MAK TECHNOLOGIES

VR-Engage First Experience Guide



Version 1.7

ST Engineering North America

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1. Introduction to VR-Engage

Thank you for deciding to try out VR-Engage. VR-Engage is a multi-role virtual simulator developed for use in training simulations or laboratory experimentation. VR-Engage lets users play the role of a first person human character, a ground vehicle driver, gunner or commander, or the pilot or sensor operator of a fixed wing aircraft or helicopter.

VR-Engage is built with the game quality 3D graphics of VR-Vantage, the simulation engine from VR-Forces, and the network interoperability of VR-Link. VR-Engage is a standalone application. It can interoperate with any simulation using DIS or HLA. However, when installed with a compatible version of VR-Forces, you can reap the benefits of their common system architecture, including scenario creation, terrain agility, common terrains, models, configurations, and common representation of the environment.

Before you begin, install and license the software. Please see "5.1. Installing VR-Engage" on page 56 for instructions. If you want to control ground vehicles or aircraft, you must connect a game controller. VR-Engage is configured for the Logitech F310 and F710 game controllers and the G27 and G29 steering wheels. It also supports the Thrustmaster HOTAS Warthog™ flight controller and the T.Flight Hotas X. Please contact support@mak.com for help configuring other DirectInput devices.

This First Experience guide is designed to give you a successful first experience with VR-Engage. It guides you through a series of activities that demonstrate many of the features of the application without bogging you down in the minutiae of all of its capabilities.

VR-Engage includes the following example scenarios:

- VR-Engage Test Drive. VR-Engage Test Drive is a simple scenario that lets you practice controlling the four basic types of players in VR-Engage – humans, ground vehicles, helicopters, and airplanes. Humans and ground vehicles are pretty easy to control, but aircraft can be a bit tricky if you have not played with a flight simulator before.

Once you feel confident controlling the different player types, or if you already feel confident and want to skip the test drive, you can move on to VR-Engage First Experience, which introduces you to the most frequently used VR-Engage capabilities.

- VR-Engage First Experience. A scenario with many different entities that shows off the capabilities of VR-Engage, such as firing weapons, embarking on and disembarking from entities, parachuting, and air-to-air combat.
- VR-Engage Security Checkpoint. An example of how you can customize VR-Engage with new entity types to create a focused training environment.
- MAK Suite Demo. This is a complex scenario that MAK uses to demonstrate the features of VR-Engage and how MAK products work together to create compelling simulations for training.
- MR VR Flight Demo. This scenario has several T-38 C Talon aircraft flying in formation. It is used to demonstrate the mixed reality capability of VR-Engage.

! The tutorials in this manual require you to run VR-Forces scenarios. You must have a VR-Forces simulation engine license to run the scenarios. The VR-Engage product does not include a VR-Forces license.

If you do not have a VR-Forces license, you can run VR-Engage, choose a terrain database to simulate on, create and place an entity, and control that entity. VR-Engage can only simulate and control a single entity at a time. When you change role and create a different entity to simulate, the entity you were previously simulating is deleted and replaced by the new one.

For details about license issues, please see *"License Requirements for Hosting a VR-Forces Session,"* in *VR-Engage Users Guide*.

For complete details about using VR-Engage, see *VR-Engage Users Guide*. The VR-Engage documentation set is provided to all customers in PDF format. PDF versions of the manuals are in the *./doc* directory and, in Windows, are accessible from the MAK Technologies shortcut on the Start menu.



2. Controlling Entities in VR-Engage

This first experience assumes that you have some familiarity with using a Logitech Gamepad or a joystick to control vehicles and people in a first-person simulation. If you have not used a game controller before, especially for controlling aircraft, do some extra exploring with the experiences in this chapter to get the feel for them.

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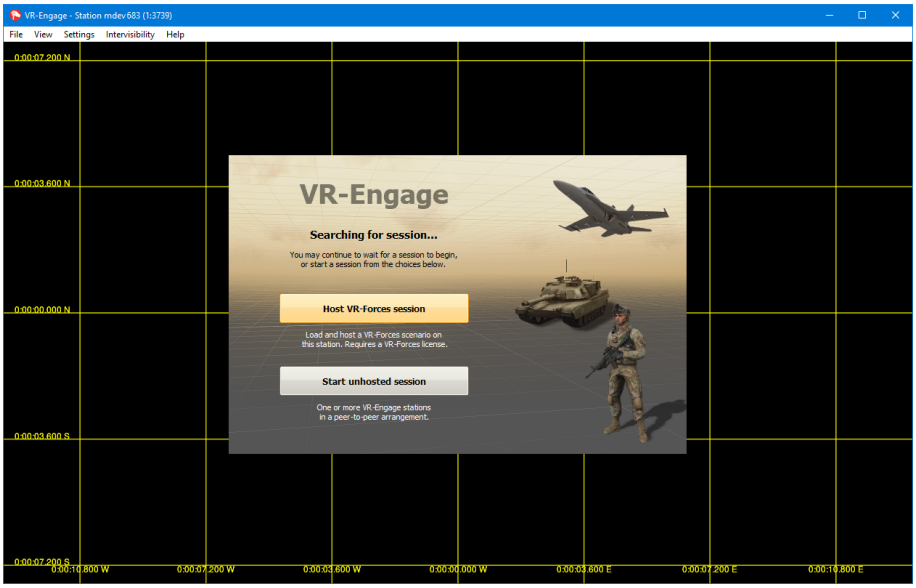
2.1. Start VR-Engage and Load a Scenario

When you start VR-Engage, it looks for an instance of VR-Engage that is already running or an instance of VR-Forces that is running. If it finds one, it immediately connects to that session, loads the terrain it is using, and then asks you what character you want to control. If it does not find a session, it stops and ask you what to do.

1. On the Start menu, choose **MAK Technologies > VR-Engage**. (If you only have a license for VR-Engage Ground or VR-Engage Air, choose that instead of VR-Engage.)

   The VR-Engage window opens. The Searching for Session screen opens (Figure 1).

Figure 1. Searching for Session

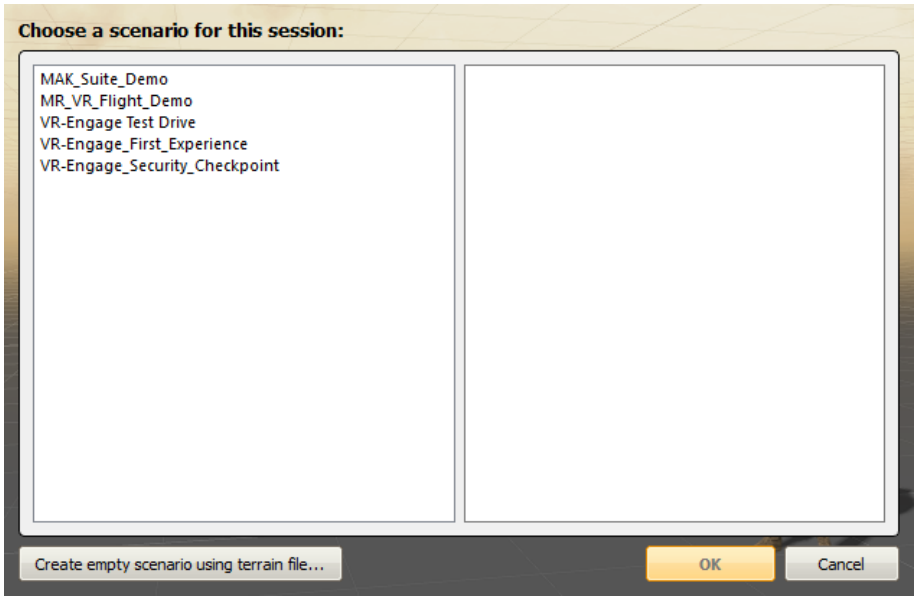


If you run VR-Engage Ground or VR-Engage Air, the characters available to you are limited to ground or air.

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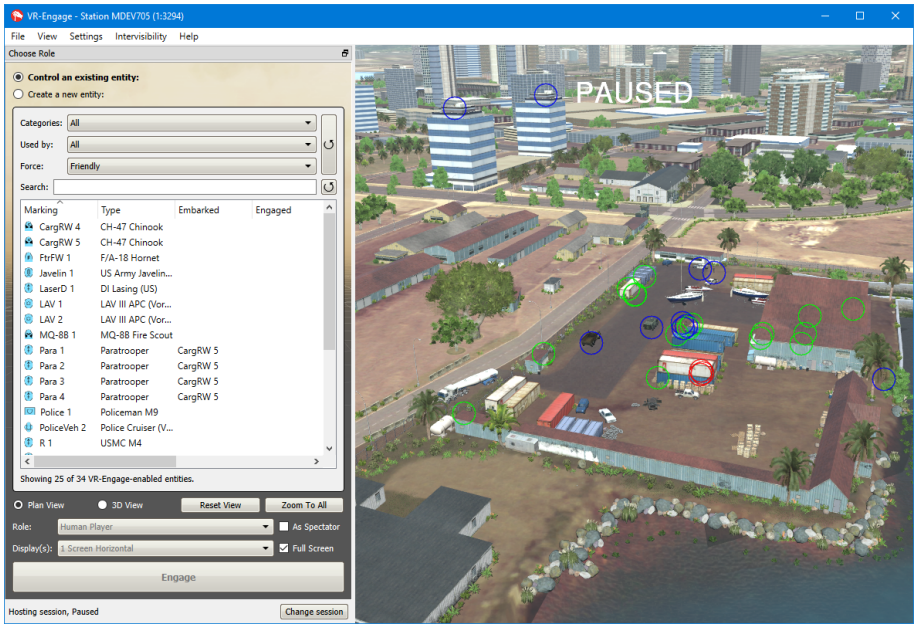
2. Click Host VR-Forces Session. This option lets you load a scenario that was created using VR-Forces and is provided with VR-Engage. The Choose a Scenario for this Session dialog box opens (Figure 2).

Figure 2. Choose a scenario for this session dialog box



3. Select VR-Engage_First_Experience.
4. Click OK. The terrain and scenario load. The Choose Role Panel displays (Figure 3). It lists the characters that are in the scenario for the selected force.

Figure 3. Choose Role panel



If you only have a license for VR-Engage Ground, you will see a couple of warning messages when the scenario loads telling you that you do not have the licenses for controlling fixed-wing and rotary-wing aircraft. Click OK. The scenario will run without these licenses, but you can only control ground entities.

2.2. Explore as a Human Character

➤ **To control a human:**

1. In the Choose Role Panel, select the Control an Existing Entity option.
2. In the list of entities, select R1 USMC M4.
3. Click Engage. The display changes to full screen mode and the scenario starts to run.

