "longitudinal": Semi-Minor Axis Value (Meters)  
                }  
            ]  
        }  
    ],  
    "DIT Name 2": [  
        {  
            "diveAngle": Dive Angle Value (Degrees),
```

```
"dispersions": [
    {
        "distance": Distance Value (Meters),
        "lateral": Semi-Major Axis Value (Meters),
        "longitudinal": Semi-Minor Axis Value (Meters)
    }
],
...
}
```

### Example:

This example contains the following DIT definitions:

- **Large** - Large dispersion, with several dive angles.
- **Missile9** - This DIT always returns the same value, regardless of distance and dive angle, which can be useful for guided missiles.

```
"AmmoDispersionTypes": {
    "Large": [
        {
            "diveAngle": 0,
            "dispersions": [
                { "distance": 1000, "lateral": 20, "longitudinal": 40 },
                { "distance": 2000, "lateral": 30, "longitudinal": 50 },
                { "distance": 5000, "lateral": 40, "longitudinal": 60 }
            ]
        },
        {
            "diveAngle": 15,
            "dispersions": [
                { "distance": 1000, "lateral": 15, "longitudinal": 25 },
                { "distance": 5000, "lateral": 30, "longitudinal": 50 }
            ]
        },
        {
            "diveAngle": 45,
            "dispersions": [
                { "distance": 500, "lateral": 10, "longitudinal": 15 },
                { "distance": 2000, "lateral": 15, "longitudinal": 20 },
                { "distance": 5000, "lateral": 25, "longitudinal": 30 }
            ]
        }
    ],
    "Missile9": [
        ...
    ]
}
```

```
{  
    "diveAngle": 0,  
    "dispersions": [  
        { "distance": 500, "lateral": 9, "longitudinal": 9 }  
    ]  
},  
]  
}
```

Munitions are defined in the [AmmoTypes](#) JSON object (see [Munitions \(on page 36\)](#)). To associate a DIT with a munition type, use the [dispersion](#) parameter in the munition type definition:

```
"AmmoTypes": {  
    "Munition Type Name": {  
        ...  
        "dispersion": "DIT Name"  
    },  
}
```

## 6.4 Aircraft

You can configure the aircraft itself and use the [Loadouts \(on page 35\)](#) (and, consequently, [Munitions \(on page 36\)](#) and [Dispersion \(on page 39\)](#)) configuration.

Aircraft are specified in the [Aircrafts](#) JSON object:

```
"Aircrafts": {  
    "Aircraft Name": {  
        "maxDiveAngle": Maximum Dive Angle (Degrees),  
        "maxRollAngle": Maximum Roll Angle (Degrees),  
        "maxAngularVelocity": Maximum Angular Velocity (Degrees per Second),  
        "maxAttackPitch": Maximum Attack Pitch (Degrees),  
        "minAttackPitch": Minimum Attack Pitch (Degrees),  
        "cruiseSpeed": Cruise Speed (Meters per Second),  
        "attackSpeed": Attack Speed (Meters per Second),  
        "holdingRadius": Routing Area Radius (Meters),  
        "egressTravelLength": Distance to Egress Location (Meters),  
        "minFlyAltitude": Minimal Flight Altitude (Meters),  
        "flySpeed": Flight Speed (Meters per Second),  
        "diveSpeed": Dive Speed (Meters per Second),  
        "flyAltitude": Flight Altitude (Meters),  
        "loadouts": ["Loadout Name 1", "Loadout Name 2", ...]  
    }  
}
```

Aircraft Parameter	Units of Measurement	Description
<code>maxDiveAngle</code>	Degrees	Maximum dive angle achieved when performing a Dive attack pattern (see <b>Attack Profile</b> in <a href="#">CAS Mission Order Tool (on page 85)</a> ).
<code>maxRollAngle</code>	Degrees	Used when calculating the roll angle based on spline curvature, limits the resulting roll angle at a point on the spline.
<code>maxAngularVelocity</code>	Degrees/s	Used when calculating the roll angle based on spline curvature, limits the angular speed at a point on the spline at which the <code>maxRollAngle</code> is achieved.
<code>maxAttackPitch</code>	Degrees	Used to validate a firing solution for rotary-wing aircraft, specifically the firing angle of the aircraft at the calculated firing position.
<code>minAttackPitch</code>	Degrees	Used to validate a firing solution for rotary-wing aircraft, specifically the firing angle of the aircraft at the calculated firing position.
<code>cruiseSpeed</code>	m/s	Aircraft attempts to accelerate to this speed when approaching the IP or BP.
<code>attackSpeed</code>	m/s	Used by rotary-wing aircraft in a Level attack pattern (see <b>Attack Profile</b> in <a href="#">CAS Mission Order Tool (on page 85)</a> ).
<code>holdingRadius</code>	Meters	Default Holding Area radius when egressing from a mission.
<code>egressTravelLength</code>	Meters	Distance the aircraft travels during egress, when a specific egress direction is specified.
<code>minFlyAltitude</code>	Meters	AGL and is used during terrain following and path / spline planning, so the spline does not go under this value.
<code>flySpeed</code>	m/s	Aircraft attempts to accelerate to this speed when approaching a Holding Area.
<code>diveSpeed</code>	m/s	Aircraft attempts to accelerate to this speed when performing the actual dive during a Dive attack pattern (see <b>Attack Profile</b> in <a href="#">CAS Mission Order Tool (on page 85)</a> ).
<code>flyAltitude</code>	Meters	Overrides the default Holding Area applied to aircraft when starting a mission for the first time.
<code>loadouts</code>	<code>Loadout Name 1</code> , <code>"Loadout Name 2"</code> , ...	List of unique identifiers for one or more loadouts, specified in the <a href="#">Loadouts (on page 35)</a> class.

In `loadouts`, use one or more of the loadouts that you defined in [Loadouts \(on page 35\)](#).

**Example:**

```
"Aircrafts": {  
    "ARH": {  
        "maxDiveAngle": 10.0,  
        "maxRollAngle": 25.0,  
        "maxAngularVelocity": 4.0,  
        "maxAttackPitch": 16.0,  
        "minAttackPitch": 0.0,  
        "cruiseSpeed": 55.5555,  
        "attackSpeed": 38.8889,  
        "holdingRadius": 400.0,  
        "egressTravelLength": 400.0,  
        "minFlyAltitude": 50,  
        "flySpeed": 69.4444,  
        "flyAltitude": 308.0,  
        "loadouts": ["ARH default loadout", "ARH loadout 2"]  
    }  
}
```

For the example definitions in [loadouts](#), see the [Loadouts \(on page 35\)](#) example.

## 7. CAS No Fly Zone (NFZ) Tool

Use the No Fly Zone (NFZ) Tool to designate No Fly Zones on the map for your CAS Unit (see [CAS Units Tool \(on page 30\)](#)).



Do any of the following:

- [Create a CAS NFZ Object \(below\)](#)
- [Modify a CAS NFZ Object \(on the next page\)](#)

**i** **NOTE**

When the mission runs, the built (see [Build Missions \(on page 67\)](#)) VBS4 aircraft entities (see [CAS Units Tool \(on page 30\)](#)) use the CAS NFZ Objects.

### 7.1 Create a CAS NFZ Object

You can create a CAS NFZ Object, visible in 2D / 3D.

**Follow these steps:**

1. In the [CAS Tools Panel \(on page 26\)](#), expand **Control Measures** (expanded by default).



**i** **NOTE**

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see [View Menu Options in the VBS Plan Manual](#)) to show all the VBS Plan UI panels.

2. Select one of the following NFZ shapes:

**i** **NOTE**

To stop drawing the object, press **Esc**. This removes the object from the map.

- **Cylinder**



- **Polyhedron**



3. Based on the selected NFZ shape, do one of the following:

- **Cylinder**

Click a position on the map and hold the **LMB**, drag to set the NFZ cylinder size. Release the **LMB** to confirm.

- **Polyhedron**

Click the start and subsequent NFZ positions to define the NFZ polyhedron. Double-click to close the NFZ polyhedron.

 **NOTE**

If the last position is different from the start position, an extra side is added to the NFZ polyhedron.

 **WARNING**

Complex polyhedrons with intersections are invalid. Attempting to draw such a polyhedron results in the shape turning **gray**, in which case, drawing cannot be completed.

The CAS NFZ object appears on the map and is selected.

4. Set the [Global Properties \(on page 48\)](#).

5. Click outside the object.

The CAS NFZ object is created on the map.

To modify the CAS NFZ object, see [Modify a CAS NFZ Object \(below\)](#).

## 7.2 Modify a CAS NFZ Object

You can modify an existing CAS NFZ object.

Click the **Select Tool** and select the CAS NFZ object.

 **NOTE**

The Select Tool has the following considerations:

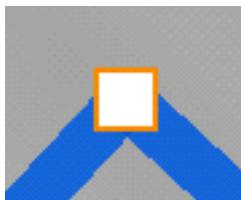
- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see [Managing Overlays in the VBS Plan Manual](#).

You can do any of the following:

- In case of an NFZ **polyhedron**, to change the polyhedron shape, do any of the following:

- Drag any of the control points, and click outside the object to confirm.



- Delete any of the control points.

The object updates itself automatically by creating a line, using the shortest path possible, between the control points on either side of the deleted one.

- Use **LCtrl + Y / LCtrl + Z (Undo / Redo)** to undo / redo either of the aforementioned control points actions (see also Share Overlays - Considerations in the VBS Plan Manual).

- To rotate the NFZ shape, do the following:

- a. Click the shape.

**NOTE**

Make sure not to click the control points.

- b. Click and hold the rotation point, and move the mouse to rotate the shape.



Alternatively, hold **Shift + RMB** and move the mouse to rotate the shape.

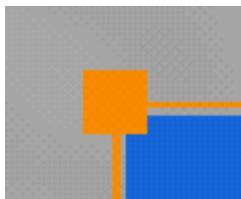
- To resize / scale the NFZ shape, do the following:

- a. Click the shape.

**NOTE**

Make sure not to click the control points.

- b. Drag any of the bounding-box points.



- Drag the object to relocate it to a different position on the map.
- Modify the [Global Properties \(below\)](#).
- Modify the [Specific Properties \(on the next page\)](#).
- Delete the object by pressing **Delete**.

The CAS NFZ object is modified.

## 7.3 CAS NFZ Properties

Set the following CAS NFZ properties.

### 7.3.1 Global Properties

Global Property	Description
<b>Stroke</b>	Stroke size (line width). Do any of the following: <ul style="list-style-type: none"> <li>• Enter the stroke number.</li> <li>• Use the up / down arrows to increase / decrease the stroke.</li> <li>• Use the drop-down to select one of the preset values.</li> </ul>
<b>Fill Color</b>	 Check the Fill checkbox, then click the Fill icon, and use the Color Palette to select the shape fill color.
<b>Border Color</b>	 Check the Border checkbox, then click the Border icon, and use the Color Palette to select the shape border color.
<b>Color Palette</b>	 You can set the color by clicking the color spectrum, or by typing in the RGBA values manually. Use the Plus icon and the Trash icon to add / remove the selected color to / from the <b>Saved Colors</b> list.   Select to apply the selected border or fill color.  

## 7.3.2 Specific Properties

Specific Property	Description
<b>Text</b>	Text to appear.
<b>Font</b>	Font family / type.
<b>Font Size</b>	Font size.
<b>Render Text on Surface</b>	Select to snap the text to the same plane as the ground.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
<b>Base Alt.</b>	Object AGL altitude (in meters) in the 3D View.
<b>Width / Length</b>	Object width / length (in meters).
<b>Height</b>	NFZ 3D height (in meters). <div style="border: 2px solid red; padding: 5px; margin-top: 10px;"> <b>WARNING</b> Make sure that the NFZ height is high enough for aircraft not to fly above it.</div>
<b>Rotation</b>	Rotation angle (in degrees) to rotate the object.

## 8. CAS No Fire Area (NFA) Tool

Use the No Fire Area (NFA) Tool to designate No Fire Areas on the map for your CAS Unit (see [CAS Units Tool \(on page 30\)](#)).



Do any of the following:

- [Create a CAS NFA Object \(below\)](#)
- [Modify a CAS NFA Object \(on the next page\)](#)

**i** **NOTE**

When the mission runs, the built (see [Build Missions \(on page 67\)](#)) VBS4 aircraft entities (see [CAS Units Tool \(on page 30\)](#)) use the CAS NFA Objects.

### 8.1 Create a CAS NFA Object

You can create a CAS NFA Object, visible in 2D / 3D.

