ARH ACATS

VBS4 24.1.1

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The BISim Wiki is the primary resource on VBS4 scripting:

https://sqf.bisimulations.com/display/SQF/VBS+Scripting+Reference

PhysX

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

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

Contents

1. Aviation Combined Arms Training System

VBS4 provides Armed Reconnaissance Helicopter (ARH) model variants and additional functionality to enable ARH crews to participate in a greater range of training activities as part of the Aviation Combined Arms Training System (ACATS).

VBS4 delivers the variants and functionality as a set of features in VBS4.

1.1 ACATS ARH Model Variants

VBS4 adds to the existing ARH models with the following ACATS ARH model configurations:

ACATS ARH Variant	ACATS ARH Model	Loadout Capacity
Reconnaissance	Recon - M781, Hydra, Hellfire	2 Hellfire Missiles, 26 Rockets
Firepower	Firepower - M781, Hydra, Hellfire	4 Hellfire Missiles, 33 Rockets
Anti-Tank	Anti-Tank - M781, Hydra, Hellfire	8 Hellfire Missiles, 14 Rockets

The ACATS ARH variants extend the base ARH models with the following additional functions:

- Night-Vision Compatible Aircraft Lighting
- Steerable Landing Light
- Improved Weapon Selection Dialogs
- Roof-Mounted Sight (RMS)
- Helmet-Mounted Sight Display (HMSD)

> **NOTE**
>
> The ACATS ARH variants are intended only for multi-user simulation. AI units cannot use ACATS ARH systems.

1.2 Configurable Weapon Loads

Mission Editors can customize the missile and rocket loads to create new ACATS ARH variants:

Hellfire Missile Types:

- AGM-114K Hellfire Missiles - laser-guided with a high-explosive warhead
- AGM-114L Hellfire Missiles - radar-guided with a high-explosive warhead
- AGM-114M Hellfire Missiles - laser-guided with a fragmentation / incendiary warhead

By default, the ACATS ARH variants load AGM-114K Hellfire missiles.

70mm Hydra Rocket Types:

- HE Rockets
- Anti-Materiel Rockets
- Flechette Rockets
- Smoke Rockets
- Illumination Rockets
- IR Illumination Rockets

By default, the ACATS ARH variants load HE Rockets.

For more information, see Customize the ARH Ammunition Load (on the next page).

1.3 ACATS Mission Objects and Features

VBS4 includes the following features to support ACATS ARH training:

- Add Reference Marks to Missions (on page 9)
- Add Resupply Points to Missions (on page 10)
- Full helicopter flight and operational control as described in ACATS ARH Control Overview (on page 14).
- Multi-weapon display in the ACATS ARH User View (on page 18).
- AGM114 Hellfire Missiles (on page 28) simulation and lock-on modes.
- Mini-Map Navigation (on page 34)

2. Add ACATS ARH Models to Missions

The Editor enables you to add the ACATS ARH variants to your missions and further customize their weapons load.

Follow these steps:

1. Launch VBS4.
2. Open the mission where you want to use ACATS ARH models.
3. Select **(F4) Vehicles** from the Editor Objects List, right-click a location on the map, and select **New Object**.
4. Expand the **AU Army Air - Woodland** category, and select the ACATS ARH variant to add:

ACATS ARH Variant	ACATS ARH Model	Loadout Capacity
Reconnaissance	Recon - M781, Hydra, Hellfire	2 Hellfire Missiles, 26 Rockets
Firepower	Firepower - M781, Hydra, Hellfire	4 Hellfire Missiles, 33 Rockets
Anti-Tank	Anti-Tank - M781, Hydra, Hellfire	8 Hellfire Missiles, 14 Rockets

5. Input any additional Object Properties that you require for the vehicle.

   For more information, see Adding Vehicles in the VBS4 Editor Manual.
6. Click **OK** to add the default ACATS ARH variant to the mission or Customize the ARH Ammunition Load (below).

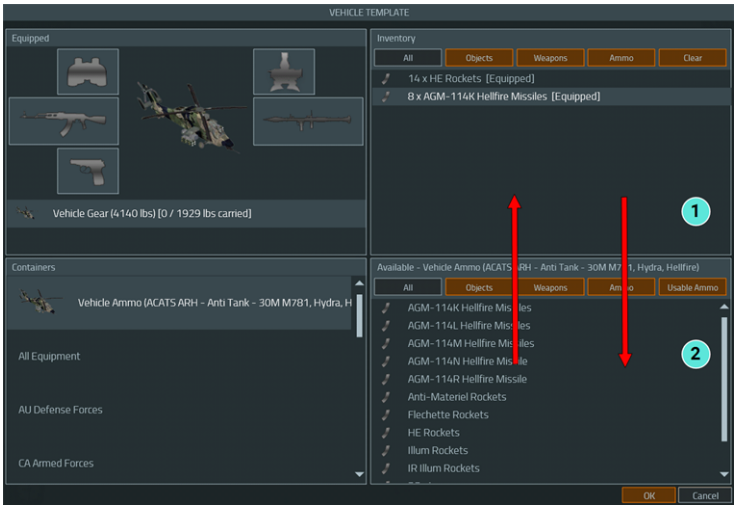
2.1 Customize the ARH Ammunition Load

The ARH models enable you to create new variants with customized ammunition loads.

In the Editor Object Properties dialog, select the ARH variant to copy, and click **New Vehicle**.

The Vehicle Template panel opens.

Image-1: Vehicle Template



The current vehicle displays in the top left, with ammunition to the right.

1	Equipped Ammunition
2	Available Ammunition

Follow these steps:

1. Change the ammunition load:
   - To remove an item, drag-and-drop from Equipped to Available ammunition, and select the number to move.
   - To add an item, drag-and-drop from Available to Equipped ammunition, and select the number to move.

   > **NOTE**
   > The maximum number of missiles and rockets for the new variant is the same as the copied variant.

2. Click **OK**.
3. Input a name for the new variant and click **OK**.

   A new variant is added to the list of available vehicles, with an asterisk (*) to indicate that you can **Edit Vehicle**.