Figure 4 shows R 1 when you first engage it.

Figure 4. R1 USMC 1st person view



Refer to Figure 5 for the Gamepad movement controls for humans, or Figure 6 on the facing page for the keyboard movement controls.

Figure 5. Basic human controls



2.2.1 Walking Around

Your character is standing in front of a warehouse with other friendly forces and some vehicles.

Walking around requires coordination of the thumbsticks on the Gamepad, or movement keys on the keyboard.

To walk, push the left thumbstick in the direction that you want to go, or press the **W** (forward), **A** (left), **S** (backward), and **D** (right) keys. When you walk to the left or right, the character continues to face forward.

Figure 6. Primary movement keys, observer coordinates (3D)



To change orientation (turn), push the right thumbstick to the left or right, or press the **Left Arrow** and **Right Arrow** keys. (In 1st-person mode, pushing the right thumbstick forward or back (or pressing the **Up Arrow** and **Down Arrow** keys) causes the character to look up or down. In 3rd-person mode, the view rotates around the character.)

1. Use the keyboard, mouse, and Gamepad (if available) to look around and then start walking. (Please see Table 1 on page 34 for a complete list of mouse and keyboard mappings and Figure 28 on page 38 for an illustration of all Gamepad mappings.)
2. There is a door to the right of the open bays in the warehouse (Figure 7). There is a door to the right of the open bays in the warehouse.

Figure 7. Warehouse door



As you get close to the door, the Door menu opens (Figure 8).



You can choose menu options using your keyboard, mouse, and game controller. Rather than trying to list all the options each time we ask you to choose a menu command, we will introduce different methods throughout this chapter.

Figure 8. Door menu



3. Press **1** to choose Open.

4. Walk into the building.
5. Look around the room. There are a couple of targets.
6. Press the Fire button on your Gamepad or the **Space** key to shoot at the targets. (See the next section for lots of target practice.)
7. Walk into other rooms. Walk up the stairs and explore the upstairs rooms.
8. When you feel confident moving the entity, return to the starting location. You can either walk there or reset.

2.2.2 Resetting Entities to Saved Position

While you are moving entities around the scenario, you can choose to reset them to the saved position where you started. This restores their health and replenishes any resources, such as fuel and munitions.

➤ **To reset the entity to the saved position:**

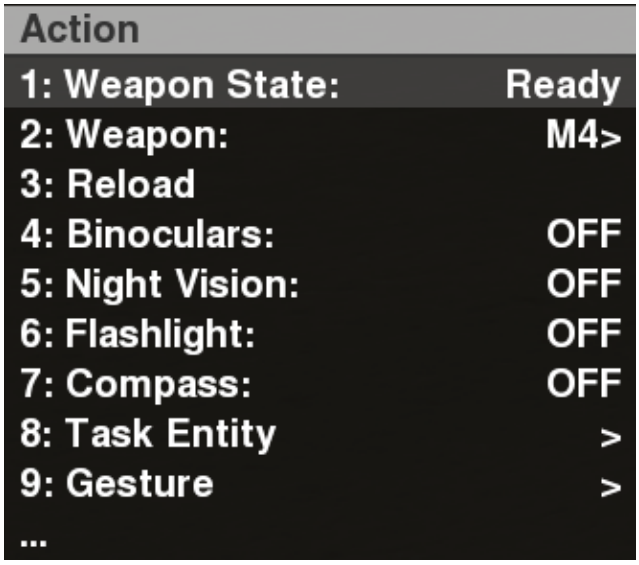
1. Press **~** to open the Action menu.
2. Choose **Reset**.

You return to your starting position (Figure 4 on page 10).

2.2.3 The Action Menu

VR-Engage includes context-sensitive menus that open automatically. The next activity in this first experience asks you to open the Action menu. The Action menu lets you turn several features on and off (toggles) and lets you assign tasks to other players if you are hosting a VR-Forces scenario or connected to a VR-Forces session.

Figure 9. Action menu



➤ **To open the Action menu, do either of the following:**

- Press **~**.
- Press the menu button on your game controller (the Back button on the Gamepad).

Selecting Options on the Action Menu

You can select options on the Action menu using the keyboard (arrow keys or number keys), the D-pad on a Gamepad, or your mouse.

➤ **To select an option on the Action menu using the arrow keys or D-pad:**

1. Press the **Up Arrow** and **Down Arrow** keys on your keyboard or the up and down buttons on a Gamepad's D-pad to highlight an option.
2. Press the **Right Arrow** key or the right button on the D-pad to toggle the option on or off or to display a submenu.

➤ To select an option on the Action menu using a mouse, click the menu option.

Each option on the Action menu has a number.

Numbers are reassigned dynamically if you scroll the Action menu, or menu commands are removed due to some change in the state of the character. Therefore, you cannot assume that a particular number always controls the same command.

➤ To select an option on the Action menu using a number key, press the number associated with the menu option.

➤ To close the Action menu, press **~** or the menu button on your game controller.

2.2.4 Shooting At Targets

The default weapon is a rifle. At any point, press **R** to reload your weapon with a fresh magazine of ammunition. Your character also pauses to reload when your magazine is empty.

1. Open the Action menu.
2. On the Action menu, choose **Weapon State**.
3. Use an Action menu control method to toggle the Weapon State to Aiming.
4. Close the Action menu.
5. Walk back out to the parking area in front of the warehouse.
6. Look at the top of the shipping containers. You will see some targets.
7. Align the reticle (the white bullseye) of your gun on a target and press **Spacebar**, the left mouse button, or the Gamepad trigger to fire at it. Each target is knocked over when you shoot it.

Figure 10. Reticle aligned on target



8. Walk along the shipping containers, looking at the spaces between them. Watch for some enemy combatants (Figure 11).

Figure 11. Enemy combatants



9. When you see the combatants, you can fire at them. (If you walk within approximately 4 meters of the opening between the shipping containers, the combatants will attack you.)
10. To aim the rifle, hold down the . (period) key, the right mouse button, or the Aim Down Sight button on your Gamepad. Move the sight with the arrow keys, the mouse, or the right thumbstick.

In this scenario, all Friendly forces are invulnerable, including R1 USMC M4. The Opposing forces cannot kill those entities.

2.3. Drive a Ground Vehicle

To drive a vehicle, you must embark in the Driver role. You can do this by moving to a vehicle that you can drive and then, on the Action menu, selecting Driver. You can also choose this role in the Choose Role Panel for a ground vehicle entity.

Figure 12 shows the driver view.

Figure 12. LAV driver view



The overlay has some important information that you will need to be aware of as you drive. In the lower left corner, it displays the speed and gear.

Refer to Figure 13 for ground vehicle driver controls on the Gamepad.

Figure 13. Driver controls for LAV and M1A2



To drive a ground vehicle, you must:

1. Start the engine.
2. Put the vehicle in gear.
3. Use the Gamepad thumbsticks to control the throttle (forward, backward, and braking) and steering. (You can also control ground vehicles from the keyboard.)

2.3.1 Starting the Engine

➤ **To start the engine, do one of the following:**

- On the Gamepad, press the Start button.
- On the Racing Wheel Controller, press the Engine On button.
- Press **X**.

2.3.2 Putting the Vehicle into Gear

The LAV has eight forward gears and one reverse gear.

➤ To put the vehicle into gear, press the Gear Up or Gear Down buttons on your gaming controller or press **Q** (up) or **E** (down).

2.3.3 Controlling the Throttle

➤ To move the vehicle, press the throttle control (left thumbstick on the Gamepad) forward or press **W**.

If you are driving using a Racing Wheel Controller, use the gas and brake pedals.

➤ To brake the vehicle, pull the throttle control backwards.

2.3.4 Steering a Vehicle

➤ To steer the vehicle, use the right thumbstick on a Gamepad or the steering wheel of the racing wheel controller. (You can also press **A** (left) or **D** (right).)

2.3.5 Driving the LAV

When you put the LAV in gear, it starts to move.

By default, you are in first-person mode as the driver. To get a better sense of where the LAV is in relationship to the terrain, you can repeatedly press the Y button on the Gamepad to get different views of the LAV.

➤ **To drive the LAV:**

1. Turn your character and walk towards the LAV. When you get close to the LAV, the Embark LAV menu opens (Figure 14).

Figure 14. Embark LAV menu



2. Select Driver. You are now controlling the driver of the LAV. Use your game controller to drive the LAV.
3. Press the Y button on your Gamepad to switch through different views: a driver's view, a couple of oblique 3rd-person views, and a gunner's view. Note that you can aim and fire the gun as well as drive.
4. Press the Gamepad Start button to start the engine.
5. Press the Gear Up button to put the LAV into gear.

6. Use the throttle and steering controls to drive towards the exit at the far end of the warehouse area. (You might find it easier to navigate through the area using one of the 3rd-person views.)
7. Take a left out of the gate onto the road and drive down the road.

While the driver can shoot as well as drive, it is also possible to have one VR-Engage player assume the role of gunner while another player is in the role of driver.

2.3.6 Physics Model

There is another LAV vehicle on the road on the right.

1. If you have not done so already, change the view of your LAV to a third-person view. (Press the Y button on your Gamepad.)
2. Drive into the vehicles and observe how the physics-based vehicle model realistically models the collision.
3. Drive onto the curb or nearby rugged terrain and observe the individual articulation of the wheels.

2.3.7 Disengaging and Returning to the Choose Role Panel

At any point, you can stop playing as the selected entity. This allows you to choose another role or exit VR-Engage.

➤ To exit to the Choose Role Panel, press **Esc**.

2.4. Parachute Out of a Helicopter

Paratroopers can jump from aircraft and deploy parachutes. They can steer left and right and can slow their descent. Parachutes are affected by wind.

When a paratrooper jumps, the view changes to a third-person view and the weapon is hidden. When the paratrooper lands, it returns to the view mode used prior to jumping and the weapon is available.