**Follow these steps:**

1. In the [CAS Tools Panel \(on page 26\)](#), expand **Control Measures** (expanded by default).



**i** **NOTE**

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see [View Menu Options in the VBS Plan Manual](#)) to show all the VBS Plan UI panels.

2. Select one of the following NFA shapes:

**i** **NOTE**

To stop drawing the object, press **Esc**. This removes the object from the map.

- **Cylinder**



- **Polyhedron**



3. Based on the selected NFA shape, do one of the following:

- **Cylinder**

Click a position on the map and hold the **LMB**, drag to set the NFA cylinder size. Release the **LMB** to confirm.

- **Polyhedron**

Click the start and subsequent NFA positions to define the NFA polyhedron. Double-click to close the NFA polyhedron.

 **NOTE**

If the last position is different from the start position, an extra side is added to the NFA polyhedron.

 **WARNING**

Complex polyhedrons with intersections are invalid. Attempting to draw such a polyhedron results in the shape turning **gray**, in which case, drawing cannot be completed.

The CAS NFA object appears on the map and is selected.

4. Set the [Global Properties \(on page 53\)](#).

5. Click outside the object.

The CAS NFA object is created on the map.

To modify the CAS NFA object, see [Modify a CAS NFA Object \(below\)](#).

## 8.2 Modify a CAS NFA Object

You can modify an existing CAS NFA object.

Click the **Select Tool** and select the CAS NFA object.

 **NOTE**

The Select Tool has the following considerations:

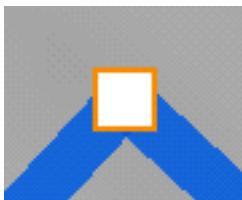
- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see [Managing Overlays in the VBS Plan Manual](#).

You can do any of the following:

- In case of an NFA **Polyhedron**, to change the polyhedron shape, do any of the following:

- Drag any of the control points, and click outside the object to confirm.



- Delete any of the control points.

The object updates itself automatically by creating a line, using the shortest path possible, between the control points on either side of the deleted one.

- Use **LCtrl + Y / LCtrl + Z (Undo / Redo)** to undo / redo either of the aforementioned control points actions (see also Share Overlays - Considerations in the VBS Plan Manual).

- To rotate the NFA shape, do the following:

- a. Click the shape.

**NOTE**

Make sure not to click the control points.

- b. Click and hold the rotation point, and move the mouse to rotate the shape.



Alternatively, hold **Shift + RMB** and move the mouse to rotate the shape.

- To resize / scale the NFA shape, do the following:

- a. Click the shape.

**NOTE**

Make sure not to click the control points.

- b. Drag any of the bounding-box points.



- Drag the object to relocate it to a different position on the map.
- Modify the [Global Properties \(below\)](#).
- Modify the [Specific Properties \(on the next page\)](#).
- Delete the object by pressing **Delete**.

The CAS NFA object is modified.

## 8.3 CAS NFA Properties

Set the following CAS NFA properties.

### 8.3.1 Global Properties

Global Property	Description
<b>Stroke</b>	Stroke size (line width). Do any of the following: <ul style="list-style-type: none"> <li>• Enter the stroke number.</li> <li>• Use the up / down arrows to increase / decrease the stroke.</li> <li>• Use the drop-down to select one of the preset values.</li> </ul>
<b>Fill Color</b>	 Check the Fill checkbox, then click the Fill icon, and use the Color Palette to select the shape fill color.
<b>Border Color</b>	 Check the Border checkbox, then click the Border icon, and use the Color Palette to select the shape border color.
<b>Color Palette</b>	 You can set the color by clicking the color spectrum, or by typing in the RGBA values manually. Use the Plus icon and the Trash icon to add / remove the selected color to / from the <b>Saved Colors</b> list.   Select to apply the selected border or fill color.  

## 8.3.2 Specific Properties

Specific Property	Description
<b>Text</b>	Text to appear.
<b>Font</b>	Font family / type.
<b>Font Size</b>	Font size.
<b>Render Text on Surface</b>	Select to snap the text to the same plane as the ground.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
<b>Base Alt.</b>	Object AGL altitude (in meters) in the 3D View.
<b>Width / Length</b>	Object width / length (in meters).
<b>Height</b>	NFA 3D height (in meters). <div style="border: 2px solid red; padding: 10px; margin-top: 10px;"> <b>WARNING</b><p>Make sure that the NFA height is high enough for aircraft not to fire above it.</p></div>
<b>Rotation</b>	Rotation angle (in degrees) to rotate the object.

## 9. CAS Control Point (CP) Tool

Use the Control Point (CP) Tool to create Control Measure points for fixed-wing aircraft, prior to moving to the Initial Point (IP) (see [CAS Initial Point \(IP\) Tool \(on page 58\)](#)), to:

- Define routing points.
- Define egress points.
- Check-in with designated JTAC.



Do any of the following:

- [Create a CAS CP Object \(below\)](#)
- [Modify a CAS CP Object \(on the next page\)](#)

**NOTE**

When the mission runs, the built (see [Build Missions \(on page 67\)](#)) VBS4 aircraft entities (see [CAS Units Tool \(on page 30\)](#)) use the CAS CP Objects.

### 9.1 Create a CAS CP Object

You can create a CAS CP object, visible in 2D / 3D.

**Follow these steps:**

1. In the [CAS Tools Panel \(on page 26\)](#), expand **Control Measures** (expanded by default).



**NOTE**

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see View Menu Options in the VBS Plan Manual) to show all the VBS Plan UI panels.

## 2. Click the **CAS CP Tool**.



### **NOTE**

To stop drawing the object, press **Esc**. This removes the object from the map.

## 3. Click a position on the map where you want to place the CAS CP object.

The New Control Point dialog opens.

## 4. Set the [Specific Properties \(on the next page\)](#) in the New Control Point dialog.

## 5. Click **Create**.

The CAS CP object appears on the map and is selected.

## 6. Click outside the object.

The CAS CP object is created on the map.

To modify the CAS CP object, see [Modify a CAS CP Object \(below\)](#).

## 9.2 Modify a CAS CP Object

You can modify an existing CAS CP object.

Click the **Select Tool** and select the CAS CP object.

### **NOTE**

The Select Tool has the following considerations:

- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see Managing Overlays in the VBS Plan Manual.

You can do any of the following:

- Drag the object to relocate it to a different position on the map.
- Modify the [Specific Properties \(on the next page\)](#).
- Delete the object by pressing **Delete**.

The CAS CP object is modified.

## 9.3 CAS CP Properties

Set the following CAS CP properties.

### 9.3.1 Specific Properties

Properties before placement:

Specific Property	Description
<b>Name</b>	CP name.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>

Additional properties after placement:

Specific Property	Description
<b>Text</b>	CP name.
<b>Font</b>	Font family / type.
<b>Font Size</b>	Font size.
<b>Render Text on Surface</b>	Select to snap the text to the same plane as the ground.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
<b>Base Alt.</b>	Object AGL altitude (in meters) in the 3D View.

# 10. CAS Initial Point (IP) Tool

Use the Initial Point (IP) Tool to create Control Measure points for fixed-wing aircraft as starting points for maneuvering to the target.



Do any of the following:

- [Create a CAS IP Object \(below\)](#)
- [Modify a CAS IP Object \(on the next page\)](#)

**i** **NOTE**

When the mission runs, the built (see [Build Missions \(on page 67\)](#)) VBS4 aircraft entities (see [CAS Units Tool \(on page 30\)](#)) use the CAS IP Objects.

## 10.1 Create a CAS IP Object

You can create a CAS IP object, visible in 2D / 3D.

**Follow these steps:**

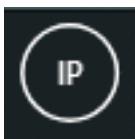
1. In the [CAS Tools Panel \(on page 26\)](#), expand **Control Measures** (expanded by default).



**i** **NOTE**

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see View Menu Options in the VBS Plan Manual) to show all the VBS Plan UI panels.

2. Click the **CAS IP Tool**.



**i** **NOTE**

To stop drawing the object, press **Esc**. This removes the object from the map.

3. Click a position on the map where you want to place the CAS IP object.

The New Initial Point dialog opens.

4. Set the [Specific Properties \(below\)](#) in the New Initial Point dialog.

5. Click **Create**.

The CAS IP object appears on the map and is selected.

6. Click outside the object.

The CAS IP object is created on the map.

To modify the CAS IP object, see [Modify a CAS IP Object \(below\)](#).

## 10.2 Modify a CAS IP Object

You can modify an existing CAS IP object.

Click the **Select Tool** and select the CAS IP object.

### **i** NOTE

The Select Tool has the following considerations:

- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see [Managing Overlays](#) in the VBS Plan Manual.

You can do any of the following:

- Drag the object to relocate it to a different position on the map.
- Modify the [Specific Properties \(below\)](#).
- Delete the object by pressing **Delete**.

The CAS IP object is modified.

## 10.3 CAS IP Properties

Set the following CAS IP properties.

### 10.3.1 Specific Properties

Properties before placement:

Specific Property	Description
Name	IP name.

<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
-----------------	--

Additional properties after placement:

Specific Property	Description
<b>Text</b>	IP name.
<b>Font</b>	Font family / type.
<b>Font Size</b>	Font size.
<b>Render Text on Surface</b>	Select to snap the text to the same plane as the ground.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
<b>Base Alt.</b>	Object AGL altitude (in meters) in the 3D View.

# 11. CAS Holding Area (HA) Tool

Use the Holding Area (HA) tool to create Control Measure points for rotary-wing aircraft, prior to moving to the Battle Position (BP) (see [CAS Battle Position \(BP\) Tool \(on page 64\)](#)), to:

- Define routing points.
- Define egress points.
- Check-in with designated JTAC.



Do any of the following:

- [Create a CAS HA Object \(below\)](#)
- [Modify a CAS HA Object \(on the next page\)](#)

**i** **NOTE**

When the mission runs, the built (see [Build Missions \(on page 67\)](#)) VBS4 aircraft entities (see [CAS Units Tool \(on page 30\)](#)) use the CAS HA Objects.

## 11.1 Create a CAS HA Object

You can create a CAS HA object, visible in 2D / 3D.

**Follow these steps:**

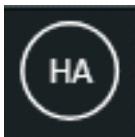
1. In the [CAS Tools Panel \(on page 26\)](#), expand **Control Measures** (expanded by default).



**i** **NOTE**

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see View Menu Options in the VBS Plan Manual) to show all the VBS Plan UI panels.

2. Click the **CAS HA Tool**.



**NOTE**

To stop drawing the object, press **Esc**. This removes the object from the map.

3. Click a position on the map where you want to place the CAS HA object.

The New Holding Area dialog opens.

4. Set the [Specific Properties \(on the next page\)](#) in the New Holding Area dialog.

5. Click **Create**.

The CAS HA object appears on the map and is selected.

6. Click outside the object.

The CAS HA object is created on the map.

To modify the CAS HA object, see [Modify a CAS HA Object \(below\)](#).

## 11.2 Modify a CAS HA Object

You can modify an existing CAS HA object.

Click the **Select Tool** and select the CAS HA object.

**NOTE**

The Select Tool has the following considerations:

- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see Managing Overlays in the VBS Plan Manual.

You can do any of the following:

- Drag the object to relocate it to a different position on the map.
- Modify the [Specific Properties \(on the next page\)](#).
- Delete the object by pressing **Delete**.

The CAS HA object is modified.

## 11.3 CAS HA Properties

Set the following CAS HA properties.

### 11.3.1 Specific Properties

Properties before placement:

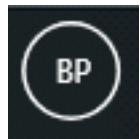
Specific Property	Description
<b>Name</b>	HA name.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>

Additional properties after placement:

Specific Property	Description
<b>Text</b>	HA name.
<b>Font</b>	Font family / type.
<b>Font Size</b>	Font size.
<b>Render Text on Surface</b>	Select to snap the text to the same plane as the ground.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
<b>Base Alt.</b>	Object AGL altitude (in meters) in the 3D View.

## 12. CAS Battle Position (BP) Tool

Use the Battle Position (BP) Tool to create Control Measure points for rotary-wing aircraft as starting points for maneuvering to the target.