   > **NOTE**
   > VBS4 saves new vehicles in:
   >
   > `\Documents\VBS4\Config\editorVehicles.cfg`.

4. Click **OK** in the Object Properties panel to add the new variant to your mission.

3. Add Reference Marks to Missions

Reference marks are an alternative to waypoints, offering greater flexibility to mission editors.

> **NOTE**
> For Trainee usage, see Add User Reference Marks (0-8-1) (on page 32).

Reference marks differ from waypoints in the following ways:

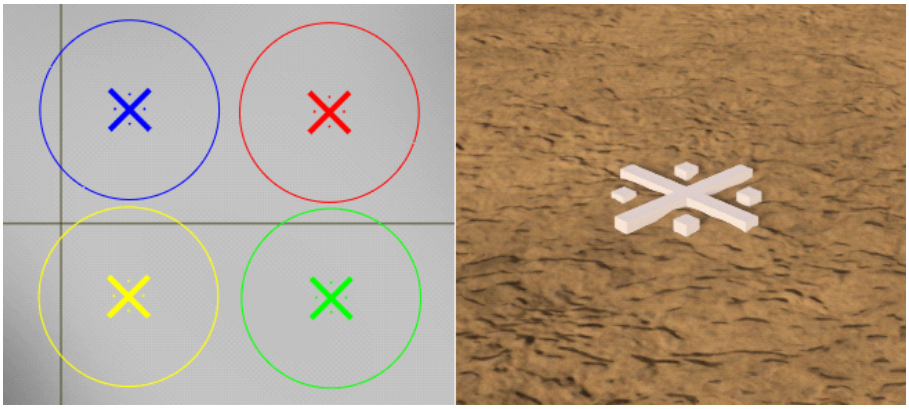
- Unlike waypoints, reference marks are persistent, and remain in place.
- They are active, but deactivate under the following conditions:
  - Autocomplete - When a unit / vehicle arrives at the reference mark.
  - Not Autocomplete - When the reference mark is manually deactivated.

Follow these steps:

1. In the Editor Objects List, select **Reference Mark**.
2. Double-click a location on the map to open the Object Properties dialog.
3. Input the **Mark Name**, and the **Side** it is visible to.
4. Set **Autocomplete**:
   - **true** - The reference mark deactivates on arrival.
   - **false** - The reference mark stays active until manually deactivated.
5. Click **OK**.

VBS Editor adds the reference mark to the map at the specified location.

> **NOTE**
> Reference Marks must be activated during Scenario Execution to become visible and to auto-complete. For more information, see Add User Reference Marks (0-8-1) (on page 32).



4. Add Resupply Points to Missions

Resupply Points (FARP) provide supplies to vehicles in their designated areas (shown on the map with a yellow rectangle or circle).

Configure resupply points to specify the following:

- The available supplies and repairs
- The vehicles that can use the resupply point
- Custom event handlers to execute custom code when vehicles interact with the resupply point
- Links to vehicles and objects to tie the resupply area to the linked vehicle or object

Add Resupply Points in VBS Editor.

Follow these steps:

1. In the Editor Objects List, select **Resupply Point**, right-click a location on the map, and select **New Object**.
2. Set the following basic parameters for the Resupply Point:

Resupply Parameter	Description
Name	Specifies the variable name to reference in scripts.
Rectangular	Specifies the shape of the resupply area: • True - Rectangular • False - Circular
Size (Left-Right) / (Up-Down)	Specifies the size in meters for rectangular areas.
Radius	Specifies the size in meters for circular areas.
Time (hr)	Specifies the time a vehicle must spend in the area *before* it receives any supplies. **NOTE** Vehicles must spend the entire time within the resupply area. There are no partial resupplies

3. Set the following **Options** to specify the available supplies and resupply point visibility:

Resupply Option	Description
Rearm	Specifies whether vehicles receive ammunition resupply.
Refuel	Specifies whether vehicles receive fuel resupply.
Repair	Specifies whether vehicles receive repairs.
Supply (Rearm / Refuel / Repair)	Specifies the available resupply units for each supply type (-1 = unlimited supplies). **NOTE** Vehicles use up full units even if they only require partial resupply
Restock Repair Parts	Specifies if repair vehicles receive new spare parts.
Create Map Marker	Specifies whether the resupply point is visible on maps. **NOTE** Only administrators and users on the same side see the map marker

4. Set the following **Conditions** to specify which vehicles to resupply:

Resupply Condition	Description
Side	Specifies which side can use the resupply point (or ALL).
Specific	Specifies additional conditions for vehicles to use the resupply point: • Landed • Engine Off • Vehicle Parked
Code	Specifies a scripted condition that a vehicle must meet before it receives resupply. Use `_this` in the condition to refer to the vehicle to resupply.
Fail Message	Specifies a custom message to display if a vehicle does not meet the scripted condition in the Code input.
Resupply Linked	Specifies whether to also resupply linked vehicles.

5. Set scripts to execute at specified **Events**:

Resupply Event	Description
On Arrive	Specifies a script to execute when a vehicle arrives at the resupply point. Use `_this` to specify the arriving vehicle.
On Leave	Specifies a script to execute when a vehicle leaves the resupply point. Use `_this` to specify the departing vehicle.
On Start Supply	Specifies a script to execute when a vehicle resupply starts. Use `_this` to specify the resupplied vehicle.
On End Supply	Specifies a script to execute when a vehicle resupply ends. Use `_this` to specify an array for the resupplied vehicle, `[vehicle, result]`, where `result` is true for a successful resupply.

6. Click **OK**.

   VBS Editor adds the Resupply Point to the mission.

7. **Optional:** Right-click the Resupply Point and use a **Link To ...** option to associate the Resupply Point with a vehicle or object.

For more information about scripting, see the Scripting Overview in the VBS4 Scripting Manual.

4.1 Resupply Point (FARP) setvariables

You can reference named resupply points and change their properties with the `setVariable` script command.