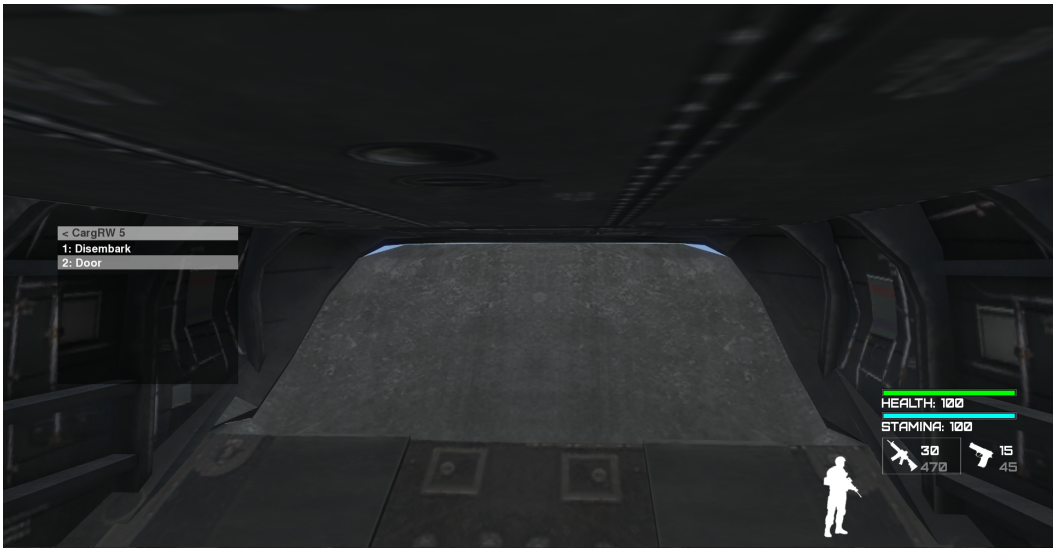
1. In the Choose Role list, select Para 1 (Paratrooper). This entity is embarked on CargRW 5 CH-47 Chinook entity.
2. Click Engage. You are now seated in a helicopter. You can see other paratroopers seated across the aisle. The Action menu displays the embarkation menu for the vehicle (Figure 15).

Figure 15. Seated in the helicopter



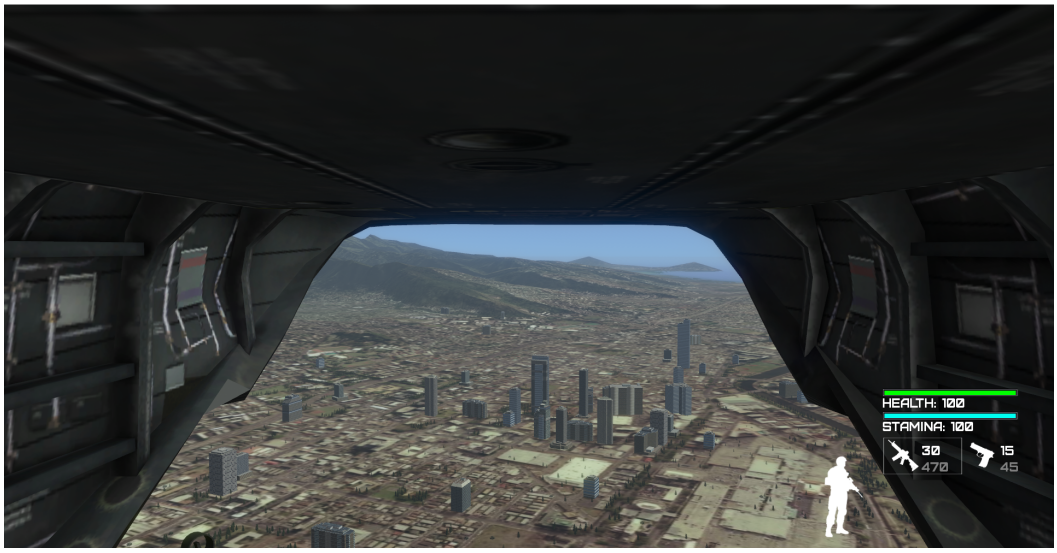
3. Press **C** or Y on the Gamepad to stand up.
4. Turn right and walk towards the rear of the helicopter. You must walk past all of the seats and up to the cargo door (Figure 16).

Figure 16. Cargo door closed



5. On the Action menu, select Door. The cargo door opens (Figure 17).

Figure 17. Cargo door opened



6. (Hint: Read Step 8 through Step 10 on the next page before you complete Step 7 below so that you know how to deploy your parachute and control it before you jump out of the helicopter.) Walk to the cargo door as far as you can. When you step off, the view changes to third person and you are falling towards the earth. The overlay shows the wind speed and direction and your altitude (Figure 18).

Figure 18. Free fall



7. After your character falls for a few hundred feet, press **Spacebar** or the left thumbstick on your Gamepad to deploy the parachute (Figure 19). (If you do not deploy the parachute, or wait too long to do so, the paratrooper dies on impact.)

Figure 19. Parachute deployed



8. As you descend towards the ground, press the **A** and **D** keys or buttons 5 and 6 on your Gamepad to move left or right. (For a diagram of Gamepad buttons, please see "4.8. Generic Gamepad Button Numbering" on page 53.)
9. Press **A** and **D** or buttons 5 and 6 together to slow the rate of descent.
10. Move the right thumbstick on the Gamepad, the Up and Down arrows on your keyboard, or move the mouse forward and back to look up and down.
11. When you land, you return to first-person view. You do not need to gather the parachute.

2.5. Fly a Fighter Jet

So far we have looked at controlling humans and ground vehicles. Now let's try to fly a jet. The VR-Engage First Experience includes planes that are already airborne that you can fly. It also includes a jet on a runway so that you can take off. You can use either of them to practice landing. VR-Engage includes mappings for the Thrustmaster Warthog flight controller, the T.Flight Hotas X flight controller, and the Gamepad F310.

Figure 20 illustrates the flight controls for the T.Flight Hotas X joystick. This controller also has a throttle control. Figure 21 illustrates the flight controls for a Logitech Gamepad.

Please see "4.6. Flight Controllers" on page 44 for more detailed controller information.

Figure 20. Fixed-wing T.Flight Hotas X joystick - fixed wing

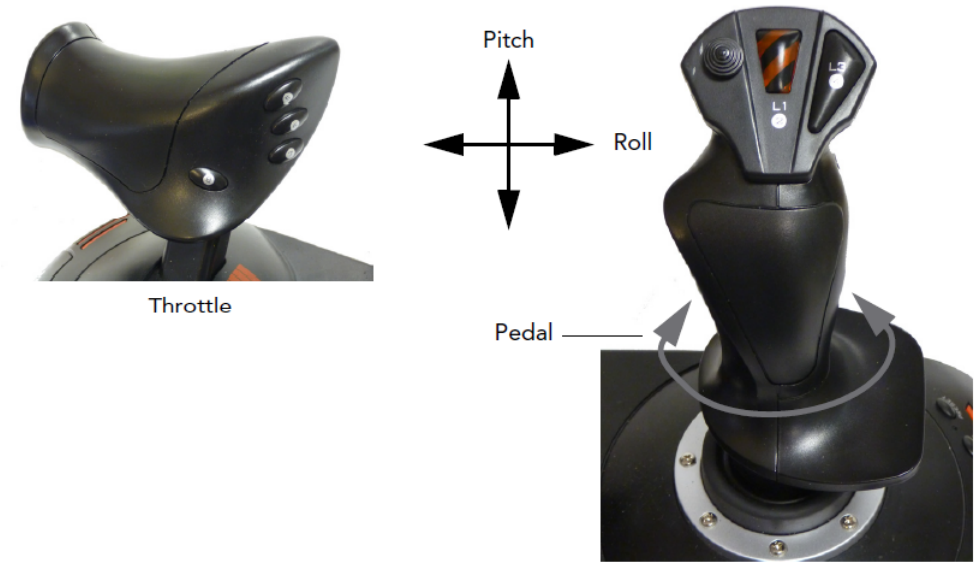


Figure 21. Fixed-wing flight controls



The Gamepad provides limited flight support. It is recommended that you use a game controller with a joystick and throttle, such as the supported Thrustmaster controllers.

The Action menu has options for raising and lowering landing gear and flaps.

2.5.1 The Head-Up Display

The head-up display (HUD) provides an out-the-window view with an overlay showing speed, altitude (R = above ground level; A = above mean sea level), and heading.

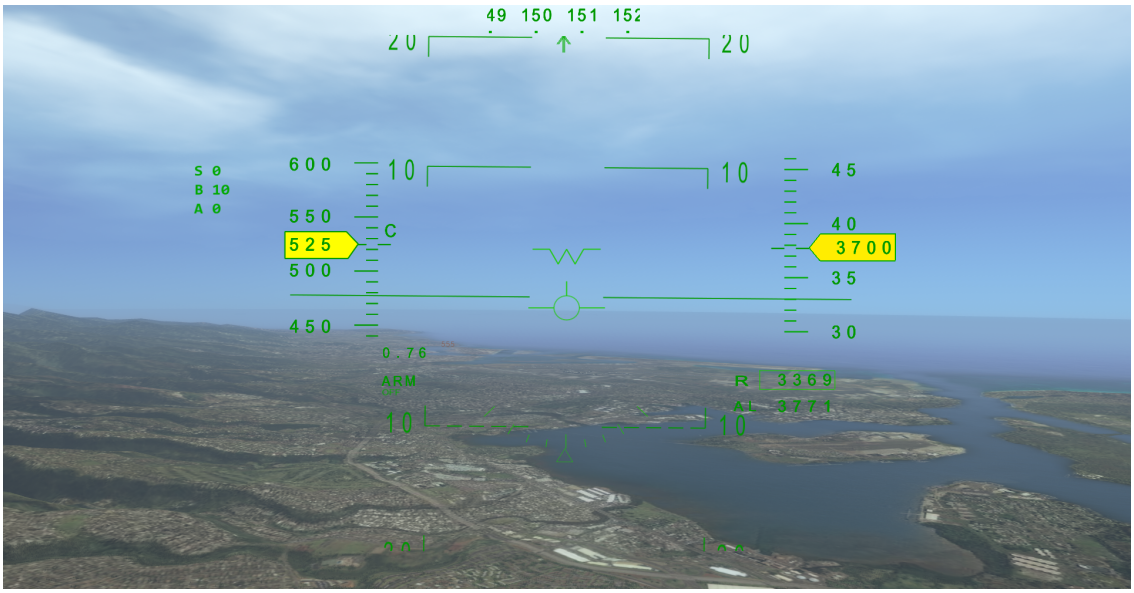
Figure 22 shows the head-up display and instrument panel for a fixed-wing aircraft in the 1 Screen Horizontal display.

Figure 22. HUD and instrument panel (1 Screen Horizontal display)



For a 2 screen display, Figure 23 shows the head-up display and Figure 24 on the facing page shows the instrument panel.