Do any of the following:

- [Create a CAS BP Object \(below\)](#)
- [Modify a CAS BP Object \(on the next page\)](#)

**i** **NOTE**

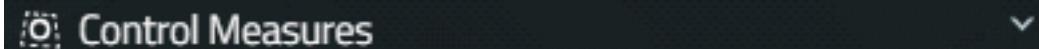
When the mission runs, the built (see [Build Missions \(on page 67\)](#)) VBS4 aircraft entities (see [CAS Units Tool \(on page 30\)](#)) use the CAS BP Objects.

### 12.1 Create a CAS BP Object

You can create a CAS BP object, visible in 2D / 3D.

**Follow these steps:**

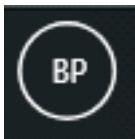
1. In the [CAS Tools Panel \(on page 26\)](#), expand **Control Measures** (expanded by default).



**i** **NOTE**

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see [View Menu Options in the VBS Plan Manual](#)) to show all the VBS Plan UI panels.

2. Click the **CAS BP Tool**.



**i** **NOTE**

To stop drawing the object, press **Esc**. This removes the object from the map.

3. Click a position on the map where you want to place the CAS BP object.

The New Battle Position dialog opens.

4. Set the [Specific Properties \(below\)](#) in the New Battle Position dialog.

5. Click **Create**.

The CAS BP object appears on the map and is selected.

6. Click outside the object.

The CAS BP object is created on the map.

To modify the CAS BP object, see [Modify a CAS BP Object \(below\)](#).

## 12.2 Modify a CAS BP Object

You can modify an existing CAS BP object.

Click the **Select Tool** and select the CAS BP object.

### **i** NOTE

The Select Tool has the following considerations:

- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see Managing Overlays in the VBS Plan Manual.

You can do any of the following:

- Drag the object to relocate it to a different position on the map.
- Modify the [Specific Properties \(below\)](#).
- Delete the object by pressing **Delete**.

The CAS BP object is modified.

## 12.3 CAS BP Properties

Set the following CAS BP properties.

### 12.3.1 Specific Properties

Properties before placement:

Specific Property	Description
Name	BP name.

<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
-----------------	--

Additional properties after placement:

Specific Property	Description
<b>Text</b>	BP name.
<b>Font</b>	Font family / type.
<b>Font Size</b>	Font size.
<b>Render Text on Surface</b>	Select to snap the text to the same plane as the ground.
<b>Location</b>	Location coordinates. Choose the coordinate type: <ul style="list-style-type: none"><li>• LLMS</li><li>• MGRS</li><li>• UTM</li></ul>
<b>Base Alt.</b>	Object AGL altitude (in meters) in the 3D View.

# 13. Build Missions

Once you finish designing your Tactical Plan, using Drawing Objects, Tactical Objects, and CAS Objects (see the VBS Plan Manual), and reviewing it (see Review Plans in the VBS Plan Manual), you can prepare it further for mission execution by building it.

## NOTE

You can only build a mission in **Prepare Mode**.

To build the Tactical Plan into a mission, click **Build Mission** or select **File > Build Mission**.

## NOTE

Built Tactical Objects (see the VBS Plan Manual) have the following aspects:

- When the mission is built, Tactical Objects are converted to VBS4 Control AI personnel and vehicle entities, Waypoints (see Waypoints in the VBS4 Editor Manual), and VBS Call for Fire fire missions and gunlines.
- When the mission runs, the built VBS4 AI personnel and vehicle entities execute Orders, converted to Waypoints, and take Control Measures (apart from Boundary Lines) into account.

Built CAS Objects (see the VBS Plan Manual) have the following aspects:

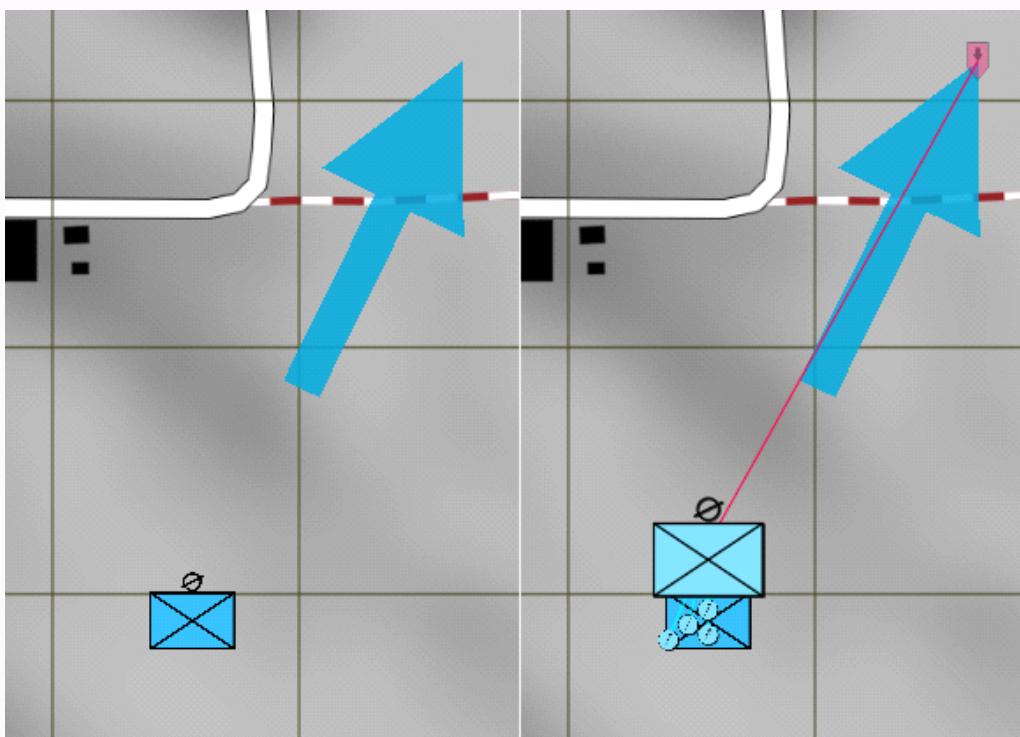
- When the mission is built, CAS Unit Objects are converted to VBS4 personnel and aircraft entities (see [CAS Units Tool \(on page 30\)](#)).
- When the mission runs, the built VBS4 entities execute the CAS Orders (see [CAS Mission Order Tool \(on page 85\)](#)), using Control Measures (see [CAS Initial Point \(IP\) Tool \(on page 58\)](#), [CAS Control Point \(CP\) Tool \(on page 55\)](#), [CAS Holding Area \(HA\) Tool \(on page 61\)](#), [CAS Battle Position \(BP\) Tool \(on page 64\)](#), [CAS No Fly Zone \(NFZ\) Tool \(on page 45\)](#), [CAS No Fire Area \(NFA\) Tool \(on page 50\)](#)).

Rebuilding a mission resets the VBS4 entities based on their Tactical / CAS Objects representations.



## EXAMPLE

Image-4: Before (left) and after (right) Build Mission



As can be seen in the right image, a BLUFOR group and waypoints are added after the mission is built.

Once the mission is built, you can make additional changes.

### Follow these steps:

1. Add additional Editor Objects, or update the ones created by VBS Plan. For more information, see Scenario Preparation in the Introduction to VBS4 Guide.



### WARNING

If you build a mission, go back to the VBS Plan, and delete the Tactical Objects representing mission entities. The latter are not removed and have to be deleted manually in the Editor. Also, if you make changes to mission entities represented by Tactical Objects in the Editor, rebuilding a mission in VBS Plan resets any of those changes.

## 2. Preview the mission in single-player.

Select **Preview** in the VBS4 Toolbar (see VBS4 UI Overview in the Introduction to VBS4 Guide).

### **WARNING**

A mission that has no playable units cannot be previewed.

The Scenario starts as a playable mission with you controlling the first playable character placed in the Scenario.

### **TIP**

To select a specific playable character, edit the wanted unit (from the list of units, created with **Build Mission**), using Edit Unit Options (see the VBS4 Editor Manual) in the Editor.

For more information, see Scenario Preparation in the Introduction to VBS4 Guide.

## 3. Save your Tactical Plan and built mission:

Click the **Main Menu** icon and select **Battlespaces > Save**.



For more information, see Save in the VBS Plan Manual.

## 4. Execute the Tactical Plan.

Instructors see Tactical Orders that Tactical Units execute at in the Scenario.



For more information, see Scenario Execution in the Introduction to VBS4 Guide.

# 14. User Actions

User actions are available to interact with the VBS4 simulation environment and objects in it.

User actions are divided into:

- [3D World Actions \(below\)](#)
- [Quick Menu Actions \(on the next page\)](#)

## 14.1 3D World Actions

3D World Actions appear on objects in the 3D View of the VBS4 simulation.

Their appearance usually depends on proximity to the object and the view direction. This means that the majority of the 3D World Actions appear when standing next to an object and looking at it.



3D World Actions are often available for:

- Equipment and weapons.
- Other objects on the ground.
- Control stations, static weapons, vehicles, and their equipment.
- Specific equipment in your vehicle position.
- Terrain obstacles, such as ladders and gates.
- Other characters.

### Follow these steps:

1. Approach the object you want to interact with.  
The 3D World Actions appear.
2. Use the [3D World Action Controls \(on the next page\)](#).

A line points to the object to indicate that 3D World Actions are available.

## 14.1.1 3D World Action Controls

The following table lists the 3D World Action Controls, defaults, and option names from the Controls Settings (see Controls Settings in the VBS4 Administrator Manual):

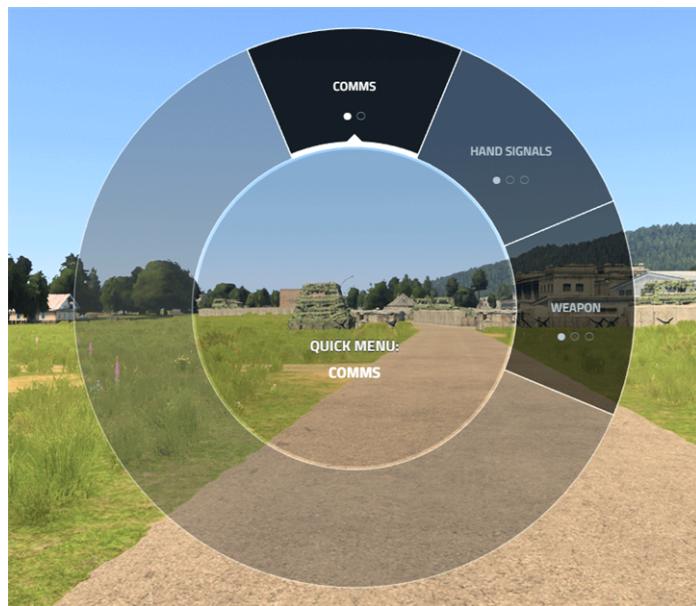
### NOTE

For Microsoft Xbox 3D World Action controls, see Microsoft Xbox Controls.

Control Name	Default Control
Perform Action	<b>Enter</b> or Mouse Scroll Button
Previous Action	[ or Mouse Scroll Wheel Up
Next Action	] or Mouse Scroll Wheel Down

## 14.2 Quick Menu Actions

The Quick Menu provides access to additional functions, typically more complex personal movements than those found among 3D World Actions.



The following actions use the Quick Menu:

- Hand Signals
- Weapon Handling
- Forms
- CBRN Suits and Gas Masks
- Swedish CBRN Protection
- Using VBS Radio
- Some vehicle equipment systems.

The Quick Menu consists of multiple levels of numbered menu options, some with multiple pages.

## Follow these steps:

1. Press **Quick Menu (Left Windows)** to open the Quick Menu.
2. Use the [Quick Menu Controls \(below\)](#).
3. Click a Quick Menu option, press the appropriate number, or for highlighted options, press **Enter** to access the next menu level.