> **NOTE**
>
> If you use `setVariable` in Execute mode, the values in the Editor Object edit dialog change only after VBS Editor closes and opens again.

Available Variables:

```
VBS2_RESUPPLYPOINT_SIZEX - number
VBS2_RESUPPLYPOINT_SIZEY - number
VBS2_RESUPPLYPOINT_RECTANGULAR - boolean
VBS2_RESUPPLYPOINT_TIME - number
VBS2_RESUPPLYPOINT_REARM - boolean
VBS2_RESUPPLYPOINT_REARM_VOL - number
VBS2_RESUPPLYPOINT_REFUEL - boolean
VBS2_RESUPPLYPOINT_REFUEL_VOL - number
VBS2_RESUPPLYPOINT_REPAIR - boolean
```

```
VBS2_RESUPPLYPOINT_REPAIR_VOL - number
VBS2_RESUPPLYPOINT_RESUPPLY_REPAIR - boolean
VBS2_RESUPPLYPOINT_SIDE - string
- Any
- West
- East
- Guer
- Civ
VBS2_RESUPPLYPOINT_SPECIFIC - string
- None
- Landed
- EngineOff
- Parked
VBS2_RESUPPLYPOINT_CONDITION - string
VBS2_RESUPPLYPOINT_EVTARRIVE - string
VBS2_RESUPPLYPOINT_EVTLEAVE - string
VBS2_RESUPPLYPOINT_EVTSTART - string
VBS2_RESUPPLYPOINT_EVTEND - string
VBS2_RESUPPLYPOINT_RESUPPLY_LINKED - boolean
VBS2_RESUPPLYPOINT_MINIMAP - boolean
VBS2_RESUPPLYPOINT_FAILMSG - string
```

For more information, see setVariable (https://sqf.bisimulations.com/display/SQF/setVariable) in the online Scripting Reference.

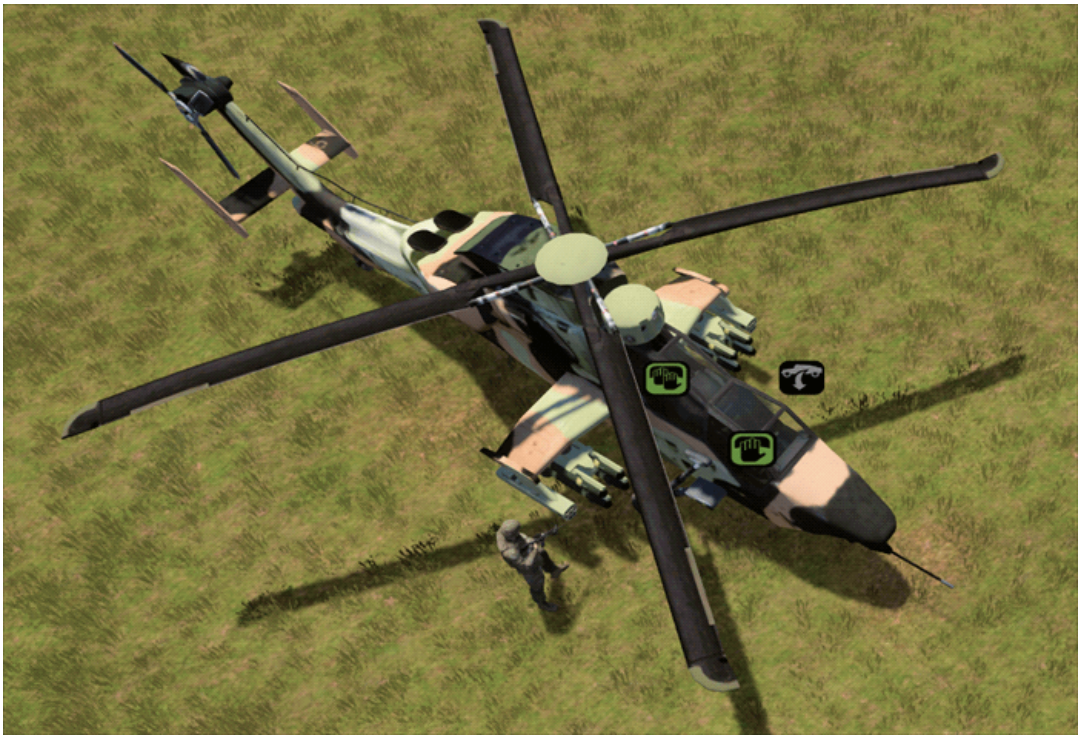
5. ACATS ARH Control Overview

The ACATS ARH is a two-crew helicopter, with a Pilot (Driver) and Battle Captain (Co-Pilot). The controls and functions available depend on your position in the aircraft.

Open the IWV to change position, or to use IWV vehicle functions:

- Press **Quick Menu** (**Left Windows**), and select the **INTERACT** option (see Quick Menu Actions in the VBS4 Trainee Manual).
- Press **Interact with Vehicle** (**U**).

Image-2: ACATS ARH Interact with Vehicles View



Perform any of the following actions in the IWV interface:

IWV Actions	Description
Click an aircraft position icon	Occupy the position in the aircraft and access its controls. See ACATS ARH Aircraft Positions (on the next page).
Click an aircraft function icon	Perform the aircraft function. See ACATS ARH Aircraft Functions (on the next page).
Click **Cancel**, or press **Interact with Vehicle** (**U**) or **Esc**	Exit the IWV view

5.1 ACATS ARH Aircraft Positions

IWV Icon	Position	Description
	Pilot (Driver)	The Pilot controls aircraft flight with access to the following functions: • ACATS ARH Flight Control (on page 21) • ACATS ARH Light Control (on page 23) • ACATS ARH Weapons Control (on page 25) • ACATS ARH Optics Control (on page 29)
	Battle Captain (Co-Pilot)	The Battle Captain controls aircraft systems with access to the following functions: • ACATS ARH Weapons Control (on page 25) • ACATS ARH Optics Control (on page 29) • Roof Mounted Sight Control (on page 30)