Figure 23. HUD (2 Screen display)

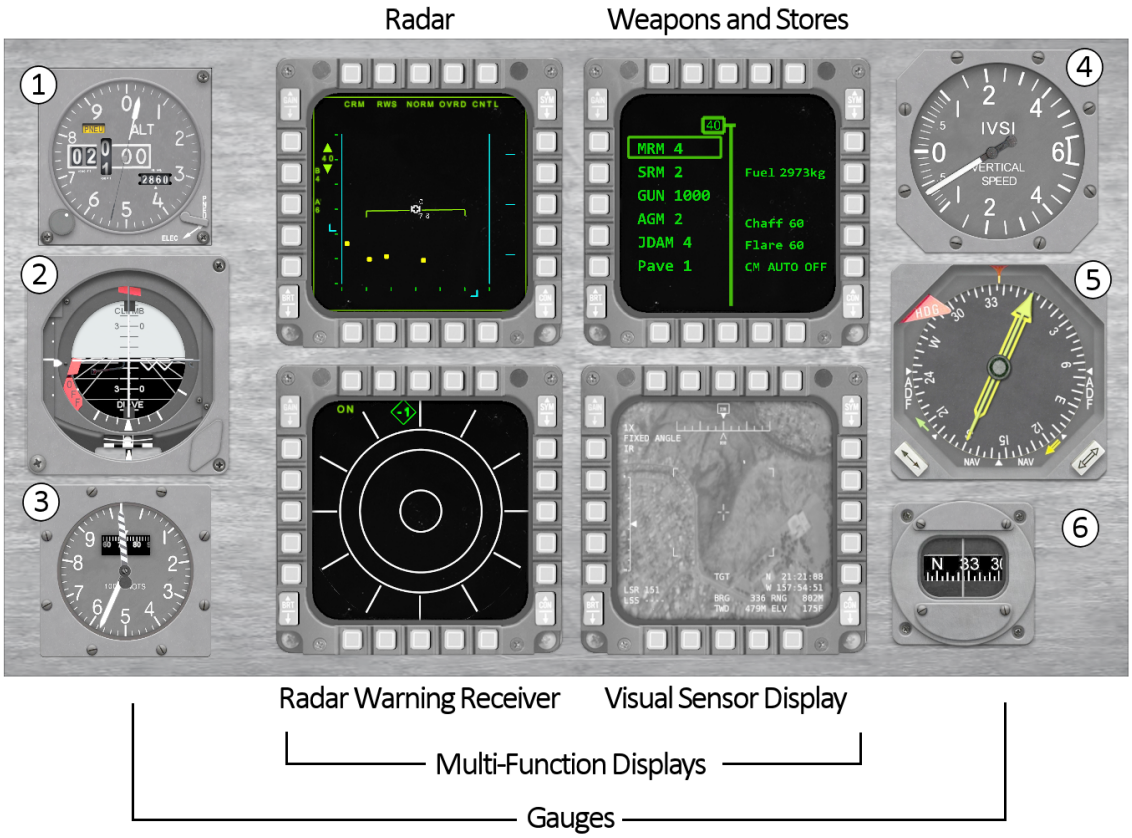


2.5.2 The Instrument Panel

The Instruments Only display shows the instrument panel (Figure 24), which has six gauges and four multi-function displays (MFD). The 1 Screen Horizontal display shows six gauges and two MFDs on the instrument panel (Figure 22 above).

In the 2 Screen display, the instrument panel is an independent window. You can minimize and maximize it. Sometimes it is hidden behind the HUD. If that happens, press **Alt**+**Tab** to bring it to the front.

Figure 24. Instrument panel (2 Screen display)



The gauges are:

- 1 – Altimeter.
- 2 – Attitude Indicator (Artificial Horizon).
- 3 – Airspeed Indicator.
- 4 – Vertical Speed Indicator.
- 5 – Heading Indicator.
- 6 – Compass.

The MFDs are:

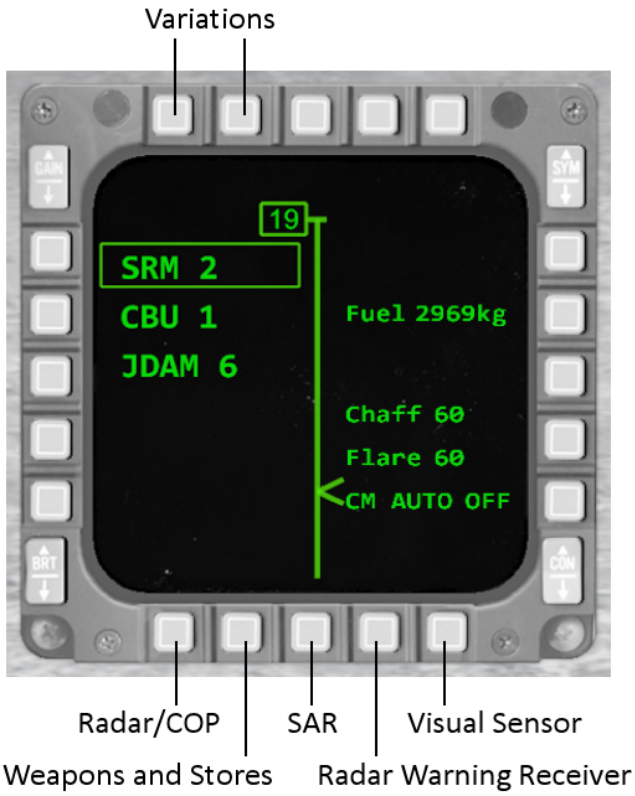
- Tactical Situation Display (Radar Indicator).
- Weapons/Stores Control Panel.
- Synthetic Aperture Radar (SAR) view.

- Radar Warning Receiver. Shows entities that are detecting you on their radar. The rings show the effective threat range.
- Visual Sensor Display. Displays the view from the gimbaled sensor or a plan view display of the scenario.

Changing the Multi-Function Display

Each MFD window can display any of the possible display types.

Figure 25. Multi-function display



➤ To change the display, click one of the buttons along the bottom of the display. For Radar, Radar Warning Receiver, and Visual Sensor, clicking one of the two leftmost buttons on the top of the MRD changes the display.

If the MFD display does not change when you click the buttons, the instrument panel might not have focus. Maximize it to ensure that it has focus.

2.5.3 Taking Control of a Jet

➤ **To take control of a jet in flight:**

1. In the Choose Role Panel, select the Control an Existing Entity option.
2. In the list of entities, select FtrFW 1 F/A-18 Hornet.

3. If you are using two monitors, in the Display(s) list, select 2 Screen. If you are using one monitor, select 1 Screen Horizontal or 1 Screen Vertical, depending on the orientation of your monitor.
4. Click Engage. The screen changes to show a HUD and an instrument panel. (If you just have one monitor and choose 2 Screen, the HUD will probably obscure the instrument panel. Press **Alt**+**Tab** to display the instrument panel.)

When you engage an entity that is flying, keep an eye on your speed and altitude to ensure that you do not crash.

---

5. Fly around the region, changing air speed, altitude, and heading, as follows:
    a. Move the throttle or the left thumbstick forward to increase your air speed. Pull them back to reduce air speed.
    b. Move the joystick or the right thumbstick forward and back to control the elevator on the aircraft. This changes the pitch up or down. If the aircraft is level, this results in an increase or decrease in altitude.
    c. Move the left thumbstick right or left, or twist the joystick to control the ailerons. This causes the aircraft to bank left or right.
    d. Refer to the head-up display or the instrument panel to determine your speed, pitch, and roll.

2.5.4 Taking Off and Landing in a Jet

The jet on the runway has its flaps up. If you want to shorten the distance required to take off, you can use the Action menu to lower the flaps. This is not required, however, because the runway is more than long enough for a fighter jet to take off.

➤ **To take off:**

1. If VR-Engage is not running, start it and load the VR-Engage Test Drive scenario. If it is running, start a new session, as follows:
    a. Press **Esc** to return to the Choose Role Panel.
    b. At the bottom of the Choose Role Panel, click Change Session. VR-Engage displays a confirmation prompt.
    c. Click Yes. VR-Engage returns to the Host VR-Forces Session screen.
    d. Click Host VR-Forces Session and load the VR-Engage Test Drive scenario.
2. In the Choose Role Panel, select the Control an Existing Entity option.
3. In the list of entities, select FtrFW 2 F/A-18 Hornet.
4. Click Engage. The display changes to full screen mode and the scenario starts to run. The jet is on the runway at the Honolulu airport.
5. Use the throttle to accelerate down the runway. Takeoff speed is about 150 mph, less if you lower the flaps.

6. When you reach takeoff speed, pull back on the joystick or use the Gamepad pitch control to raise the nose. The plane takes off.
7. Use the Action menu or the Landing Gear button on the throttle to raise the landing gear.
8. Fly the plane as desired.

➤ **To land the jet:**

1. Fly around the region until you can line up the aircraft with the runway.
2. Use the Action menu or the Landing Gear button to lower the landing gear.
3. Use the Action menu, the Flaps button on the throttle, or Gamepad Y button to lower the flaps. This reduces speed and also lowers the speed at which the aircraft will stall, thereby giving you more leeway for landing.
4. Reduce speed and lower altitude as you approach the runway. To reduce speed, pull back on the throttle, use the air brake (A button on the Gamepad), or both. The goal is to get below takeoff speed and go as slowly as possible without stalling.
5. Touch down on the runway, keeping the nose higher than the rear of the plane so that the rear wheels touch down first.
6. Use the wheel brake to stop the plane.

This is much easier to say than to do. You will have to practice until you get a feel for how the plane handles.



3. The Security Checkpoint Scenario

The Security Checkpoint scenario is an example of how you can use VR-Engage to set up a focused training environment.

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- 3.1.1 Load the Security Checkpoint Scenario 30
- 3.1.2 Opening the Security Panel 31
- 3.1.3 Using the Security Panel 31

3.2. Adding Security Checkpoints to a VR-Forces Scenario 32

3.1. Introduction to the Security Checkpoint Scenario

The Security Checkpoint scenario has a security checkpoint (Figure 26) consisting of:

- A security booth.
- Two gates with articulated arms.
- Gimbaled cameras mounted on poles.
- Traffic lights.

Figure 26. Security checkpoint



The checkpoint is manned by guards. If you engage the scenario as a guard, when you enter the gatehouse, you can open a security panel. Use the panel to move the cameras and raise and lower the gates. The traffic lights are dynamic. When a gate is raised, the light is green. When it is lowered, the light is red.

The scenario uses the VR-Forces pattern of life feature to generate traffic. When a gate is down, cars that approach the gate come to a stop. If the gate is up, they drive through the checkpoint.

3.1.1 Load the Security Checkpoint Scenario

➤ **To load the Security Checkpoint Scenario**

1. If VR-Engage is not running, start it. If it is running, in the Choose Role Panel, click Change Session.
2. Click Host VR-Forces Session. The Choose a Scenario for this Session dialog box opens.
3. Select VR-Engage Security Checkpoint.
4. Click OK. The terrain and scenario load. The Choose Role Panel is displayed.
5. Select Guard 1.