4. Repeat steps 2 and 3 to access the next menu level or to perform the specified option.

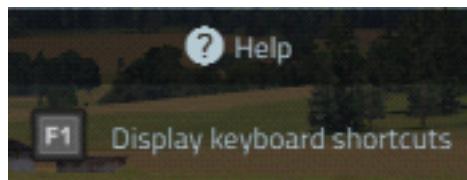
### 14.2.1 Quick Menu Controls

The following table lists the Quick Menu Controls, defaults, and option names from the Controls Settings (see Controls Settings in the VBS4 Administrator Manual):

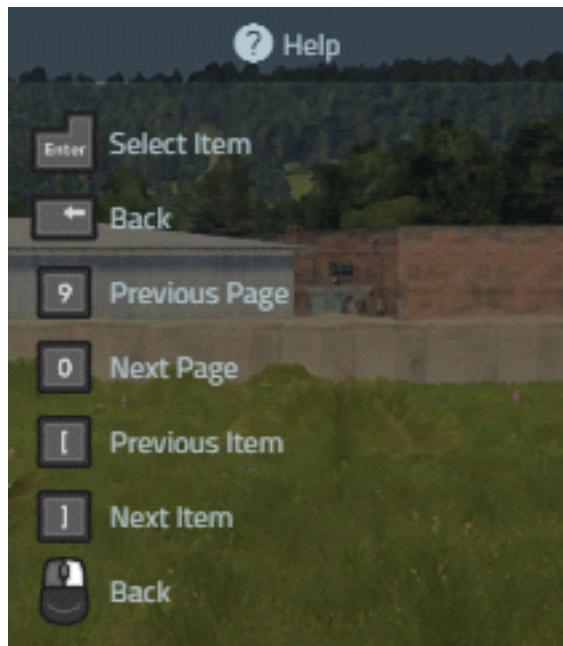
#### **i** NOTE

For Microsoft Xbox Quick Menu controls, see Microsoft Xbox Controls.

The Quick Menu Help shows when you open the Quick Menu.



Press **F1** to display the Quick Menu controls.



Quick Menu Control	Default Control	Control Option Name
Open / Close Quick Menu	<p><b>Left Windows</b></p> <p>Do one of the following:</p> <ul style="list-style-type: none"> <li>• Tap the key to open it, and tap again to close it.</li> <li>• Hold the key to open the Quick Menu, and release the key to close it.</li> </ul>	Quick Menu
Select Option	<p>Do one of the following:</p> <ul style="list-style-type: none"> <li>• Mouse over an option or press the appropriate number.</li> <li>• Select previous option: [ or <b>Mouse Scroll Wheel Up</b>.</li> <li>• Select next option: ] or <b>Mouse Scroll Wheel Down</b>.</li> </ul>	<p>Previous Action</p> <p>Next Action</p>
Perform Action	<b>LMB / Enter / MMB</b> for a selected / highlighted option.	Perform Action
Navigate to Previous Menu	<b>Backspace, RMB</b> , or click <b>BACK</b> .	Back
Menu Page Navigation	<b>0</b> and <b>9</b> , or click the Box icons below the menu.	

## 15. Control Links

The Control Link is an Editor Object that enables control over unmanned vehicles such as UAVs, UGVs, security cameras, or other objects found in **(F5) Empty Vehicle > Unmanned Vehicles** in the Editor. The Control Link object is found in the Editor Objects List (see Mission Designer Interface in the VBS4 Editor Manual).

### **WARNING**

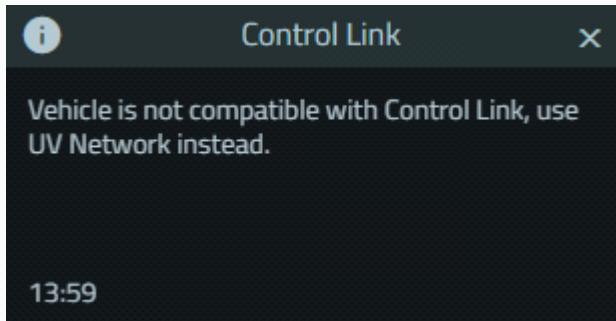
Adding / deleting this Editor Object in the VBS Editor during a multiplayer scenario may not be reflected on other clients.

### **NOTE**

The following additional considerations apply:

- Control Links are essential when streaming video from UAVs. For more information, see UAV Video Streaming in the VBS4 Editor Manual.
- Unmanned Vehicle System (UVS)-compatible UAVs / UGVs need to use the UV Network Editor Object instead of the Control Link Editor Object.

Attempting to link a UVS-compatible UAV / UGV to a Control Link results in the following error popup:



Control Links are represented on the map by the following icon.



Double-click the **Control Link icon** to open the Object Properties dialog.

**Image-5: Control Link Object Properties dialog**

Type of Control Station	UAV Controller
Origin /W/S/Zone/Hem	-383513   4577756   33   North
Coordinates Type	UTM
Allow Camera Locking	True
Activate on Veh Entry	False
Activate on Msn Start	False
Enable Auto Orbiting	Enable (When Controlled Unit Runs out of Waypoints)
Show Hints	Show Hints
Can Mark Tgts on Map	True
Enable Map	True
Relocate Locked Target	Allow Relocating

## 15.1 Control Link Parameters

The following table lists the available parameters in the Control Link Object Properties dialog. Some fields may not be available depending on the selected Control Link type.

### NOTE

For some UAVs and UGVs, using the Control Link places the user in direct control of the vehicle. For more information, see Unmanned Vehicles in the VBS4 Trainee Manual.

Parameter	Description
<b>Type of Control Station</b>	Select the Control Link type from the following options: <ul style="list-style-type: none"><li>• UAV Controller - Unmanned Aerial Vehicle camera, movement, or munitions.</li><li>• UAV Controller (Old Style) - Old style controller for Unmanned Aerial Vehicles.</li><li>• UGV Controller - Unmanned Ground Vehicle (for example, MarcBot, TALON controller).</li><li>• Security Camera - GBOSS security camera, see GBOSS Security Camera in the VBS4 Editor Manual.</li><li>• MAV - Micro Air Vehicle.</li><li>• Rover III - Pure Camera stream, no control (only shows UAV feeds).</li><li>• LITENING Targeting Pod - Provides control over a targeting pod on an aircraft equipped with this pod. This Control Link type does not have Lock and Targeting Cursor options.</li></ul>
<b>Origin W/S/Zone/Hem</b>	<p> <b>NOTE</b></p> <p>When a player accesses a UGV Control Link using the Quick Menu (see Quick Menu Actions in the VBS4 Trainee Manual), they see all available UGVs.</p> <p> <b>NOTE</b></p> <p>If no Map Origin is present or it is cleared, these coordinates and the Coordinates Type field are hidden.</p>

Parameter	Description
<b>Coordinates Type</b>	<p>Choose from the following coordinate types:</p> <ul style="list-style-type: none"> <li>• UTM</li> <li>• MGRS</li> <li>• Lat / Long Decimal</li> <li>• Lat / Long to be displayed</li> </ul>
	<div style="border: 1px solid #0070C0; padding: 10px; margin-bottom: 10px;"> <p><b>i NOTE</b></p> <p>To be able to choose a coordinate system to be displayed, the terrain must be one which is geo-referenced to a real world location, or the - Map Origin (UTM) - set in Scenario Settings. Otherwise, this drop-down is not shown.</p> </div> <p>If no origin is defined, UAV coordinates default to standard VBS4 UTM coordinates.</p>
<b>Allow Camera Locking</b>	<p>Locks the camera on a target or a position in-game. If set to <b>True</b>, pressing <b>Toggle Camera Lock (L)</b> in-game locks the camera view.</p> <p>Default is <b>True</b>.</p>
<b>Activate on Veh Entry</b>	<p>If set to <b>True</b>, and the Control Link is linked to a vehicle (as opposed to a unit), the Controller starts as soon as a unit gets into the vehicle.</p> <p>Default is <b>False</b>.</p>
<b>Activate on Msn Start</b>	<p>If set to <b>True</b>, the Controller starts on mission start when under player control (not for an empty vehicle). This only works if the Control Link is linked to units, not vehicles.</p>
<b>Enable Auto Orbiting</b>	<p>If enabled, the controlled vehicle orbits around the last waypoint position, or the target, when it runs out of waypoints or locks.</p>
	<div style="border: 1px solid #0070C0; padding: 10px; margin-bottom: 10px;"> <p><b>i NOTE</b></p> <p>This functionality is only available for the UAV or Rover III controllers.</p> </div>
<b>Show Hints</b>	<p>If set to <b>Show Hints</b>, helpful hints are shown explaining the most important keys.</p>
	<div style="border: 1px solid #0070C0; padding: 10px;"> <p><b>i NOTE</b></p> <p>Only available for UAVs.</p> </div>
<b>Can Mark Tgts on Map</b>	<p>If set to <b>True</b>, pressing the <b>K</b> key in-game adds a target marker to the map at current target position in the camera sight.</p>

Parameter	Description
<b>Enable Map</b>	If set to <b>True</b> , <b>GPS (Toggle) (RCtrl + M)</b> opens the Mini-Map. Default is <b>True</b> .
<b>Relocate Locked Target</b>	If set to <b>Allow Relocating</b> , you can relocate the target when the camera is locked. <b>Follow these steps:</b> <ol style="list-style-type: none"><li>1. Click the <b>target</b>.</li><li>2. Press and hold <b>LCtrl</b> and drag your mouse. The target moves.</li><li>3. Click at the new location to place the target.</li></ol>

## 15.2 Unmanned Vehicle and Security Camera Setup

Control Links are one of the components used to setup unmanned vehicles and remotely controlled security cameras. The following list includes the other components:

- **Control Link** - The Editor Object that initiates the unmanned vehicle simulation.
- **Operator** - A single unit, or any number of units or vehicles, grouped or ungrouped operating the unmanned vehicle or security camera.
- **Stations / Terminals** - Unmanned terminals that can be entered to activate the Control Link (not essential).
- **Unmanned Vehicle / Security Camera** - A UAV, UGV, GBOSS security camera, or other remote controlled unit.

### **i** NOTE

To use the Control Link, it must be linked to an Operator or one or more Stations / Terminals.

**Follow these steps:**

1. Place a Control Link on the map.
2. In the [Control Link Object Properties dialog \(on page 75\)](#), set the parameters relevant to the UAV, UGV, or Security Camera.

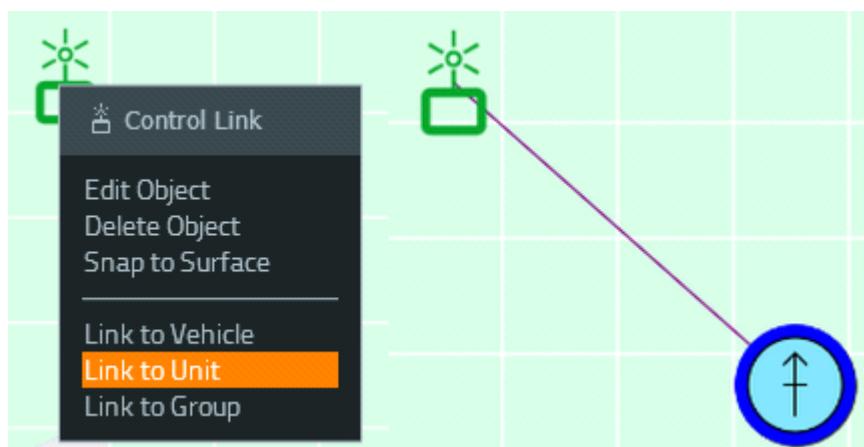
3. Right-click the Control Link and select one of the following from the context menu:

- **Link to Vehicle**
- **Link to Unit**
- **Link to Group**

4. Click the unit, vehicle, or group you want to link to.

Any unit or vehicle(s) linked to the Control Link can now access the UAV, UGV, or Security Camera using their Quick Menu (see Quick Menu Actions in the VBS4 Trainee Manual).

#### Image-6: Linking a Control Link to a unit



In this example, the Operator is able to access all unmanned vehicles in the mission using the Quick Menu.

#### **NOTE**

There must be at least one Control Link placed on the map for each unmanned vehicle type.

# 16. Laser Designator

Units are able to use a laser designator to guide air-launched weapons onto high priority targets.

To use the laser designator or a laser guided weapon in a vehicle, you should be in the gunner position.

## ★ FEATURE NOTICE

AI units temporarily cannot engage laser-designated targets. For more information, see One AI in the VBS4 Release Notes.

## NOTE

Armed rotary and fixed-wing aircraft (such as the USMC Cobra **AH-1Z** or Harrier **AV-8B**) in the vicinity automatically engage the laser designated target.

For information on how Administrators can toggle the visualization of laser lines, when units lase targets with laser designators, see Show / Hide Laser Target Lines in the VBS4 Instructor Manual.

**Image-7: Target designated for destruction**



- **Required Units:** A FAC / JTAC unit (equipped with a laser designator, PLDR, or SSARF+).
- **Functionality:** AI aircraft automatically detect and target the laser dot.
- **Additional Points:** The timing of the weapons delivery may vary as the aircraft maneuver into a firing position. The target needs to be "lit" until munitions hit the target.

**NOTE**

The laser designator uses a battery which is required as ammunition. To add a laser designator using scripting, you must also add a battery in the script **before** the laser designator. For more information about the object names, see the Content Library ([VBS4\\_Content.chm](#) in your installation \docs\ folder).