Both positions use ACATS ARH User View (on page 18) including the Helmet Mounted Sight Display (on page 19) and can access the following generic user functions:

- Add User Reference Marks (0-8-1) (on page 32)
- Mini-Map Navigation (on page 34)

5.2 ACATS ARH Aircraft Functions

ACATS ARH Functions	IWV Icon	Position	Description	Control Methods
Exit Vehicle		All	Exit the vehicle through the nearest available exit. The aircraft must be on the ground.	Small IWV Position Icons Quick Menu - **GET OUT** Press **Get Out** (**2 x H**)
Engine On / Off		Pilot	Turn the engine on and off.	Quick Menu - **VEHICLE > ENGINE ON / OFF**

ACATS ARH Functions	IWV Icon	Position	Description	Control Methods
Aircraft Lights		Pilot	Turn the main aircraft light on and off. The pilot has additional control of lights. See ACATS ARH Light Control (on page 23)	Press **Lights On / Off** (**L**) Quick Menu - **VEHICLE > TAKE CONTROL OF LANDING LIGHT**
RMS Control		Battle Captain	Open the RMS Control interface. See Roof Mounted Sight Control (on page 30)	Quick Menu - **VEHICLE > RMS CONTROL**
		Pilot	Automatically align the aircraft with the current RMS target. See Roof Mounted Sight Control (on page 30)	Quick Menu - **VEHICLE > ALIGN TO RMS**
		All	Switch the RMS View On / Off. See Roof Mounted Sight Control (on page 30)	Press **RShift + Toggle Optics** (**V**)
Set PRF Code		Pilot	Set the laser designation code for the RMS Laser. See Roof Mounted Sight Control (on page 30)	Quick Menu - **VEHICLE> SET PRF CODE**
		Battle Captain	Set the laser designation code for Hellfire missiles. See AGM114 Hellfire Missiles (on page 28)	
Weapon Selection		All	Open the Weapon Selection dialog. See ACATS ARH Weapons Control (on page 25)	Quick Menu - **VEHICLE > WEAPON SELECTION**
30M 781 Cannon		All	Take control of the 30M 781 Cannon. See 30M 781 Cannon (on page 27)	Quick Menu - **VEHICLE > CONTROL 30M 781 CANNON**

ACATS ARH Functions	IWV Icon	Position	Description	Control Methods
Free Look		All	The ACATS ARH includes functions that follow the user view to determine target directions. Use Free Look for: • ACATS ARH Light Control (on page 23) • Roof Mounted Sight Control (on page 30) • 30M 781 Cannon (on page 27)	Hold **LAlt** + move the mouse Numeric keypad numbers Press **Free Look** (**LAlt**) to toggle free look mode Press **Lean Forward** (**R**) to lean forward

6. ACATS ARH User View

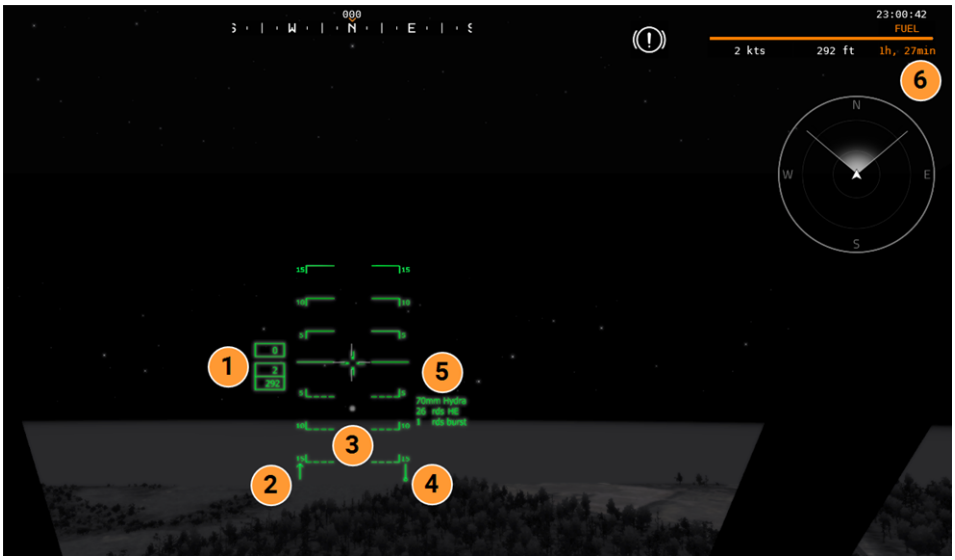
The ACATS ARH view combines the standard VBS4 HUD with additional ACATS ARH features.

Image-3: ACATS ARH Pilot View

1	**Helmet Mounted Sight Display**	The HMSD is a specific display for ACATS ARH crew. For more information, see Helmet Mounted Sight Display (on the next page).
2	**Electronic Warning System**	The EWS is a visual threat alert system indicating the direction and type of threat. For more information, see Electronic Warning System (on page 20).
3	**Roof Mounted Sight**	The RMS is a camera and laser system the Battle Captain controls that locks onto specified targets. For more information, see Roof Mounted Sight Control (on page 30).
4	**Multi-Weapon HUD**	The multi-weapon display shows the weapon each position currently controls. For more information, see ACATS ARH Weapons Control (on page 25).

6.1 Helmet Mounted Sight Display

Both positions in ACATS ARH aircraft use the Helmet Mounted Sight Display.



1	PFD Quadrant: • Aircraft Heading • Speed in Knots • Altitude in Feet
2	Heading of Cannon Relative to Vehicle Orientation
3	Aiming Spot for Cannon
4	Heading of RMS Relative to Vehicle Orientation
5	Weapons Quadrant: • Current Weapon • Remaining Ammunition and Ammunition Type • Salvo Size For Hellfire Missiles, the weapon quadrant also displays the following: • Firing Mode ◦ LOBL: Lock-on Before Launch ◦ LOAL: Lock-on After Launch • Missile PRF Code • Flight Time to Target ◦ For LOBL: Displays immediately after launch ◦ For LOAL: Displays when the missile acquires a target For more information, see AGM114 Hellfire Missiles (on page 28).
6	(Top-right of view) Flight Time Remaining with Current Fuel Load

6.2 Electronic Warning System

The EWS is a visual threat alert system indicating the direction and type of threat:

- Radar Warning Receiver (hollow circle indicating the source).