6. Click Engage. You are inside the guard house and the Security Station menu is open.

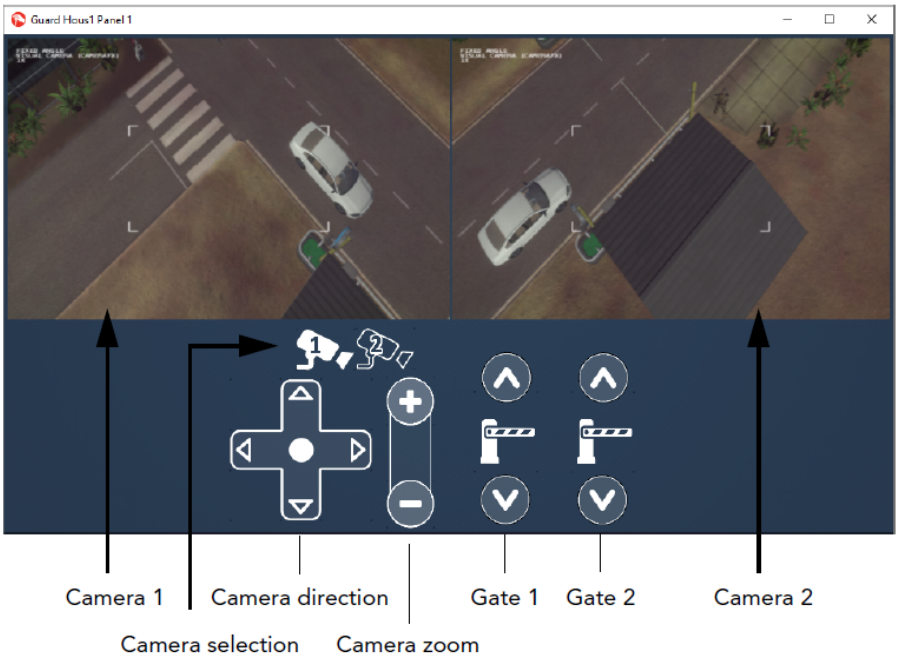
3.1.2 Opening the Security Panel

If you are playing the role of a security guard, you can open the security panel and manipulate its controls.

➤ **To open the security panel:**

1. On the Action menu, select Open Security Panel. The security panel opens (Figure 27).

Figure 27. Security panel



The security panel may open behind the main VR-Engage window. To see it, press **Alt**+**Tab** to select it or press **Ctrl**+**Enter** to change to windowed mode and select the window. You can also simply drag the security panel to a different monitor or location in the window.

3.1.3 Using the Security Panel

You control the security panel with your mouse. You can do the following things (Figure 27):

- Move the security cameras.
- Zoom the camera view.
- Raise and lower the gates.

➤ To move a camera, select the icon for the camera you want to control. Then click the directional arrows.

➤ To zoom a camera in or out, click the zoom controls.

➤ To raise or lower a gate, click the Up or Down arrow.

➤ To close the security panel, click the Close button (X) on the title bar.

3.2. Adding Security Checkpoints to a VR-Forces Scenario

The security booth and gates are created in VR-Forces as a simulation object group. The VR-Engage Add-ons for VR-Forces installs the following four versions of the security checkpoint that you can use to build your own scenarios:

- Security booth and one gate for driving on the right side of the road.
- Security booth and one gate for driving on the left side of the road.
- Security booth and two gates for driving on the right side of the road.
- Security booth and two gates for driving on the left side of the road.



4. Mouse, Keypad, and Controller Mappings

This chapter describes mouse and keyboard mappings and controller mappings for VR-Engage. You can use other controllers. To do so, you must create a configuration for each controller. For details, please see *"Configuring Joysticks and Keyboard Control,"* in *VR-Engage Users Guide*.

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4.1. Mouse and Keyboard Mappings

Using the mouse and keyboard, you can control human characters, ground vehicles, and navigate the Action menu. You can also perform some aircraft behaviors.

4.1.1 Human Controls

Table 1 lists mouse and keyboard mappings for human players.

Table 1. Human player mouse and keyboard controls

Mouse Mappings	
Turn and move weapon	Mouse move
Fire	Left mouse button
Zoom in	Mouse wheel forward
Zoom out	Mouse wheel backward
Aim	Right mouse button
Keyboard Mappings	
Application Management	
Reset in current position (the scenario continues to run)	Ctrl+F5
Reset to starting position (the scenario continues to run)	F5
Toggle Action menu	~ (tilde)
Toggle full screen	Ctrl+Enter
Disable/enable mouse control	Ctrl
Disengage/change role	Esc
Movement	
Sprint forward	Shift+W
Run forward	W
Walk forward	Alt+W
Walk backward	S
Run backward	Shift+S
Turn left	Left arrow
Turn right	Right arrow
Posture up	Q
Posture down	E
Stand	C
Lay prone	Z

Table 1. Human player mouse and keyboard controls (continued)

Toggle First-person/3rd person mode	V
Parachuting	
Deploy parachute	Spacebar
Turn left or right	A, D
Slow rate of descent	A+D
Engagement	
Aim	, (comma)
Strafe left	A
Strafe right	D
Pitch weapon/look up	Up arrow
Pitch weapon/look down	Down arrow
Toggle Weapon State (Stowed, Ready, Aiming)	‘ (apostrophe)
Cycle weapons	Spacebar
Select weapon	1, 2, 3, and so on (not on number pad)
Reload weapon	R
View and Accessories	
Look (weapons are disabled while looking)	. (period) + arrow keys or mouse
Toggle night vision goggles	N
Toggle binoculars	B
Zoom in	=
Zoom out	- (dash, not on number pad)
Talk on the radio	T
Toggle flashlight	F
Toggle compass	G
Toggle minimap	M
Zoom in on minimap	+ (plus sign on number pad)
Zoom out of minimap	- (minus sign on number pad)

4.1.2 Ground Vehicle Controls

Table 2 lists keyboard controls for ground vehicles.

Table 2. Keyboard mappings for ground vehicles

Function	Key
Movement (driver role)	
Steer left	A
Steer right	D
Throttle	W
Brake	S
Shift gear up	Q
Shift gear down	E
Start/stop engine	X
Differential lock	C
Headlights	L
Parking brake	P
Engagement (gunner role and the LAV driver role)	
Turret left	H
Turret right	K
Turret up	U
Turret down	J
Fire	F
Next weapon	R
Previous weapon	V
Commander RWS role	
Toggle laser designator	L
Slew to cue	C
Gunner override	O
Mouse Mappings (commander and gunner only)	
Look (commander)	Mouse move
Move turret (gunner)	Mouse move
Fire weapon (gunner)	Left mouse button
Zoom in	Mouse wheel forward
Zoom out	Mouse wheel backward

4.1.3 Aircraft Controls

Table 1 lists the keyboard mappings for aircraft. You require another controller to fly the aircraft. See "4.6. Flight Controllers" on page 44.

Table 3. Keyboard mappings for fixed-wing aircraft

Function	Key
Toggle radar warning receiver	M
Observer mode	V
Landing gear	G
Engagement	
Move radar cursor up	I
Move radar cursor down	K
Move radar cursor left	J
Move radar cursor right	L
Select target closest to cursor	Z
Unselect target closest to cursor	X
Cycle target list back	T
Cycle target list forward	Y
Clear air target list	U
Launch chaff	C
Launch flares	F

4.1.4 Action Menu Controls

Table 4 lists keyboard controls for the Action menu.

Table 4. Action menu mouse and keyboard mappings

Mouse Mappings	
Select menu item	Mouse click Number matching menu item
Keyboard Mappings	
Toggle Action menu	~ (tilde)
Next menu item	Up arrow
Previous menu item	Down arrow
Select menu item	Right arrow or Enter
Return to previous menu	Left arrow

4.2. Gamepad Mappings for Human Control

Figure 28 illustrates Gamepad mappings for controlling humans.

Figure 28. Human controls

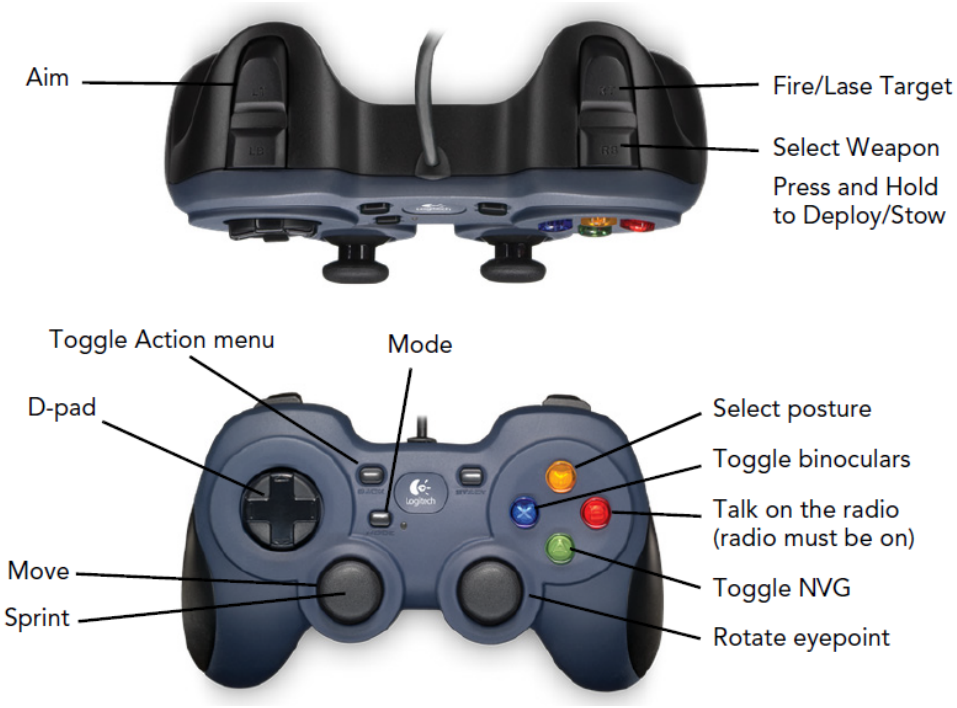


Table 5 lists the Gamepad controls for human characters.

Table 5. Gamepad control mappings - human

Function	Key/Button
Movement	
Move	Axis 1 and Axis 2, or D-pad
Sprint	Button 11 Down Toggle
Rotate Eyepoint	Axis 3 and Axis 4
Posture Select	Button 4 Down Toggle
Toggle Binoculars	Button 1 Down Toggle
Talk on radio	Button 3 Down Toggle
Human Combat	
Aim	Button 7 Down Toggle
Fire/Lase Target	Button 8 Down Toggle
Weapon Cycle	Button 6 Down Toggle

4.3. Gamepad Mappings for Using the Action Menu

Figure 29 illustrates Gamepad mappings for the Action menu.