**Laser designator:**

1. (Skip this step, if using a vehicle Laser Designator) Press **Quick Menu (Left Windows)**, and select **WEAPON > WEAPON LASER DESIGNATOR** (see [Quick Menu Actions \(on page 71\)](#)).

The Laser Designator moves towards your eyes and you go in to Optics Mode.

**TIP**

If you do not see the optics view, press **Toggle Optics (V)**.

2. In the Quick Menu, do one of the following:

- If using a personnel Laser Designator, select **SET PRF CODE**.
- If using a vehicle Laser Designator, select **VEHICLE > SET PRF CODE**.

**NOTE**

Only weapons with **the same PRF code** set are able to target this laser.

3. Add a four-digit PRF code, and click **ENTER**.
4. Press **Fire (LMB)** to turn the Laser Designator on.

**NOTE**

On specific vehicles, such as the M1A1 - LD and LAV25A2 - LD, the Laser Designator does not toggle on and off. Hold **Fire (LMB)** to continuously fire the Laser Designator instead.

The HUD display shows the coordinates of the designated target.

**Laser-guided weapon:**

1. Press **Quick Menu (Left Windows)**, and select **WEAPON SELECTION**.  
The Weapon Selection dialog opens.
2. Use the **Weapon** drop-down to select a laser-guided weapon.

3. In the **PRF Code** field, enter a four digit PRF code, and click **OK**.

**NOTE**

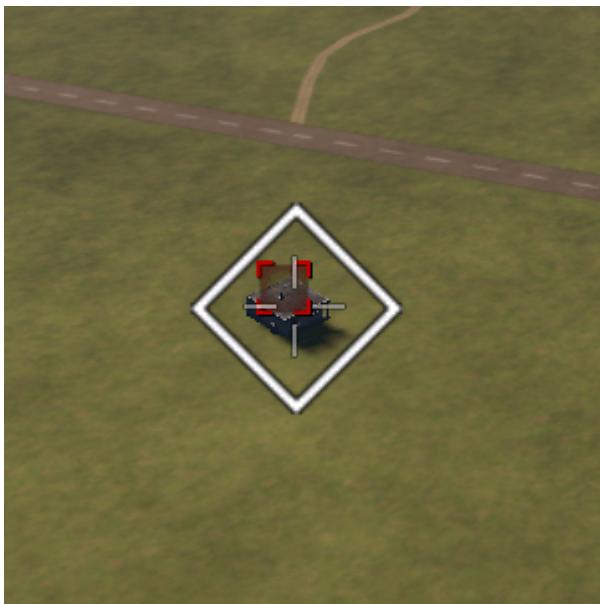
Only lasers with this PRF code are locked on to.

4. Press **Next Target (Tab)** to lock-on to lasers with **the same PRF code**.

The square target icon appears when the target is identified, but not yet locked-on.



The diamond target icon appears when the target is fully locked-on.



The weapon can be fired and is guided towards the laser (some laser guided weapons can be fired without locking on the target, and automatically seek lasers with the **PRF code** they are fired with).

## 16.1 Vehicle Mounted Laser Designator

Various vehicles are equipped with laser designators. The Gunner position may switch to the laser designator by pressing **Toggle Weapons (Spacebar)**. Press **Fire (LMB)** to lase the target.

In certain vehicles, it is possible to lase targets and then switch to other weapons to fire at the target.

For example, the AH-64D Apache comes equipped with laser-guided AGM-114K Hellfire II missiles.

### Follow these steps:

1. In the Gunner position of the vehicle, press **Toggle Optics (V)** to access the weapon optics system, and locate the target.
2. Press **Toggle Weapons (Spacebar)** to switch weapons until the laser designator is active.
3. Press **Fire (LMB)** to lase the current target.

The target indicator and lasing information appears. The weapon is not locked at this stage.



4. Press **Toggle Weapons (Spacebar)** to switch weapons to the AGM-114K.
5. Press **Safety Switch (LCtrl + LShift)** to unsafe the missile.

6. Press **Next Target (Tab)** to lock the AGM-114K to the laser target .

The target indicator displays.



**NOTE**

If multiple targets are lased, press **Next Target (Tab)** to cycle through them.

7. Press **Fire (LMB)** to fire the AGM-114K missile at the current target.

# 17. CAS Mission Order Tool

Apply a CAS Mission Order to a CAS Unit (see [CAS Units Tool \(on page 30\)](#)) at scenario runtime (Preview / Execute Mode).

## NOTE

While it is possible to create CAS Mission Orders in Prepare Mode, some of the CAS Mission Order Tool controls are only available in Preview / Execute Mode, and the intention is to mainly use it at scenario runtime.



In Preview / Execute Mode, the Order execution adds events and missions to the [CAS Event List Panel \(on page 97\)](#) and [CAS Mission List Panel \(on page 100\)](#).

Do any of the following:

- [Create a CAS Mission Order \(below\)](#)
- [Modify a CAS Mission Order \(on the next page\)](#)

## 17.1 Create a CAS Mission Order

You can create a CAS Mission Order.

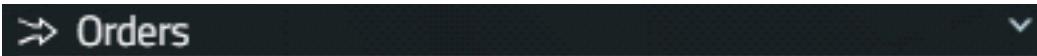
### Follow these steps:

1. Make sure to place at least one FAC / JTAC unit. For more information, see [Adding Units in the VBS4 Editor Manual](#).
2. Make sure you have created the necessary minimum of each of the required CPs / IPs or HAs / BPs, depending on the type of CAS Mission Order. For more information, see [CAS Control Point \(CP\) Tool \(on page 55\)](#), [CAS Initial Point \(IP\) Tool \(on page 58\)](#), [CAS Holding Area \(HA\) Tool \(on page 61\)](#), [CAS Battle Position \(BP\) Tool \(on page 64\)](#).
3. To apply a CAS Mission Order, select an existing CAS Unit on the map.

## WARNING

The tool is disabled if no CAS Unit object is selected and built (see [Build Missions \(on page 67\)](#)). For information on how to create a CAS Unit object, see the [CAS Units Tool \(on page 30\)](#).

4. In the **CAS Tools Panel** (on page 26), expand **Orders** (expanded by default).



**NOTE**

If you have previously closed the panel, select **Show All Panels** from the **View** menu (see View Menu Options in the VBS Plan Manual) to show all the VBS Plan UI panels.

5. Either click the **CAS Mission Order Tool**, or right-click the **CAS Unit object** and select **Add CAS Mission Order**.



6. Set the CAS Mission Order Specific Properties as described in [Modify a CAS Mission Order \(below\)](#).

**NOTE**

A grayed out **Mission Orders** panel indicates that either no CAS Unit has been selected or no CAS Mission Order has been created.

The CAS Mission Order is created.

## 17.2 Modify a CAS Mission Order

You can modify an existing CAS Mission Order.

**NOTE**

The CAS Mission Order auto-saves the modifications.

Click the **Select Tool**.

**NOTE**

The Select Tool has the following considerations:

- The cursor always selects the top object across all the available overlays.
- 3D objects are always placed above 2D objects, regardless of the overlay order.
- Objects that are part of a hidden / locked overlay are not selectable.

For more information, see Managing Overlays in the VBS Plan Manual.

Select a CAS Unit that is assigned a CAS Mission Order you want to modify.

A bounding box appears around the CAS Unit.

In **Routing**, modify the aircraft [Routing Properties \(on page 89\)](#). Click **Advance Now** to start the aircraft routing.

In **Mission Orders**, modify the following **Specific Properties**:

**NOTE**

Mandatory CAS Mission Order properties are marked with an asterisk (\*).

When all of these properties are set, splines (flying trajectories) are added to the map (visible in the 2D and 3D Views).

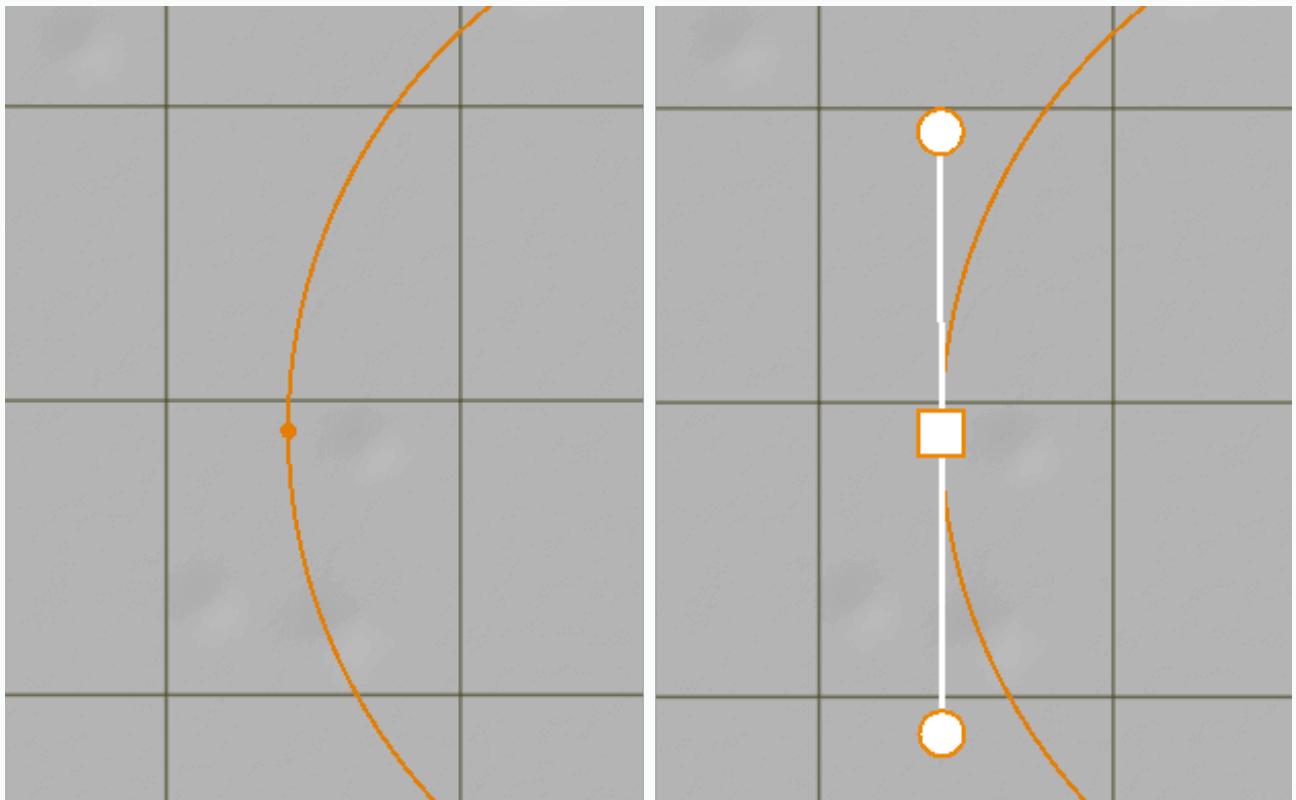
If necessary, click the spline and drag its control points to modify the trajectory.



**WARNING**

Make sure to place all the CAS Units necessary for the mission, build the mission ([see Build Missions \(on page 67\)](#)) before creating CAS Mission Orders or modifying splines, and not add any other CAS Units afterwards. Otherwise, the CAS mission (including spline delineation) may have unpredictable results.

**Image-8: Left to right: spline without and with control points**



1. In **Select Aircraft**, select an individual CAS Unit aircraft, assigned a number, for which the steps that follow apply.
2. In **Select Measures**, modify the main [Select Measures Properties \(on page 90\)](#).
3. To add a CAS target reference marker, click **Add Target**.
4. To designate the target, click either a point on the map or a vehicle entity.

 **WARNING**

Vehicle entities must be either built using [Build Missions \(on page 67\)](#) or placed using the VBS Editor, before they can be designated as targets.

 **TIP**

For better precision when designating targets, press **Map (M)** to switch to the 3D View. This allows you to:

- Designate targets on vertical surfaces of objects (for example, the side of a building).
- Designate vehicle entities (a vehicle unit symbol in the 2D View may not always correspond to the actual vehicle entity).

The New Target dialog opens.

5. Set the [New Target Dialog Properties \(on page 91\)](#).
6. Click **Create**.

The target reference marker appears on the map, and the target information is added under **Target List**.

If required, under **Target List**, modify the [Target Properties \(on page 91\)](#).