  Warns against radar guided weapons as soon as they are locked and fired. Does not warn against EW Radar ranging.

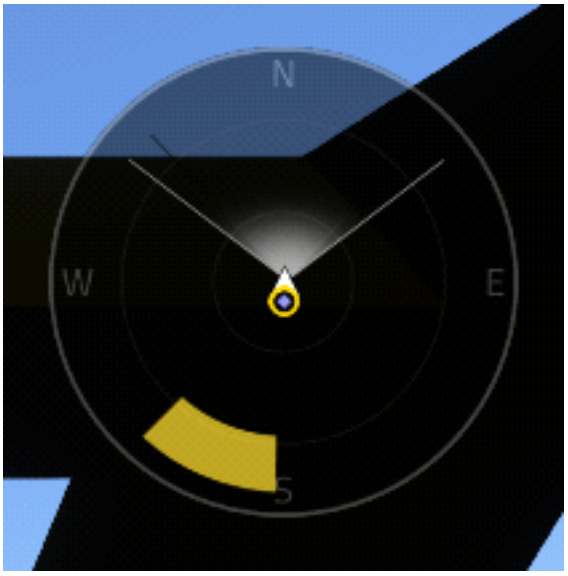
- Missile Launch Detector (hollow circle indicating the source and a triangle to indicate the missile).

  Does not detect all types of missile.

- Laser Warning Receiver (light flash icon indicating the source).

  Warns against laser guided weapons and Laser Designators. Does not warn against LRFs.

Image-4: Electronic Warning System



EWS also includes an audible alert when threats are detected.

7. ACATS ARH Flight Control

The Pilot (Driver) position controls aircraft flight.

The ACATS ARH models use standard VBS4 rotary wing flight controls with additional specific controls for ACATS ARH flight systems.

The following table lists the Rotary Wing Aircraft Controls, defaults, and option names from the **Helicopter Controls** category filter in the Controls Settings in the VBS4 Administrator Manual:

> **NOTE**
>
> For Microsoft Xbox rotary-wing aircraft controls, see Microsoft Xbox Controls in the VBS4 Trainee Manual.

Default Control	Description	Control Name
W / Up Arrow	Pitch Forward	Nose Down
S / Down Arrow	Pitch Back	Nose Up
A / Left Arrow	Bank Left	Bank Left
D / Right Arrow	Bank Right	Bank Right
Q	Rotary Up	Increase Thrust
Z	Rotary Down	Decrease Thrust
X / Insert	Rudder Left	Left Pedal
C / Page Up	Rudder Right	Right Pedal
Mouse Left	Turn Left	Left Turn
Mouse Right	Turn Right	Right Turn
E	Fast Forward	Fast Forward
2 x S **Quick Menu - VEHICLE > AUTO-HOVER ON**	Auto-Hover On	Auto-Hover On
2 x W / 2 x A / 2 x D **Quick Menu - VEHICLE > AUTO-HOVER OFF**	Auto-Hover Off	Auto-Hover Off
Not Set **Quick Menu - VEHICLE > MAINTAIN HEIGHT ON**	Maintain Height On (when Auto-Hover is on)	Maintain Height On

Default Control	Description	Control Name
Not Set **Quick Menu - VEHICLE > MAINTAIN HEIGHT OFF**	Maintain Height Off	Maintain Height Off
Not Set	Align Vehicle	Align Vehicle
Not Set	Helicopter Wheel Brake (Hold)	Helicopter Wheel Brake
Not Set	Helicopter Wheel Brake On / Off	Helicopter Wheel Brakes On / Off

ACATS ARH Pilot Control	Description
Quick Menu - **VEHICLE > ALIGN TO RMS**	Align the aircraft with the current RMS target. See Roof Mounted Sight Control (on page 30).

NOTE

See Controls Settings in the VBS4 Administrator Manual to add key mappings for unmapped controls

Low Altitude Warning

ACATS ARH aircraft signal low altitude with an alarm when the aircraft descends below a set height threshold regardless of the current airspeed. The alarm sounds a single time and does not re-arm until the ARH climbs at least 7 feet above the set height.

The default height for the ACATS ARH altitude alarm is 100 feet above ground level.

8. ACATS ARH Light Control

The ACATS ARH variants feature a steerable landing light with visible light and IR modes.

Light Controls	Key Binding	Description
L	Lights On / Off	Toggle Landing Light mode: • Visible Light Beam • IR Beam (only visible with night-vision) • Off
RCtrl + Num 1-0	Toggle Light System 1-10	Only 1 - 3 are applicable, where: • 1 - Toggle Visible Light On / Off • 2 - Toggle IR Light On / Off • 3 - Toggle Marker Light On / Off

The landing light follows the Pilot viewpoint within its movement limits.

Use Free Look controls to look around and steer the light:

The following table lists the Free Look Controls from the **Infantry Controls** and **Vehicle Controls** category filters in the Controls Settings in the VBS4 Administrator Manual:

Default Control	Description	Control Name
Num 1 - Num 9	Free Look **NOTE** Unlike the mouse Free Look, the keyboard Free Look is discrete. This means that pressing a numpad key results in turning the player head / view at a discrete angle, where the numpad keys correspond to 45-degree divisions on the horizontal plane around the player. Also, using the keyboard Free Look in vehicles may differ from using it for infantry.	Num 5 - Center Look
LAlt + Mouse Move	Free Look	Free Look
Num * / 2 x LAlt	Change free-look mode between default vehicle view and unlimited camera rotation.	Free Look Toggle

Default Control	Description	Control Name
R	Lean Forward	Lean Forward
	NOTE **Lean Forward** only works in vehicles and vehicle positions where it is supported. May conflict with the **Load Gun** command, see Vehicle Command Controls in the VBS4 Trainee Manual.	
2 x R	Toggle lean forward	Lean Forward (Toggle)
	NOTE May conflict with the Load Gun command, see Vehicle Command Controls in the VBS4 Trainee Manual.	