Figure 29. Gamepad menu controls



Table 6 lists the Gamepad controls for using the Action menu.

Table 6. Gamepad control mappings - Action menu

Function	Key/Button
Move in menu	D-pad
Toggle Action Menu	Button 9 Down Toggle
Select	Button 2 Down Toggle
Cancel	Button 3Down Toggle

4.4. Gamepad Mappings for the LAV and Tanks

Gamepad mappings for controlling the LAV and tanks depend on the role you are playing. They are illustrated as follows:

- Figure 30 illustrates driver controls. These controls also apply to driving tanks, except as noted.
- Figure 31 illustrates commander controls. These controls also apply to tanks with commander roles.
- Figure 32 illustrates gunner controls. The controls also apply to tanks.

Figure 30. Driver controls for LAV and tanks



Table 7 lists the driver's Gamepad controls for the LAV and tanks.

Table 7. Driver Gamepad control mappings - LAV and tanks

Function	Key/Button
Vehicle Control	
Start Engine	Button 10 Down Toggle
Throttle	Axis 2
Gear Down	Button 5 Down Toggle
Gear Up	Button 6 Down Toggle
Parking Brake	Button 11 Down Toggle
Steering	Axis 3
Differential Lock (LAV)	Button 1 Down Toggle
Pivot (tanks only)	Button 1 Down Toggle
Headlights	Button 2 Down Toggle
Talk on radio	Button 3 Down Toggle
Cycle saved views (LAV)	Button 4 Down Toggle
Change sensor	Button 12 Down Toggle
Engagement	
Turret	D-pad

Table 7. Driver Gamepad control mappings - LAV and tanks (continued)

Function	Key/Button
Cycle Weapon	Button 7 Down Toggle
Fire Weapon	Button 8 Down Toggle

Figure 31. Commander controls - LAV and tanks

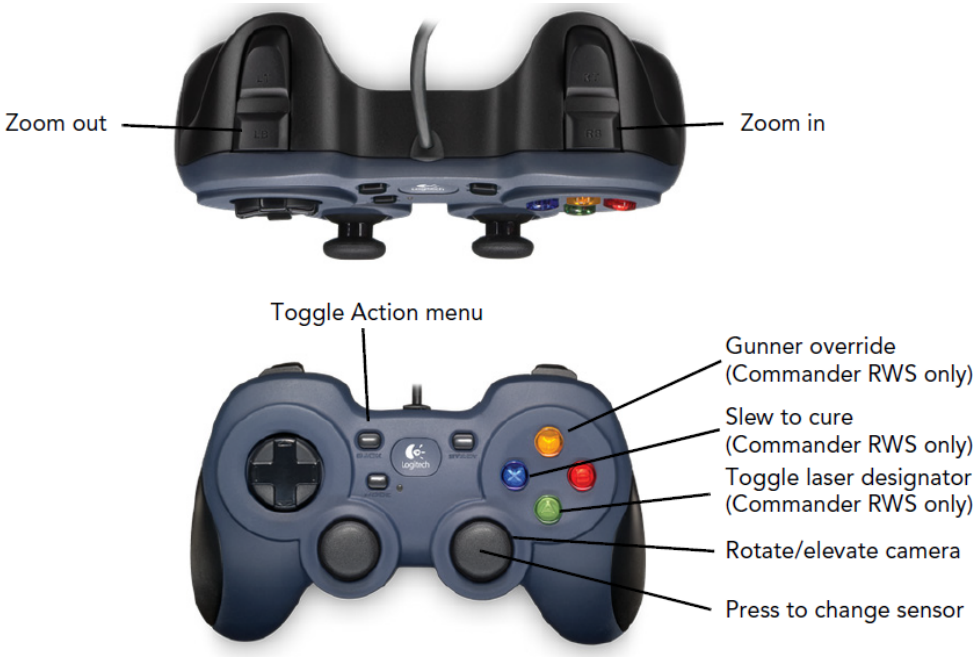


Table 8 lists the commander's Gamepad controls for the LAV and tanks. (Not all tanks are configured with commander roles.)

Table 8. Commander Gamepad control mappings - LAV and tanks

Function	Key/Button
Rotate/elevate camera	Axis 3 and Axis 4
Change sensor	Button 12 Down Toggle
Zoom out	Button 5 Down Toggle
Zoom in	Button 6 Down Toggle
Slew to cue	Button 1 Down Toggle (Commander RWS only)
Gunner override	Button 4 Down Toggle (Commander RWS only)
Toggle Laser Designator	Button 2 Down Toggle (Commander RWS only)

Figure 32. Gunner controls for LAV and tanks



Table 9 lists the gunner's Gamepad controls for the LAV and tanks.

Table 9. Gunner Gamepad control mappings - LAV and tanks

Function	Key/Button
Rotate/elevate gun	Axis 3 and Axis 4
Change sensor	Button 12 Down Toggle
Zoom out	Button 5 Down Toggle
Zoom in	Button 6 Down Toggle
Cycle Weapon	Button 7 Down Toggle
Fire Weapon	Button 8 Down Toggle
Talk on radio	Button 3 Down Toggle

4.5. Racing Wheel Controllers

VR-Engage supports the Logitech G27 and G29 racing wheel controllers.

If your racing wheel is not working as expected, make sure you are using the latest drivers.

Figure 33 illustrates the mappings of the G27 racing wheel.

Figure 33. G27 racing wheel controls



Table 10 lists the G27 racing wheel controls.

Table 10. G27 Racing Wheel control mappings

Function	Key/Button
Next View	Button 4 Down Toggle
Previous View	Button 3 Down Toggle
Cycle Sensor	Button 16 Down Toggle
Brake	Axis 3
Differential Lock	Button 7 Down Toggle
Engine Enable	Button 8 Down Toggle
Gear Down	Button 6 down Toggle
Gear Up	Button 5 Down Toggle
Headlights	Button 20 Down Toggle
Parking Brake	Button 22 Down Toggle
Reset	Button 23 Down Toggle
Steering	Axis 1
Throttle	Axis 2

Figure 34 illustrates the mappings of the G29 racing wheel.

Figure 34. G29 racing wheel controls

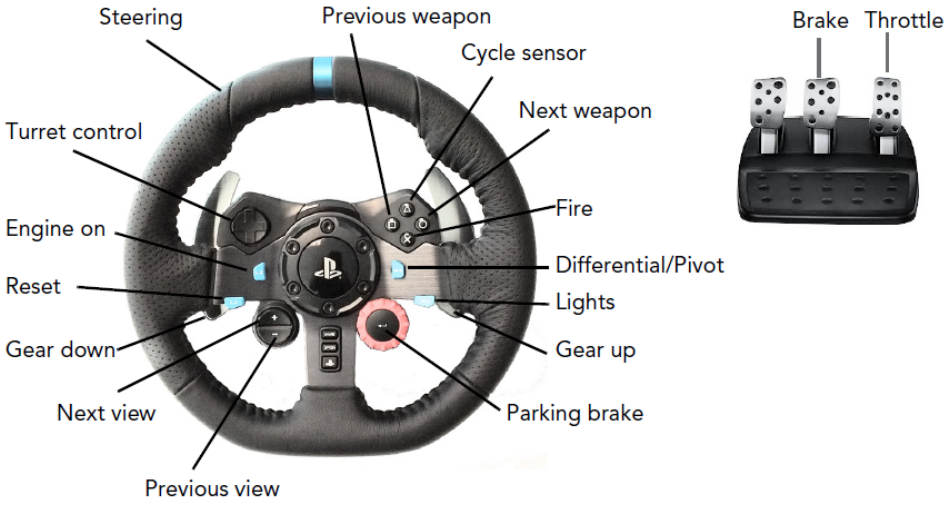


Table 11 lists the G29 racing wheel controls.

Table 11. G29 racing wheel control mappings

Function	Key/Button
Next View	Button 20 Down Toggle
Previous View	Button 21 Down Toggle
Cycle Sensor	Button 4 Down Toggle
Brake	Axis 3
Differential Lock	Button 7 Down Toggle
Engine Enable	Button 8 Down Toggle
Gear Down	Button 6 down Toggle
Gear Up	Button 5 Down Toggle
Headlights	Button 11 Down Toggle
Parking Brake	Button 24 Down Toggle
Reset	Button 12 Down Toggle
Steering	Axis 1
Throttle	Axis 2
Differential Lock	Button 7 Down Toggle

4.6. Flight Controllers

VR-Engage includes mappings for the Thrustmaster HOTAS Warthog flight (Joystick-HOTAS Warthog) controller, the T.Flight Hotas X (T.Flight Hotas X) flight controller, and the Gamepad F310 and F710 (Logitech Dual Action).

4.6.1 HOTAS Warthog Mappings for Fixed-Wing Entities

Figure 35 and Figure 36 show the mappings for the Thrustmaster Warthog flight controller for fixed-wing entities.