7. In **Select Measures**, modify the additional [Select Measures Properties \(on page 90\)](#).
8. In **Select Egress**, modify the [Select Egress Properties \(on page 92\)](#).

The lines between the IP and the target reference marker, and between the latter and the egress IP, become curved based on the egress properties.

9. In **Select Aircraft Details**, modify the [Select Aircraft Details Properties \(on page 93\)](#).
10. In **Select Attack Profile**, modify the [Select Attack Profile Properties \(on page 93\)](#).
11. Go back to the top of **Select Aircraft** to repeat the steps for other aircraft in your CAS Unit.

12. In **Execution Control**, choose one of the following:

 **NOTE**

The **Execution Control** section is only available in Preview / Execute Mode.

- To start the CAS mission, click **Start CAS Mission**.  
The CAS mission starts.
- To abort the started CAS mission, click **Abort Mission**.  
The CAS mission aborts.
- To begin the attack, based on the Cleared Hot clearance call from the JTAC, click **Cleared Hot**.  
The CAS Unit begins the attack.

The CAS Mission Order is modified.

## 17.3 CAS Mission Order Properties

Set the following CAS Mission Order properties.

### 17.3.1 Specific Properties

#### Routing Properties

 **WARNING**

CAS properties marked with an asterisk (\*) are mandatory.

Specific Property	Description
<b>Route To*</b>	Available CPs, IPs, HAs, and BPs, based on the values in the drop-down.
<b>Coordinates</b>	Routing coordinates. You can also select <b>Stay Above</b> or <b>Stay Below</b> in feet or meters, to stay above / below the specified altitude.

 **NOTE**

The following considerations apply:

- If both **Stay Above** and **Stay Below** are specified, their average is used.
- If both **Stay Above** and **Stay Below** are specified, and are mutually exclusive, the default aircraft altitude is used instead.

<b>Pattern</b>	Holding pattern. Can be: <ul style="list-style-type: none"> <li>• Race Track / Lines</li> <li>• Wheel Orbit</li> <li>• Hover</li> </ul>
<b>Radius</b>	Pattern radius in Nautical Miles (NM). <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <p><b>NOTE</b></p> <p>The minimum is 1 NM.</p> </div>

## Select Measures Properties

Main:

Specific Property	Description
<b>Observer</b>	Available JTAC playable units with a URN, based on the values in the drop-down. <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <p><b>NOTE</b></p> <p>Cannot be specified in Prepare Mode.</p> </div>
<b>Control Type</b>	CAS mission control type. Can be: <ul style="list-style-type: none"> <li>• <b>Type 1</b> - Type 1 control is used when the FAC / JTAC requires control of individual attacks and the situation requires the FAC / JTAC to visually acquire the attacking aircraft and visually acquire the target for each attack.</li> <li>• <b>Type 2</b> - Type 2 control is used when the FAC / JTAC requires control of individual attacks and is unable to visually acquire the attacking aircraft at weapons release or is unable to visually acquire the target.</li> <li>• <b>Type 3</b> - Type 3 control is used when the FAC / JTAC requires the ability to provide clearance for multiple attacks within a single engagement subject to specific attack restrictions.</li> </ul> <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <p><b>NOTE</b></p> <p>The following rules apply:</p> <ul style="list-style-type: none"> <li>• The JTAC has to correctly identify the CAS mission type they are requesting.</li> <li>• The Instructor has to record the CAS mission type requested by the JTAC.</li> </ul> </div>
<b>Initial Point</b>	Available IPs based on the values in the drop-down.
<b>Heading / Distance</b>	Heading (in degrees) and distance (in mils) to approach the CAS target.

Additional:

Specific Property	Description
<b>Mark Type</b>	CAS Mission Order mark type. Can be: <ul style="list-style-type: none"> <li>• None</li> <li>• Smoke</li> <li>• Laser</li> </ul> Set the mark <b>Laser Code</b> , which is the Pulse Repetition Frequency (PRF), and <b>LTL</b> (Laser Target Line) angle in degrees.
<b>Friendly Location</b>	Friendly forces location, indicated by the direction (NW, N, NE, E, SE, S, SW, W) and distance (in meters).

### New Target Dialog Properties



#### WARNING

CAS properties marked with an asterisk (\*) are mandatory.

Specific Property	Description
<b>Name*</b>	Target name.
<b>Type*</b>	Target type (auto-selected, depending on target designation). Can be: <ul style="list-style-type: none"> <li>• <b>Point</b> - Geo-referenced position or GPS target coordinates.</li> <li>• <b>Object</b> - Moving target.</li> </ul> <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <b>NOTE</b>            Only shows for vehicle entities, designated as targets.         </div>
<b>Location*</b>	Target coordinates in LLMS, MGRS, or UTM. <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <b>NOTE</b>            Not all the coordinate types from the <b>Coordinates Type</b> Global Property (see Global Properties in the VBS Plan Manual) can be used for the target coordinates.         </div>

### Target Properties

To delete an existing target, either select the target reference marker on the map and press **Delete**, or click the **Trash Icon** in the target entry under **Target List**.



## WARNING

CAS properties marked with an asterisk (\*) are mandatory.

Specific Property	Description
<b>Name*</b>	Target name.
<b>Type*</b>	Target type (auto-selected, depending on target designation). Can be: <ul style="list-style-type: none"> <li><b>Point</b> - Geo-referenced position or GPS target coordinates.</li> <li><b>Object</b> - Moving target.</li> </ul> <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <b>NOTE</b>            Only shows for vehicle entities, designated as targets.         </div>
<b>Target Coordinates*</b>	Target coordinates in LLMS, MGRS, or UTM. <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <b>NOTE</b>            Not all the coordinate types from the <b>Coordinates Type</b> Global Property (see Global Properties in the VBS Plan Manual) can be used for the target coordinates.         </div>
<b>Target Elevation*</b>	Target elevation (in feet or meters) above sea level. <div style="border: 1px solid #0070C0; padding: 10px; margin-top: 10px;"> <b>NOTE</b>            Filling the elevation in feet automatically updates the elevation in meters, and the other way around.         </div>

## Select Egress Properties

Specific Property	Description
<b>Egress Direction</b>	Egress direction based on the direction grid (click the required direction tile - NW, N, NE, E, SE, S, SW, W).  <b>Egress Direction</b> is optional and is followed for a distance of 2 km, before heading towards the <b>Egress Location</b> .
<b>Egress Location</b>	Egress location based on the values available in the drop-down.  Egress location can either be specified using an existing CP or IP. Or if omitted, the last known CP / HA of the CAS Unit is used by default.  It is assumed that all the CAS Unit aircraft have at least one known CP / HA, even if none is specified by the user, as it is the location where the CAS Unit spawns in the mission.

## Select Aircraft Details Properties

Specific Property	Description
<b>Engage</b>	<p>Engagement type. Can be:</p> <ul style="list-style-type: none"> <li>• <b>Immediate</b> - Default setting. The CAS mission starts as soon as you click <b>Start CAS Mission</b>.</li> <li>• <b>Time On Target</b> - The CAS mission starts with a delay, timed so that the (first, if multiple) projectile impacts at the specified mission time.</li> <li>• <b>Time To Target</b> - The CAS mission starts with a delay, timed so that the (first, if multiple) projectile impacts at the specified time from when you click <b>Start CAS Mission</b>. For example, with a Time To Target of 5 minutes, the projectile impacts 5 minutes after you click <b>Start CAS Mission</b>.</li> </ul> <p>If you select <b>Time On Target</b> or <b>Time To Target</b>, you also need to set the time in the fields that appear.</p> <div style="border: 2px solid red; padding: 10px; margin-top: 10px;"> <p> <b>WARNING</b></p> <p>If the timing is set too early, the CAS mission starts immediately.</p> </div> <div style="border: 2px solid #0070C0; padding: 10px; margin-top: 10px;"> <p> <b>NOTE</b></p> <p><b>Time On Target</b> is set in relation to the Elapsed Time / Mission Time. For more information, see Synchronize Time in the VBS4 Editor Manual.</p> </div>

## Select Attack Profile Properties



CAS properties marked with an asterisk (\*) are mandatory.

Specific Property	Description
<b>Separation</b>	Attack separation (in seconds).
<b>Altitude</b>	Attack altitude (in feet or meters).

**Attack Profile\***

Attack profile. Can be:

- Level
- Orbit
- Pop Up
- Dive

**NOTE**

An aircraft performing an Orbit attack can only engage one target per CAS mission.

**WARNING**

In case of insufficient attack distance and / or altitude, the "Not Able to Fire" error message is displayed.

**TIP**

You can also calibrate the `maxDiveAngle` in the aircraft or optimal firing distances in the munition JSON configuration (see [CAS Unit Parameters \(on page 35\)](#)) to enable dive attacks.

**Munitions\***

Munition type based on the values available in the drop-down.

Set the munitions **Quantity** and **Beaten Zone** (used by unguided munitions, and represents a line, measured in meters, along which munitions are dropped in equidistant manner).

Selecting the munition adds Risk-Estimate Distance Rings (REDs) to the map, which indicate the damage area for the chosen munition.

**TIP**

You can show / hide REDs using the [CAS Available Aircraft Tool \(on the next page\)](#).

## 18. CAS Available Aircraft Tool

After adding CAS Units using the [CAS Units Tool \(on page 30\)](#), you can manage them in the Available Aircraft Panel, which displays a list of added CAS Units.

>> Available Aircraft			
	Name	Status	Controls
👁	A-10A	N/A	
👁	A-10A-1	On hold	
👁	A-10A-2	On hold	
👁	A-10A-3	On hold	
👁	A-10A-4	On hold	
👁	F-16C	N/A	
👁	F-16C-1	On hold	
👁	F-16C-2	On hold	
👁	F-16C-3	On hold	
👁	F-16C-4	On hold	

Select a CAS Unit or individual aircraft in the Available Aircraft Panel.

Do any of the following:

- To change the visibility of aircraft splines (flying trajectories) and REDs (Risk-Estimate Distances), click any of the following **Eye** icons:



- In each row, representing either a CAS Unit or individual aircraft.
- At the panel top, for all the CAS Units in the CAS mission.

- To show the available aircraft in a CAS Unit, expand the listed CAS Unit.



- To change the clearance call type, use the **Controls** column for the aircraft that receive the clearance call from the JTAC.

To change the clearance call to Cleared Hot (CH), click **CH**.

To abort the CAS mission for the selected aircraft in the CAS Unit, click **Abort**.

- The **Status** shows any of the following aircraft statuses:

**NOTE**

Other CAS mission statuses are displayed in the Mission List (see [CAS Mission List Panel \(on page 100\)](#)).

Aircraft Status	Description
<b>Waiting</b>	Aircraft is waiting to start a mission due to user-defined separation.
<b>Ingress</b>	Aircraft is ingressing to an IP.
<b>Egressing</b>	Shows when individual aircraft are currently egressing to their final location.
<b>On Hold</b>	Shows when all or individual aircraft are in a Holding Pattern (HP) either from routing or after egressing.
<b>Cleared Hot</b>	Shows when an individual aircraft is Cleared Hot (CH) and inbound to the target.

## 19. CAS Event List Panel

The Event List panel shows a list of CAS events that occur during the CAS mission.

Type	Description	Designation	Time
✓	Mission created	A-10A-1	0:04:32
✓	Egressing	A-10A-1	0:09:26
✓	Off Dry	A-10A-1	0:09:26
⚠	No Cleared Hot Given	A-10A-1	0:09:26
⚠	Not Able to Fire	A-10A-1	0:09:26

The Event List information depends on the VBS4 Mode:

- **Preview / Execute Mode** - CAS events are added to the Event List as the CAS mission executes.
- **Assess Mode** - All the CAS events that occur during the CAS mission run are in the Event List when the After Action Review (AAR) loads. For more information, see [VBS Close Air Support \(CAS\) in AAR \(on page 111\)](#).

The following is discussed:

- [Event List Information \(below\)](#)
- [Possible Events \(on the next page\)](#)

### 19.1 Event List Information

The Event List information is divided into several columns:

Column	Description
Type	Event type. For more information, see <a href="#">Event Type (on the next page)</a> .

Column	Description
Description	Event description. For more information, see <a href="#">Event Description (below)</a> .
Designation	Aircraft name / callsign.
Time	Event time.

## 19.2 Possible Events

The possible CAS event types are:

Event Type	Icon	Event Description
Abort		CAS mission aborted. For more information, see <a href="#">CAS Mission Order Tool (on page 85)</a> .
Cleared Hot		When an aircraft is ordered a Cleared Hot before weapon release. For more information on Cleared Hot, see <a href="#">CAS Available Aircraft Tool (on page 95)</a> and <a href="#">CAS Mission Order Tool (on page 85)</a> .