Use night vision in combination with the light in IR illumination mode.

9. ACATS ARH Weapons Control

The ACATS ARH includes the following weapon systems:

- 30M 781 Cannon (on page 27)
- 70mm Hydra Rockets (on page 27)
- AGM114 Hellfire Missiles (on page 28)

Both the Pilot and Battle Captain can take control of the 30M 781 Cannon, with the Quick Menu **VEHICLE > CONTROL 30M 781 CANNON** option (see Quick Menu Actions in the VBS4 Trainee Manual).

The Pilot can specify the selection of Hydra rockets and Hellfire missiles, and fire them, but the Battle Captain is primarily responsible for control of these weapon systems.

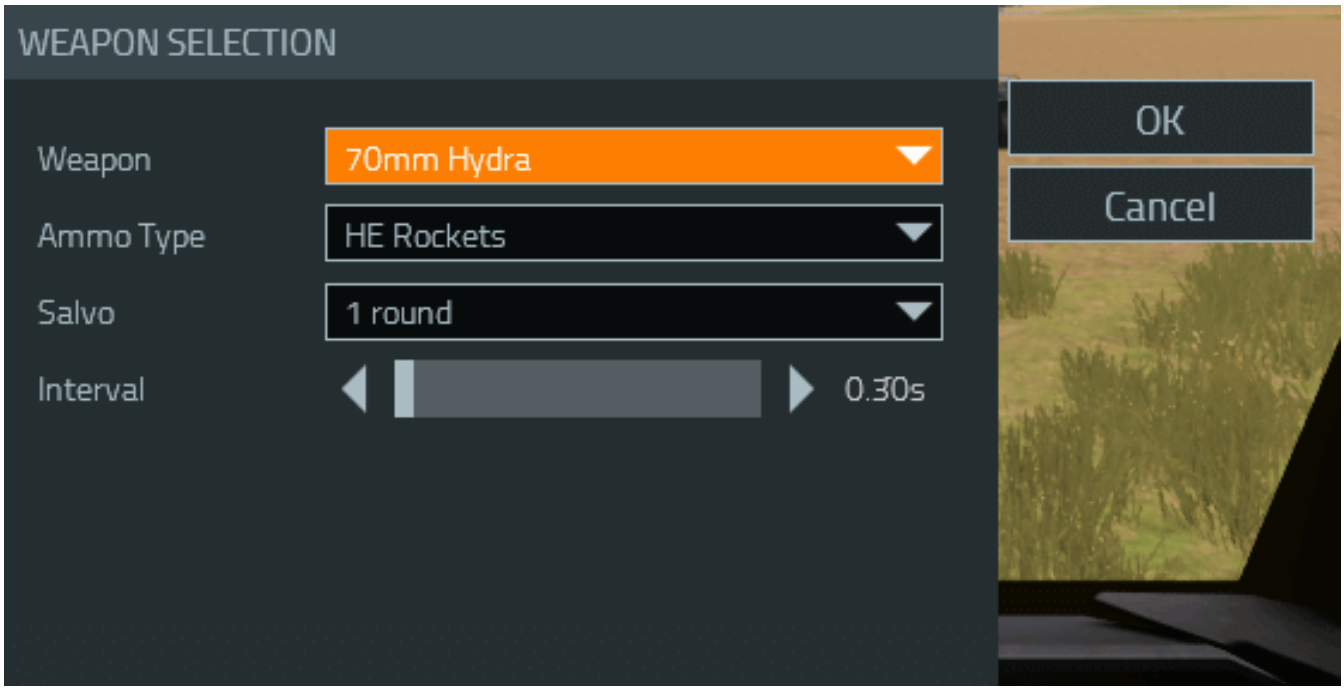
The ACATS ARH features a weapon selection dialog to enable both crew positions to specify the current weapon, its ammunition type, and to specify a salvo amount and interval.

Follow these steps:

1. Press **Quick Menu** (**Left Windows**) to open the Quick Menu, and select **VEHICLE > WEAPON SELECTION**, or press **Toggle Weapons Dialog** (**RCtrl + RAlt**).

   The weapon selection dialog opens.

   Image-5: Weapon Selection Dialog



2. Select the Weapon to use.

> **NOTE**
>
> When the Pilot selects 70mm Hydra or AGM114 Hellfire, it changes the weapon controlled by the Battle Captain. Selecting the 30M 781 Cannon takes control of that weapon.

3. Select the Ammunition Type.
4. Specify the following depending on the weapon type:
   - **30M 781 Cannon** and **70mm Hydra**: Select a Salvo amount to determine the maximum number of rounds to fire, and select an Interval to specify the time between the shots in a salvo.
   - **AGM114 Hellfire**: Set a **PRF Code** to specify the laser designator targets to lock-on to.
     a. Select the laser designator as you would select a weapon.
     b. Press **Toggle Optics** (**V**) to go into optics mode.
     c. Use the Quick Menu to set the PRF code of the laser designator.

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

     d. Fire to turn the laser designator on.

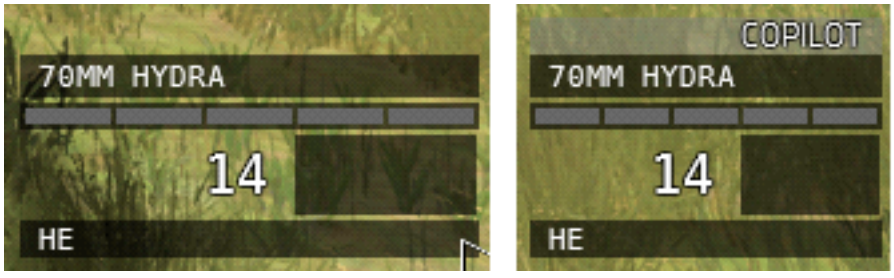
     The PRF code is now specified.
5. Click **OK**.