Figure 35. Thrustmaster HOTAS Warthog joystick mappings - fixed-wing



Figure 36. Thrustmaster HOTAS Warthog throttle mappings - fixed-wing

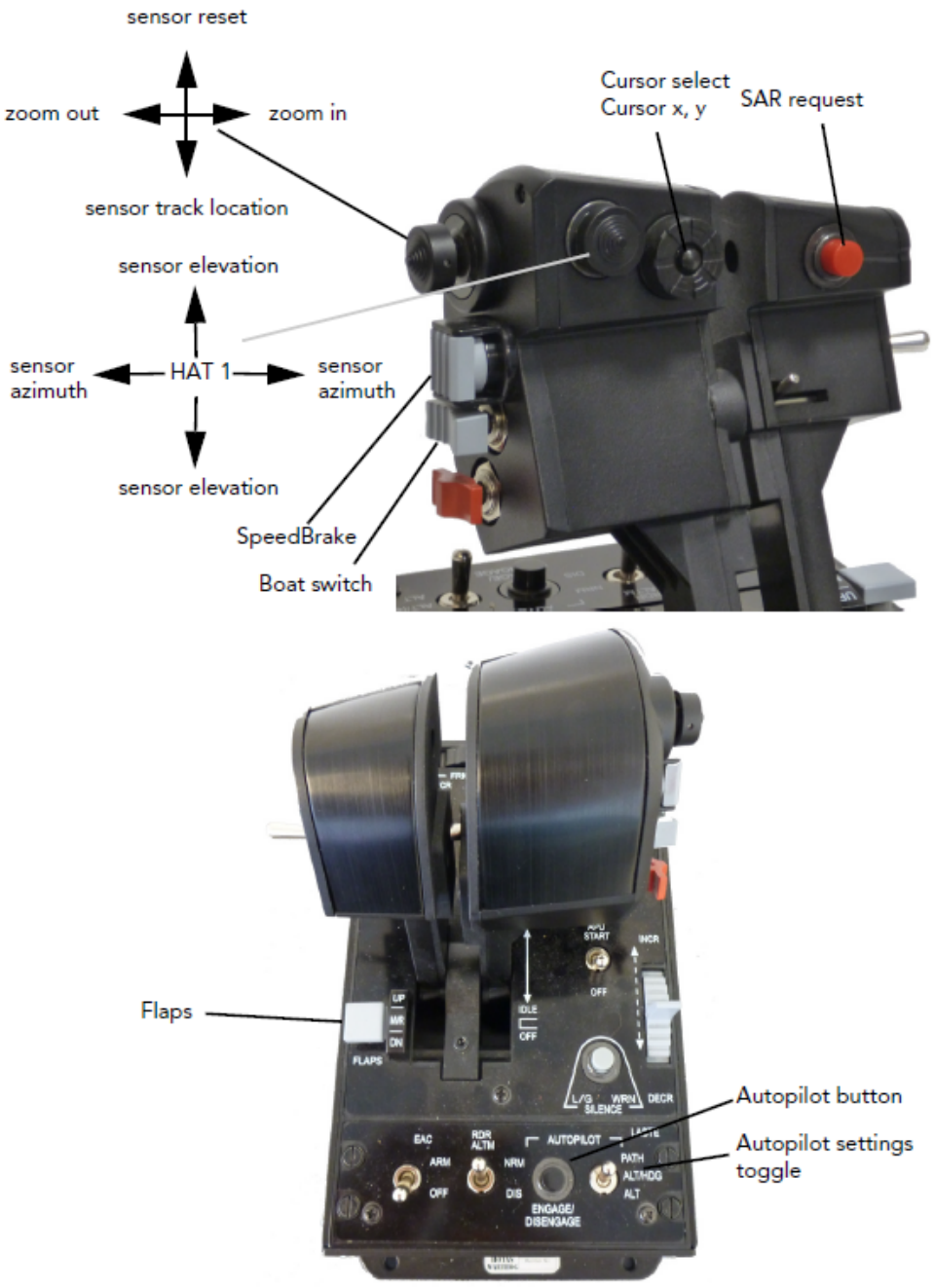


Table 12 lists the flight controls for the Thrustmaster HOTAS Warthog controller for fixed-wing entities.

Table 12. Thrustmaster HOTAS Warthog mappings - fixed-wing

Function	Key/Button
Extended Flight Controls	
AutopilotMode1	Throttle Button 27 Down Toggle
AutopilotMode2	Throttle Button 28 Down Toggle
AutopilotToggle	Throttle Button 26 Down Toggle
Flap 1	Throttle Button 22 Down Toggle. Toggle states match joystick up, maneuver, down.
Flap 2	Throttle Button 23 Down Toggle. Toggle states match joystick up, maneuver, down.
NoseWheelSteering	Button 3 Down Toggle
ToggleLandingGear	G Toggle
Engagement	
cycle weapon	Throttle Button 5 Down Toggle
fire selected weapon	Throttle Button 1 Down Toggle
replenish fuel and ordnance	Throttle Button 4 Down Toggle
FixedWingLib CGF Flight Controls	
air brake	Boat Switch (Button 10) Down. This causes excess drag and the plane's speed drops quickly.
pitch	Joystick forward and back (Axis 2)
roll	Joystick left and right (Axis 1)
throttle	Throttle lever (Axis 3)
wheel brake	SpeedBrake (Button 7) Down, button 8 Down. If you pull back and release, it re-centers. If you push forward, it locks in place. Both directions activate full brakes.
Gimbaled Sensor	
sensor-azimuth	Throttle HAT 1 Right (Up), HAT 1 Left (Down)
sensor-cycle	Joystick Button 7 Down Toggle
sensor-elevation	Throttle HAT 1 Up (Up), HAT 1 Down (Down)
sensor-reset	Throttle Button 3 Down
sensor-track-location	Throttle Button 5 Down
sensor-zoom	Throttle Button 4 (Down), Button 6 (Up)
Observer Control	
ObserverAttachMode	V (on the keyboard)
Radar Scope	
cursor-select	Button 1 (also clears the selection from the air target list)

Table 12. Thrustmaster HOTAS Warthog mappings - fixed-wing (continued)

Function	Key/Button
cursor-x	Axis 1
cursor-y	Axis 2
Clear air target list	U (on the keyboard)
SAR	
request	Throttle Button 15

4.6.2 T.Flight Hotas X Mappings for Fixed-Wing Entities

Figure 37 shows the joystick controls for the T.Flight Hotas X flight controller for fixed-wing entities.

VR-Engage also supports the T.Flight Hotas 4 controller. The button layout is similar to the T.Flight Hotas X.

Figure 37. T.Flight Hotas X joystick - fixed wing



Figure 38 shows the throttle controls for the T.Flight Hotas X flight controller for fixed-wing entities.

Figure 38. T.Flight Hotas X throttle - fixed-wing

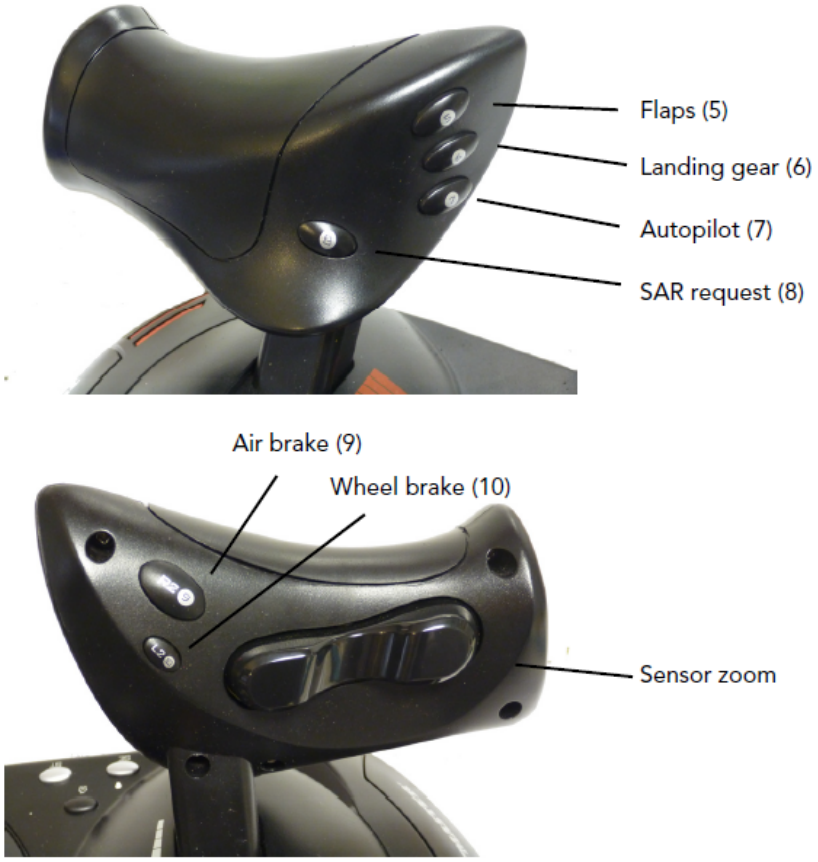


Table 13 lists the flight controls for the T.Flight Hotas X controller for fixed-wing entities.

Table 13. T.Flight Hotas X mappings - fixed-wing

Function	Key/Button
Engagement	
cycle weapon	Button 5 Down Toggle
fire selected weapon	Button 1 Down Toggle
cursor select target	Button 3 Down Toggle
FixedWingLib CGF Flight Controls	
pedal	Joystick twist left and right (Axis 4)
pitch	Joystick forward and back (Axis 2)
roll	Joystick left and right (Axis 1)
throttle	Throttle forward and back (Axis 3)
autopilot	Button 7
air brake	Button 9 Down

Table 13. T.Flight Hotas X mappings - fixed-wing (continued)

Function	Key/Button
landing gear	Button 6
flaps	Button 5
wheel brake	Button 10 Down
Menu	
Action menu	Button 4 Down
down	HAT 1 Down, <DOWN>
left	HAT 1 Left, <LEFT>
right	HAT 1 Right, <RIGHT>
up	HAT 1 Up, <UP>
Observer Control	
Attach mode	V (on keyboard)
Radar Scope	
down	HAT 1 Down, <DOWN>
left	HAT 1 Left, <LEFT>
right	HAT 1 Right, <RIGHT>
up	HAT 1 Up, <UP>
select target closest to cursor	Z (on keyboard)
clear current radar selection	X (on keyboard)
Release Bomb	
release	Button 1 Down
SAR	
request	S, Button 8 Down

4.6.3 Gamepad Flight Control Mappings for Fixed-Wing Entities

Figure 39 illustrates the fixed-wing flight controls for Gamepads.

Figure 39. Fixed-wing flight controls



Table 14 lists the flight controls for Gamepads for fixed-wing entities.

Table 14. Gamepad flight control mappings - fixed-wing

Function	Key/Button
Engagement	
cycle weapon	Button 7
fire selected weapon	Button 8
FixedWingLib CGF Flight Controls	
pedal	Axis 1 (Left thumbstick, left/right)
pitch	Axis 4 (Right thumbstick, forward/back)
roll	Axis 3 (Right thumbstick, left/right)
throttle	Axis 2 (Left thumbstick, forward/back)
air brake	Button 2
wheel brake	Button 1
flaps	Button 4

4.7. Head-Mounted Display Controllers

The Oculus Rift and HTC Vive head-mounted displays support hand controllers. This section shows the mappings for these controllers, which can be used for soldier roles. If you do not have hand controllers, you can use the keyboard and Gamepad controls. (HMD hand controllers are not mapped in joystick settings.)

Figure 40 illustrates the controls on the Oculus Rift touch controller.