Egressing		Shows after an aircraft fires the last munition.
Laser Off		Aircraft reports it has fired a PRF-guided munition 10s ago.
Laser On		Aircraft reports it is about to fire a PRF-guided munition in 30s.
Mission Created		CAS mission created. For more information, see <a href="#">CAS Mission Order Tool (on page 85)</a> .
Munition Impact		Single shot munition impacts.

**NOTE**

If the munition quantity (**Munitions > Quantity** property - see [CAS Mission Order Tool \(on page 85\)](#)) is bigger than 1, whether the event only appears for the first munition impact or for all is determined by the `logAllImpacts` JSON parameter (see [CAS Unit Parameters \(on page 35\)](#)).

Event Type	Icon	Event Description
Munition Release		Aircraft releases a single shot munition.  <div style="border: 1px solid #0070C0; padding: 10px;"> <p><b>NOTE</b></p> <p>If the munition quantity (<b>Munitions &gt; Quantity</b> property - see <a href="#">CAS Mission Order Tool (on page 85)</a>) is bigger than 1, the event appears for every munition release.</p> </div>
No Ammo		Aircraft runs out of shots of the currently selected munition.
No Cleared Hot Given		Aircraft is unable to fire because of delayed Cleared Hot. For more information on Cleared Hot, see <a href="#">CAS Available Aircraft Tool (on page 95)</a> and <a href="#">CAS Mission Order Tool (on page 85)</a> .
No Fire Area Violation		Aircraft fires munitions in a No Fire Area (NFA). For more information, see <a href="#">CAS No Fire Area (NFA) Tool (on page 50)</a> .  <div style="border: 1px solid #0070C0; padding: 10px;"> <p><b>NOTE</b></p> <p>If the munition quantity (<b>Munitions &gt; Quantity</b> property - see <a href="#">CAS Mission Order Tool (on page 85)</a>) is bigger than 1, the event appears for every munition release.</p> </div>
No Fly Zone Violation		Aircraft enters a No Fly Zone (NFZ). For more information, see <a href="#">CAS No Fly Zone (NFZ) Tool (on page 45)</a> .
Not Able to Fire		Aircraft is unable to fire because of invalid CAS Mission Order parameters. For more information, see <a href="#">CAS Mission Order Tool (on page 85)</a> .
Off Dry		Aircraft reports it starts egressing and that no munitions were released.
Off Hot		Aircraft reports it starts egressing and that munitions were released.
Return to Base		Aircraft returns to base.
Time of Flight		Time of flight of unguided / GPS-guided munitions. Shown in brackets in seconds.

## 20. CAS Mission List Panel

The Mission List panel shows a list of mission statuses based on the missions that CAS Units (see [CAS Units Tool \(on page 30\)](#)) execute during the CAS scenario.

Mission List			
Name	Status	Start Time	End Time
A-10A	On Mission	0:04:32	0:06:45

The Mission List information depends on the VBS4 Mode:

- **Preview / Execute Mode** - CAS mission statuses are added to the Mission List as the CAS scenario executes.
- **Assess Mode** - All the CAS mission statuses that occur during the CAS scenario run are in the Mission List when the After Action Review (AAR) loads. For more information, see [VBS Close Air Support \(CAS\) in AAR \(on page 111\)](#).

The CAS mission statuses are:

**NOTE**

Other aircraft statuses are displayed in the Available Aircraft Panel (see [CAS Available Aircraft Tool \(on page 95\)](#)).

Mission Status	Description
On Hold	Shows when all or individual aircraft are in a Holding Pattern (HP) either from routing or after egressing.
On Mission	Shows when one or more aircraft are conducting a CAS mission but have different individual statuses.
On Route	Shows when one or more aircraft are egressing.

# 21. Forms

VBS4 enables scenario designers to create customizable forms that can be used as required. In addition, there is a range of existing forms provided for use by Administrators / Instructors and Trainees. All scenario participants can view a list of completed forms, once they are sent / transmitted.

This topic discusses the following:

- [Accessing Form Options \(below\)](#)
- [Creating a Form \(on the next page\)](#)
- [Filling-In and Sending a Form \(on page 104\)](#)
- [Existing Form Types \(on page 105\)](#)
- [Completed Forms \(on page 109\)](#)

## 21.1 Accessing Form Options

Form options are accessed from the following locations:

- Under the Tools Menu Options in the VBS Editor in Prepare, Execute, and C2 Modes (see Tools Menu Options in the VBS4 Instructor Manual).
- In the Quick Menu (see Quick Menu Actions) in Execute and C2 Modes.

Option	Mode	Location	Description
Send Form	Execute / C2	Tools Menu / Quick Menu	Opens the <b>Send Form</b> dialog, where you can select the type of form you want to send, and the recipients. For more information, see <a href="#">Filling-In and Sending a Form (on page 104)</a> .
Create Form	Prepare / Execute	Tools Menu	Opens the <b>Form</b> dialog, where you can create customized form templates. For more information, see <a href="#">Creating a Form (on the next page)</a> .
List Forms	Execute / C2	Tools Menu	Opens the <b>List Forms</b> dialog, which lists all <a href="#">Completed Forms (on page 109)</a> .

## 21.2 Creating a Form

Select **Create Form** from the Tools Menu to create a new form template.

**Follow these steps:**

1. Go to **Tools > Create Form**.

The Form dialog opens.



2. Use the first drop-down to select the type of row on the form that you want to create:

Type	Description	Label	Value
Text	Text only, no fields to fill-in.	Row item name.	Item value, which cannot be edited.  Use the drop-down to select the number of rows for the item value. If there is more than one value, they are placed side-by-side in the same row.
Edit	Text with a field to fill-in.	Row item name.	Item value, which can be edited.  Use the drop-down to select the number of rows for the item value. The value is placed in a box, which can be edited by the user. If there is more than one value, they are placed side-by-side the box.
Combo	Text with a drop-down menu.	Row item name.	Item value, which cannot be edited. Multiple values can be added by separating them with a comma (,).  <b>Value 1, Value 2, Value 3</b>  Use the drop-down to select the number of rows for the item value. If 1 row is selected, the items in the Value field are placed in a drop-down menu. If more than 1 row is selected, the values are placed in a list.

3. Do one of the following:

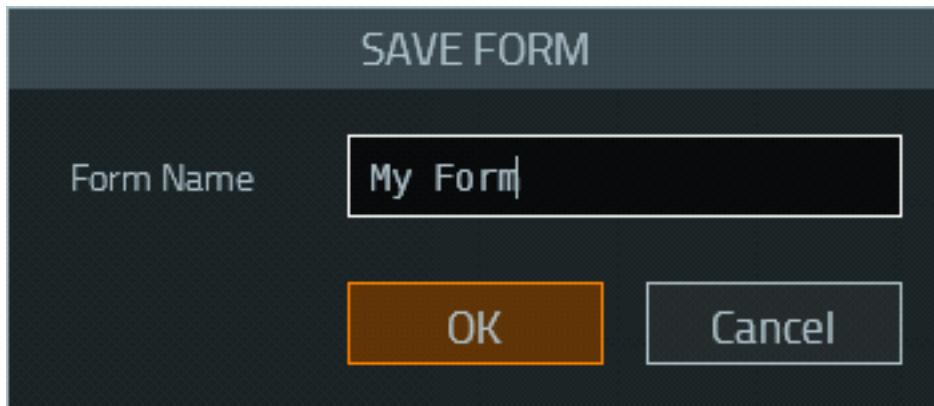
- Click **Preview** to see how the form looks (click **X** to return to the Form dialog to continue creating your form).
- Click **Add**, to add more rows.
- Click **Clear** to clear the row and start again.

4. If necessary, click the **arrow icons** to move the rows up or down on the form, or click the **trash icon** to reset the row.



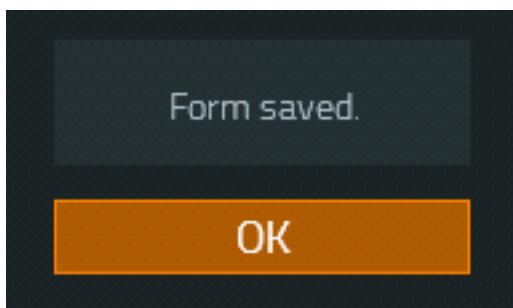
5. Click **Save** to save the form.

The Save Form dialog opens.



Input a name for the form, and click **OK**.

The Form Saved dialog opens.



Click **OK**. The form is created, and saved in the profile data (it is mission independent).

6. Once the form is loaded / saved, click **Transfer** to send the created form across the network.

## 21.3 Filling-In and Sending a Form

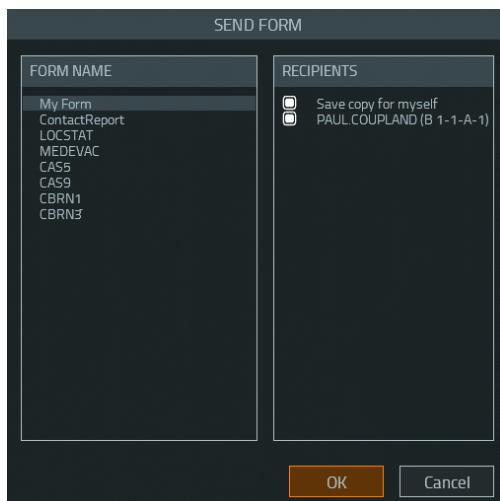
Once other computers receive the form templates, they are available in the **Form Name** list of the **Send Form** dialog, along with the [Existing Form Types \(on the next page\)](#).

### Follow these steps:

1. Do one of the following to send a form:

- Go to **Tools > Send Form**.
- Open the Quick Menu (see Quick Menu Actions) and click **COMMS**, then click **FORMS**.

The **Send Form** dialog opens.



2. Select a form to send in the **Form Name** list so that it is highlighted.
3. If you are in a multiplayer scenario, select the **Recipients** you want to send the form to.

#### **NOTE**

By default, all Administrators / Instructors are selected, as is **Save copy for myself**. If you change the selection, the list of recipients is used for all forms for the remainder of the scenario, or until the selection is updated.

4. Click **OK**.

The selected form opens.

5. Fill-in the form, and click **Send / Transmit / OK** to send it.

The form is sent.

#### **NOTE**

Dedicated servers always receive the forms.

## 21.4 Existing Form Types

This section lists the existing form types, that are provided by default, and describes their uses. The procedure to access and send them is described in [Filling-In and Sending a Form \(on the previous page\)](#).

### ContactReport

Use this form to report the detection of an enemy.

The screenshot shows a dark-themed window titled "CONTACTREPORT". It contains several input fields:

- A large empty text input field.
- An empty text input field below it.
- A text input field containing "31TFF2814726245".
- A text input field containing "Unknown".
- A text input field containing "12:00:11".
- An empty text input field below the timestamp.
- A section labeled "ENEMY SHOTS" with an empty text input field.
- A section labeled "FRIENDLY SHOTS" with an empty text input field.

### LOCSTAT

Use this form to send your "Location State". Your coordinates are included by default.

The screenshot shows a dark-themed window titled "LOCSTAT". It contains three input fields:

- A text input field containing "B".
- An empty text input field below it.
- An empty text input field below the first one.

### MEDEVAC

Use this form to request medical assistance.

The screenshot shows a dark-themed window titled "MEDEVAC". It contains several input fields:

- A large empty text input field.
- A section labeled "ENEMY HITS" with an empty text input field.
- A section labeled "ENEMY WOUNDS" with an empty text input field.
- A section labeled "FRIEND HITS" with an empty text input field.
- A section labeled "FRIEND WOUNDS" with an empty text input field.

The MEDEVAC form accessed here is a simplified version of the MEDEVAC form accessed from the new User Actions. For more information, see MEDEVAC / CASEVAC in the VBS4 Editor Manual and Request MEDEVAC / CASEVAC.

## CAS 5-Line / CAS 9-Line

Use these forms to request Close Air Support (CAS) (see [VBS Close Air Support \(on page 7\)](#)).