   The selected weapon is active and fires according to the weapon selection specifications.

   The multi-weapon HUD display shows the weapon that each position currently controls.

> **NOTE**
>
> The HUD only displays two weapon systems when both positions control a weapon.

Image-6: Multi-Weapon HUD Display



9.1 30M 781 Cannon

The 30M 781 Cannon is an externally mounted steerable weapon intended for light aircraft, helicopters, and ground vehicles. The cannon uses 30mm ammunition and can be fired in 5, 10, and 25 round salvos.

In the ACATS ARH, the Pilot and Battle Captain can take control of the 30M 781 Cannon, with the Quick Menu **VEHICLE > CONTROL 30M 781 CANNON** option (see Quick Menu Actions in the VBS4 Trainee Manual).

The 30M 781 Cannon uses standard controls for steerable mounted weapons.

> **NOTE**
> The cannon has a steering traverse limit.

Weapon Control	Description	Control Name
Mouse Movement	Steerable Weapon Aiming (Battle Captain only) For the Pilot, the 30M 781 Cannon automatically tracks the pilot viewpoint	Car Aim *Direction*
LCtrl + LShift	Safety Switch	Safety Switch
Spacebar / RCtrl + Spacebar	Cycle Weapon	Toggle Weapons / Toggle Weapons Reversed
LMB	Fire	Fire
F	Laser Range Finder	Lase Target
Num 5	Return the weapon to its default center position	Center Look

9.2 70mm Hydra Rockets

The 70 mm Hydra Rocket is a fixed weapon system with a range of available warheads:

- HE Rockets
- Anti-Materiel Rockets
- Flechette Rockets
- Smoke Rockets
- Illumination Rockets
- IR Illumination Rockets

Use vehicle orientation for primary rocket aiming and **Fire** (**LMB**) or **LCtrl** to fire.

Rockets can fire in salvos of 1, 2, 4, or all remaining rounds.

> **NOTE**
>
> Rocket pods adjust their elevation within a +6.5 to -10 degree angle automatically when the distance to target is measured. Press **Lase Target** (**F**) to use the Laser Range Finder.

9.3 AGM114 Hellfire Missiles

The Hellfire is a guided missile system with the following available missile types:

- AGM-114K Hellfire Missiles - laser-guided with a high-explosive warhead
- AGM-114L Hellfire Missiles - radar-guided with a high-explosive warhead
- AGM-114M Hellfire Missiles - laser-guided with a fragmentation / incendiary warhead

Use targeting systems for missile aiming and **Fire** (**LMB**) or **LCtrl** to fire.

Weapon Control	Description	Control Name
Spacebar / RCtrl + Spacebar	Cycle Weapon	Toggle Weapons / Toggle Weapons Reversed
Quick Menu - VEHICLE > SET PRF CODE	Specify the PRF Code to use for laser designation target acquisition.	
RShift + Spacebar	Toggle Lock-On Mode: • LOBL: Lock-On Before Launch targeting requires line-of-sight and uses a flat trajectory. • LOAL: Lock-On After Launch accelerates to a cruising altitude before locking onto a target. If missile lock is lost during flight, the accuracy of the missile is reduced	Toggle Weapons Modes
Tab	Cycle Targets - LOBL mode only The missile cycles through its valid targets depending on the missile type: • For radar-guided missiles, all targets in range. • For laser-guided missiles, all currently lased targets using **the same PRF Code**.	Next Target
F	Laser Range Finder	Lase Target
LCtrl + LShift	Safety switch	Safety Switch
LMB / LCtrl	Fire	Fire

10. ACATS ARH Optics Control

Both positions in ACATS ARH vehicles have night-vision capability and the Battle Captain has weapon optics linked to the Roof Mounted Sight Control (on the next page).

Use ACATS ARH Light Control (on page 23) to use IR illumination in combination with night-vision.

The following table lists the **Optics Controls**, see Controls Settings in the VBS4 Administrator Manual:

Default	Description	Control Option Name
V	Weapon Optics	Toggle Optics
Num +	Zoom In	Zoom In
Num -	Zoom Out	Zoom Out
N	Cycle Optics Mode	Cycle Optics (All Modes)
	On specific weapon systems, day / night-vision, and thermal imaging are available.	
LAlt + 1	Decrease Imaging Brightness	EO Decrease Brightness
LAlt + 2	Increase Imaging Brightness	EO Increase Brightness
LAlt + 3	Decrease Imaging Contrast	EO Decrease Contrast
LAlt + 4	Increase Imaging Contrast	EO Increase Contrast
LAlt + ~	Imaging Auto-Contrast and Auto-Brightness On / Off	EO Toggle Automatic

NOTE

The optics controls for Thermal Imaging Brightness and Contrast use the main keyboard numbers, not the Numpad numbers.

For optics with multiple TI modes, the brightness and contrast for each mode is controlled independently.

RShift + V	Turn RMS View On / Off For more information, see Roof Mounted Sight Control (on the next page)	RShift + Toggle Optics

11. Roof Mounted Sight Control

ACATS ARH models feature a Roof Mounted Sight that locks on to the target the Battle Captain (Co-pilot) selects. The RMS view is a green monochrome display at the bottom-left of the screen for both aircraft positions that displays the view in the RMS target direction.

A laser designator is also mounted with the RMS to provide targeting for laser-guided weapons.

Press **RShift + Toggle Optics** (**V**) to turn the RMS View on / off.

Press **RCtrl + RShift + Toggle Optics** (**V**) to move or resize the RMS view. Press **Esc** or **Toggle Optics** (**V**) to exit edit mode.

The Battle Captain selects an RMS target from the Quick Menu (see Quick Menu Actions in the VBS4 Trainee Manual).

Follow these steps:

1. In the Battle Captain position, press **Quick Menu** (**Left Windows**), and select **VEHICLE > RMS CONTROL**.

   The RMS Control interface opens.