**CAS 5-line form**

Line 1	A/C Callsign _____, this is _____, 5-line
	Type <input type="button" value="1"/> <input type="button" value="BOC"/> Ordinance _____
Line 2	My position _____, Marked by _____
Line 3	Target location _____
	Range _____, Bearing _____
Line 4	Target description _____, Marked by _____
Line 5	FAH _____ LTL _____ SEAD <input type="button" value="Int"/>
	ACA _____ Danger Close <input type="checkbox"/> GFC Init _____
Remarks/ Restrictions	_____

**Send** **Close**

**CAS 9-line form**

Line 1	IP/BP _____
Line 2	Heading _____ / Offset _____
Line 3	Distance _____
Line 4	Target elevation _____
Line 5	Target description _____
Line 6	Target location _____
Line 7	Type mark _____ Code _____
Line 8	Location of friendlies _____
Line 9	Egress _____
Remarks/ Restrictions	FAH _____ LTL/PTL _____ TOT _____ / TTT _____ _____

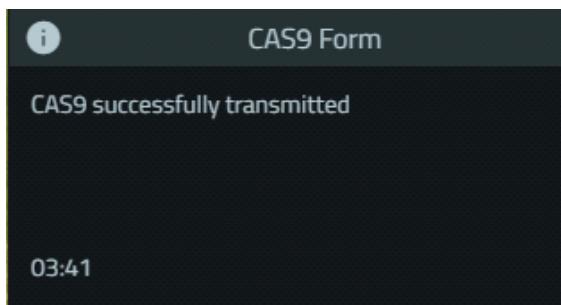
**Send** **Close**

For more information, see [VBS Close Air Support Execution](#) and [VBS Close Air Support Example Execution](#) in the [VBS Close Air Support Manual](#).

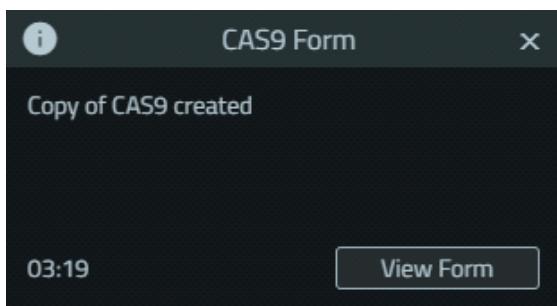
When you click **Send**, the following dialogs appear at the bottom-right of your screen, and in your **Notifications** panel.

**NOTE**

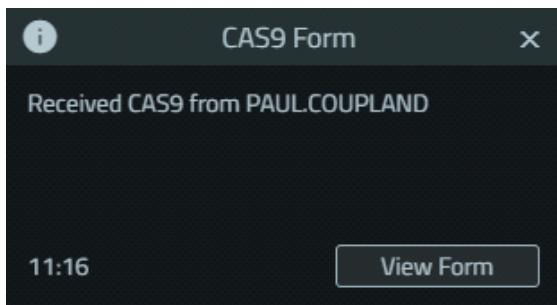
The dialogs appear in first-person view, in the VBS Editor, and in the VBS Plan / CAS UI. Dialogs that appear in first-person view cannot be interacted with.



If you selected **Save copy for yourself**, the following dialog appears. Click **View Form** to open and view the form.



If you receive a **CAS 5-Line** or **CAS 9-Line** form, the following dialog appears. Click **View Form** to open and view the form.

**TIP**

Received CAS 5-Line or CAS 9-Line forms have the informational text **Select desired text for copy and paste**. at the bottom. This means that you can copy information from the form and paste it elsewhere. For example, you may need to copy and paste target coordinates when creating a new target in the VBS Plan / CAS UI.

## CBRN1 / CBRN3

Use the CBRN1 Form to send an initial report of CBRN observations. Use the CBRN3 form to send an immediate warning of CBRN contamination, or a Hazardous Area (see Hazardous Area in the VBS4 Editor Manual).

Line	Nuclear	Chemical	Biological	Radiological
A	C	C	C	C
B	M	M	M	M
D	M	M	M	M
F	O	O	O	O
G	M	M	M	M
H	M	N/A	N/A	N/A



### TIP

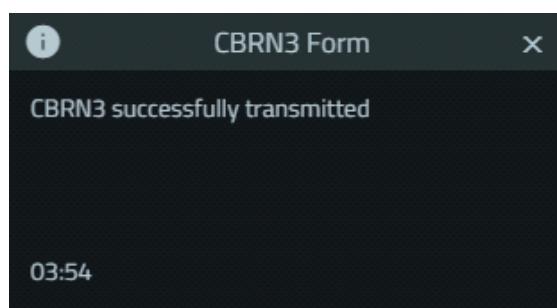
Cells marked with an **M** are mandatory. Cells marked with an **O** are optional.

When you click **Send**, the following dialogs appear at the bottom-right of your screen, and in your **Notifications** panel.

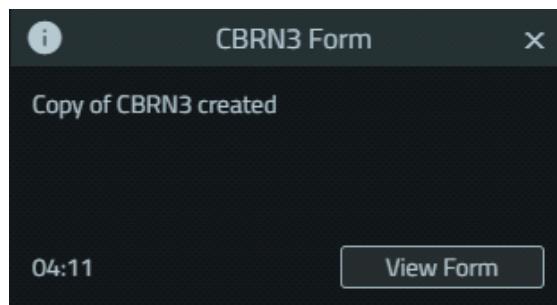


### NOTE

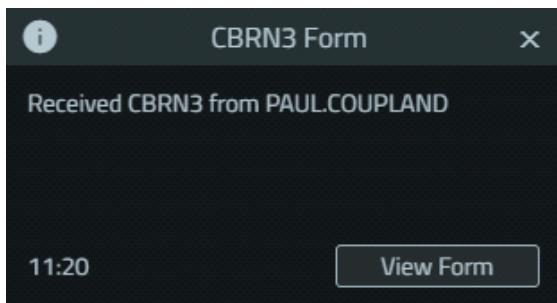
The dialogs appear in first-person view, in the VBS Editor, and in the VBS Plan / CAS UI. Dialogs that appear in first-person view cannot be interacted with.



If you selected **Save copy for yourself**, the following dialog appears. Click **View Form** to open and view the form.



If you receive a **CBRN1** or **CBRN3** form, the following dialog appears. Click **View Form** to open and view the form.



## 21.5 Completed Forms

Completed forms are forms that have been transmitted / sent.

**Follow these steps:**

1. Go to **Tools > List Forms** to access the current list of completed forms.

The **List Forms** dialog opens.

MISSION:	All	START TIME:	All	X	
Form Title	Mission	Submitted By	Side	Scenario Start	Sim Time
CBRN1	Poland	PAUL.COUPALND	BLUFOR	13-2-2023 16h 39m	00:03:52
LOCSTAT	Poland	PAUL.COUPALND	BLUFOR	14-2-2023 16h 28m	00:00:16

2. Do one of the following:

- Double-click an **entry** in the list to open and view the form.
- Click an **entry** in the list, so that it is highlighted, and click the search icon.



The form opens for you to view.

3. Click **X** to close the form.



### TIP

Sent CAS 5-Line / 9-Line forms and CBRN1 / CBRN3 forms can also be opened and viewed by the receiver by clicking **View Form** in their notification dialogs. For more information, see [CAS 5-Line / CAS 9-Line \(on page 106\)](#) and [CBRN1 / CBRN3 \(on the previous page\)](#).

The following applies to all completed forms:

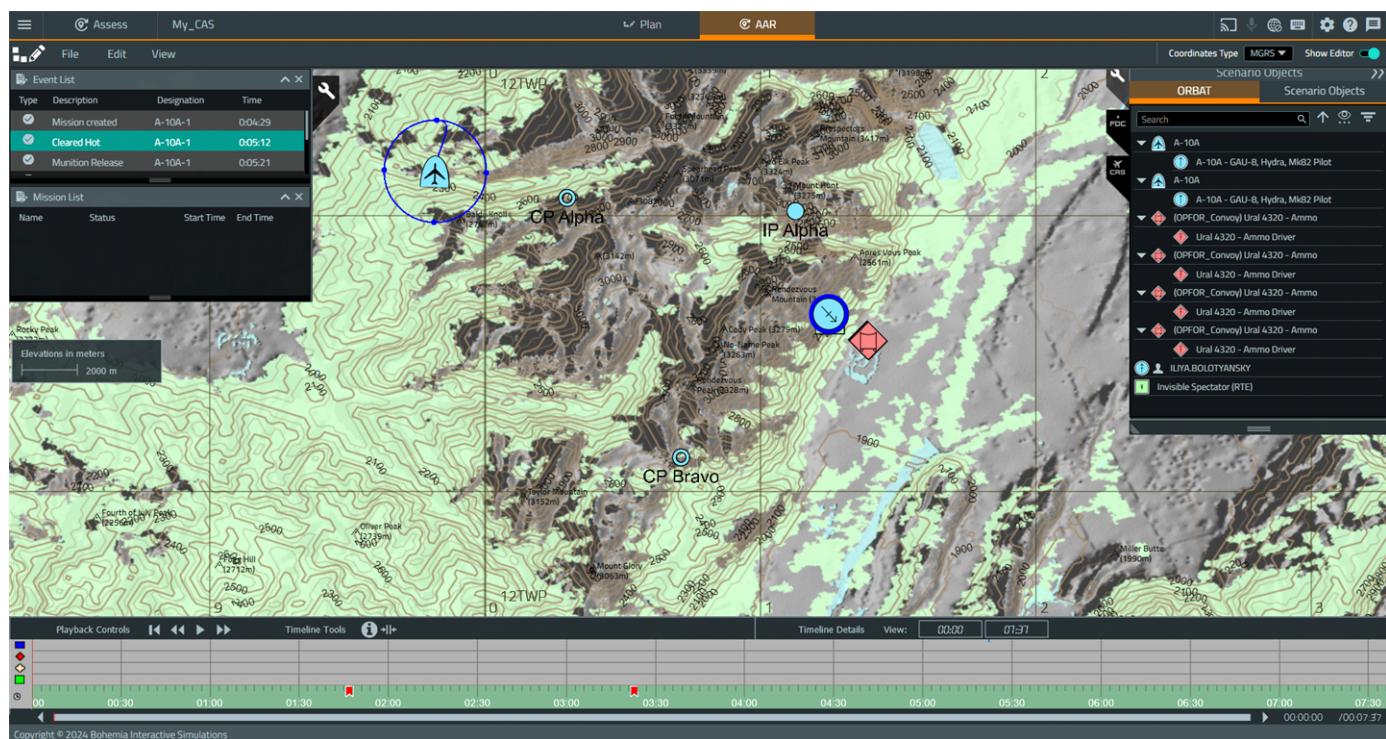
- The server receives and stores all completed forms.
- Trainees can see all the forms they have transmitted (filtering by **Mission / Start Time** is possible).
- The Administrator / Instructor can see all the forms sent by all users.
- If an After Action Review (AAR) was recorded, bookmarks appear in the Timeline and the Bookmarks List to indicate that a form was sent. Double-clicking an entry in the Bookmarks List brings up the form, and moves the current time in the Timeline to when the form was sent. For more information, see After Action Review (AAR) and Bookmarks List in the VBS4 AAR Manual.

## 22. VBS Close Air Support (CAS) in AAR

Administrators / Instructors, and Trainees are able to review CAS training scenarios retrospectively, using the After Action Review (AAR) feature. This feature enables the analysis of Trainee decision making and performance during a scenario .

AAR scenario recordings are accessed by the Administrator / Instructor. However, the Trainee can also view them on their computer. For more information about accessing AAR recordings and using the AAR UI, see After Action Review (AAR) in the VBS4 AAR Manual.

To open the CAS AAR UI, click the **CAS** tab in the AAR.



The CAS AAR UI consists of:

- [Event List \(below\)](#)
- [Mission List \(on the next page\)](#)

In addition, VBS4 automatically adds CAS activity to the AAR Timeline as overlay commits and corresponding AAR bookmarks. For more information, see Share Overlays - Network Collaboration in the VBS Plan Manual.

### 22.1 Event List

The Event List Panel shows the CAS events that happened during the CAS mission.

The Event List Panel is available in the Preview / Execute / Assess Modes.

In Assess Mode, CAS Events are added to the AAR Timeline (see AAR Playback and the User Interface in the VBS4 AAR Manual).

Type	Description	Designation	Time
✓	Mission created	A-10A-1	0:04:32
✓	Egressing	A-10A-1	0:09:26
✓	Off Dry	A-10A-1	0:09:26
⚠	No Cleared Hot Given	A-10A-1	0:09:26
⚠	Not Able to Fire	A-10A-1	0:09:26

For more information, see [CAS Event List Panel \(on page 97\)](#).

## 22.2 Mission List

The Mission List shows all the CAS missions performed by individual aircraft in the CAS Unit.

The Mission List Panel is available in the Preview / Execute / Assess Modes.

Name	Status	Start Time	End Time
A-10A	On Mission	0:04:32	0:06:45

For more information, see [CAS Mission List Panel \(on page 100\)](#).