2. Expand the **RMS Control** drop-down, select the target type:

RMS Target Type	Description and Use
Reference Mark	Select a Reference Mark.
Waypoint	Select a Waypoint.
Pilot Reference	Select Request New, and select **Request** to ask the pilot for a target. The pilot receives the request and has a limited time to use the target indicator to select a target (look around and press **LCtrl**). When the pilot designates a target, select it from the Pilot Reference list.
Laser Spot Track	Select the Laser Target. The laser must be enabled.
Grid	Input an MGRS grid reference.
Manual	Uses the current Battle Captain view.
Unlock	Stops RMS tracking the current target.

3. **Optional:** Select **Enable Laser Mark** to start laser tracking the target and specify the PRF laser designation code to use:
   a. Select the laser designator as you would select a weapon.
   b. Press **Toggle Optics** (**V**) to go into optics mode.
   c. Use the Quick Menu **VEHICLE > SET PRF CODE** option of the laser designator.

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

   d. Fire to turn the laser designator on.

   The PRF code is now specified.
4. Click **Lock Onto**.

   RMS tracks the selected target and displays the view in the target direction in the RMS View.

Open RMS Control, and select **Unlock** to stop RMS tracking the current target. RMS switches to manual control following the Battle Captain viewpoint. If the laser is enabled, it is now locked to the Battle Captain optics view.

A locked RMS target provides the following functions:

- The Pilot can align the aircraft with the RMS target:

  In the Pilot position, open the Quick Menu, and select **VEHICLE > ALIGN TO RMS**.

  The aircraft aligns to point directly at the current RMS target.

  > **NOTE**
  > If the result of the alignment places the aircraft in a position that is not level, the aircraft continues to move after alignment.

- The RMS View is the Optics View for the Battle Captain.

12. Add User Reference Marks (0-8-1)

Users can create and activate Reference Marks from within the mission.

Press **0**, **8**, **1** along the top of your keyboard to access the Reference Mark dialog.

> **NOTE**
> Use the main keyboard numbers, not the numeric keypad.

Image-7: Reference Mark Dialog

The dialog displays a list of existing reference marks.

Dialog Column	Description
Check Boxes	A filled box indicates that the reference mark is active. Double-click a manual reference mark to activate / deactivate it. **NOTE** Only active reference marks appear in map views.
Num	The number of the reference mark indicating the expected order of arrival at the marks. Use the Check Box column header arrows to move reference marks up and down the list. The primary reference mark, Num 0, appears in the HUD.
Name	The name of the reference mark.
Grid	The MGRS coordinates of the reference mark.
Alt (FT)	The altitude of the reference mark. If not specified, the altitude is set to height above sea-level of the terrain specified by the grid position.
DTK	Desired Track. Indicates the reference mark heading from the previous reference mark position, with the value for reference mark 0 measured from the current aircraft position.

Dialog Column	Description
Dis (NM)	The distance, in nautical miles, from the previous reference mark position, with the value for reference mark 0 measured from the current aircraft position.
Cum (NM)	The cumulative distance, in nautical miles, from the current aircraft position through the marks in the specified order.

To create a new reference mark, follow these steps:

1. Use the **SOURCE** drop-down:
    - Select **Position** to create a new reference mark for the current position of the aircraft.
    - Select **Grid**, and specify a 10-digit MGRS coordinate, **GRID**, and the altitude, **ALT (FT)**.
    - Select **Laser Designator** to select a target that is currently lased (only available with specific vehicles).
2. Input a **NAME**, select the **DEACTIVATION** type, and select **ADD**.

The Reference Mark dialog adds the specified mark to the Reference Mark list and to the map for all players on the same side.

13. Mini-Map Navigation

The Mini-Map is an inset version of the 2D map, that you can reference during a mission without leaving the main view. You can set custom map styles for your Mini-Map. For more information, see Custom Map Styles in the VBS4 Administrator Manual.

There are two types of Mini-Map:

- Basic Mini-Map (below)
- Advanced Mini-Map (on the next page)

13.1 Basic Mini-Map

To open the Basic Mini-Map, press **GPS (Toggle) RCtrl + M**.

The Basic Mini-Map has a black header and displays the following information:

- Coordinate location, using the current coordinates system (for example, MGRS).
- Current heading (supports magnetic declination).

> **NOTE**
>
> Magnetic declination can be adjusted by Administrators / Instructors, using the setDeclination (https://sqf.bisimulations.com/display/SQF/setDeclination) SQF command.

13.2 Advanced Mini-Map

> **NOTE**
>
> The Administrator / Instructor specifies who can access the **Advanced Mini-Map** using the Simulation Settings (see Simulation Settings in the VBS4 Administrator Manual).

To open the Advanced Mini-Map, press **GPS (Toggle) RCtrl + M**.

The Advanced Mini-Map has a gray tool bar header, and displays the following information:

- Coordinate location, using the current coordinates system (for example, MGRS).
- Current heading (supports magnetic declination).

  > **NOTE**
  >
  > Magnetic declination can be adjusted by Administrators / Instructors, using the setDeclination (https://sqf.bisimulations.com/display/SQF/setDeclination) SQF command.

- Unit location.
- View direction and turret direction for vehicles.
- Waypoints (only with **Always Show** set in the VBS Editor).
- Active reference marks (shown as a red **X**).

In addition, the Advanced Mini-Map has the following controls:

> **NOTE**
>
> Press **RCtrl + RShift + M** to access the Advanced Mini-Map controls.

Advanced Mini-Map Control	Description
Toolbar Grid Icon 	Click to turn the Mini-Map grid numbers on / off.
Toolbar Arrow Icon 	Click to switch the map orientation between North and your forward direction.
LMB + Drag Toolbar	Use to move the Mini-Map.
LMB + Edge of Mini-Map + Drag	Use to re-size the Mini-Map
Mouse Wheel Scroll	Zoom in / out (your cursor must be over the Mini-Map).
LMB / RMB + Drag the Map	Pan the Mini-Map.
Esc	Exit Edit Mode.