Figure 40. Oculus Rift touch controller

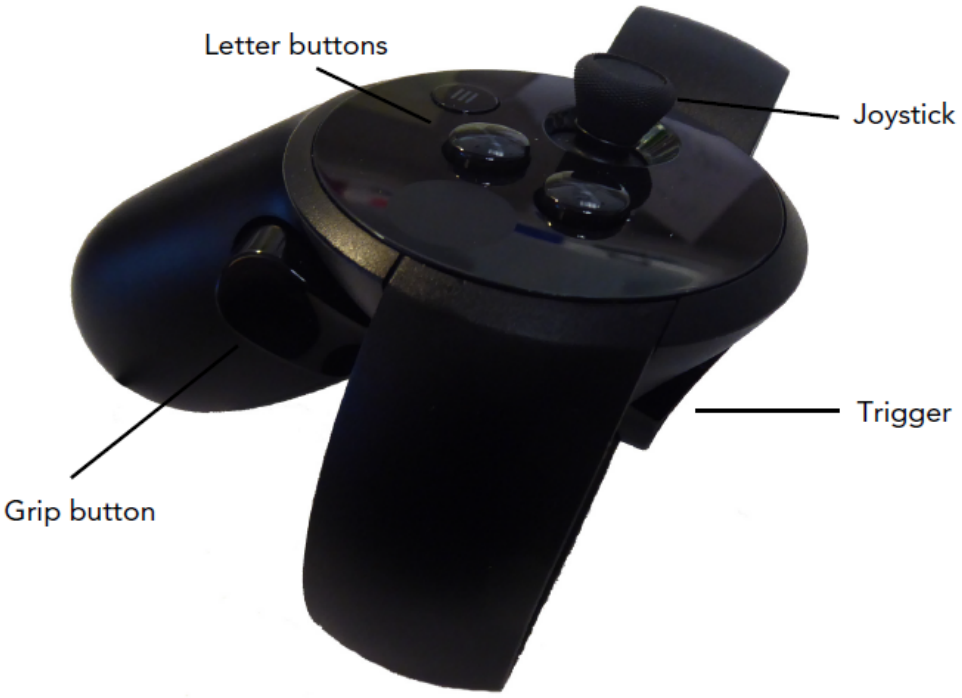
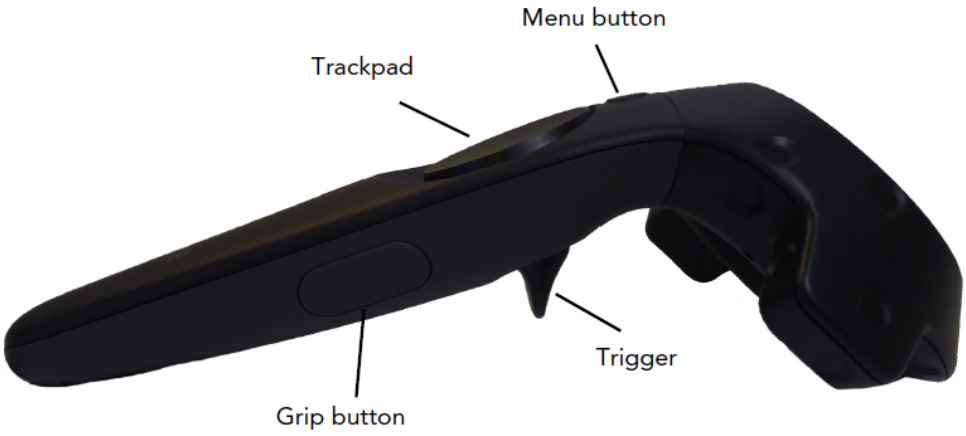


Figure 41 illustrates the controls on the Oculus Rift touch controller.

Figure 41. HTC Vive controller



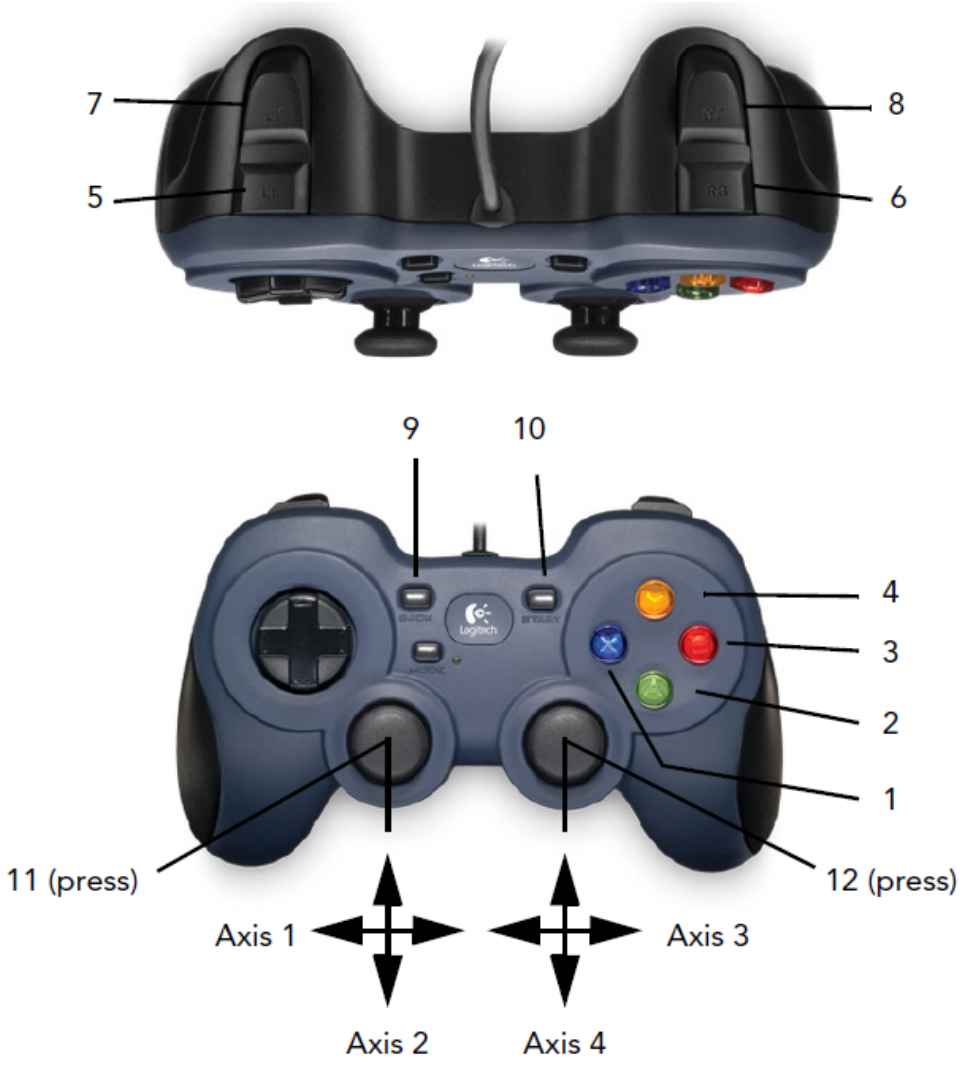
The controls work as follows:

- Fire. Press the trigger on the dominant hand to fire the weapon.
- Aim. Press the grip button to raise the weapon to the aim-down-sights position.
- Move. Movement is controlled by the right hand joystick (Oculus Rift) or trackpad (HTC Vive), as follows:

  - Walk forward. Push/touch forward. Movement is based on the orientation of the entity, not the direction it is looking or aiming.
  - Walk backwards. Pull/touch backward.
  - Walk sideways. Push/touch left and right
  - Sprint. Push down while pressing forward.
- Turn. Press/touch the left hand joystick or trackpad to the left or right.
- Change posture. Press the trigger on the non-dominant hand for Posture Up. Press the grip button on the non-dominant hand for Posture Down.
- Action menu. To open, press Y on the non-dominant hand Oculus touch controller. Press the menu button on the non-dominant hand HTC Vive controller. While the menu is open, the joystick or trackpad acts as a D-pad.

4.8. Generic Gamepad Button Numbering

Figure 42. Logitech Gamepad button and axis numbering



Game controllers are mapped in the Joystick Configuration page of the Application Settings dialog box. (For details, please see "Configuring Joysticks and Keyboard Control".) The mappings are identified by button and axis numbers. Figure 42 identifies the button and axis numbering scheme.



5. Installation and Licensing

Your MAK salesperson has given you links to the VR-Engage installers, and may have given you links to other installers. Download the files.

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5.1. Installing VR-Engage

VR-Engage has an application installer and a data package. The data package has seven files, including one for basic terrain. You must install all seven files or VR-Engage will not run properly. The default installation process installs these files automatically.

VR-Engage also has a supplementary data package that has additional terrains. The installation package includes a set of plug-ins to VR-Forces. If you are installing a VR-Forces build that is compatible with VR-Engage and want to take advantage of VR-Engage/VR-Forces integration, you must install the plug-ins.

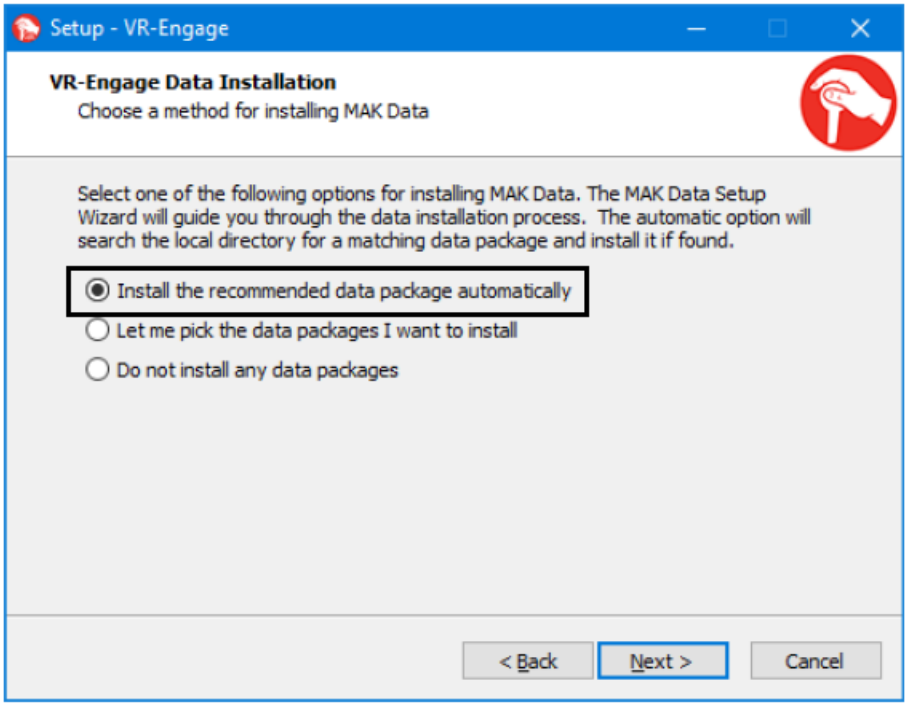
Before you install the applications, note the following possible issues:

- When you install VR-Engage, there may be a delay of up to several minutes from the time you try to run the setup program to the time that an installation dialog box is displayed. If you experience this problem, turning off User Access Control can reduce or eliminate this delay.
- These instructions assume you are familiar with installing Windows applications that use a wizard-style installer. They also assume that you have an unzipping application and know how to use it.

➤ **To install VR-Engage:**

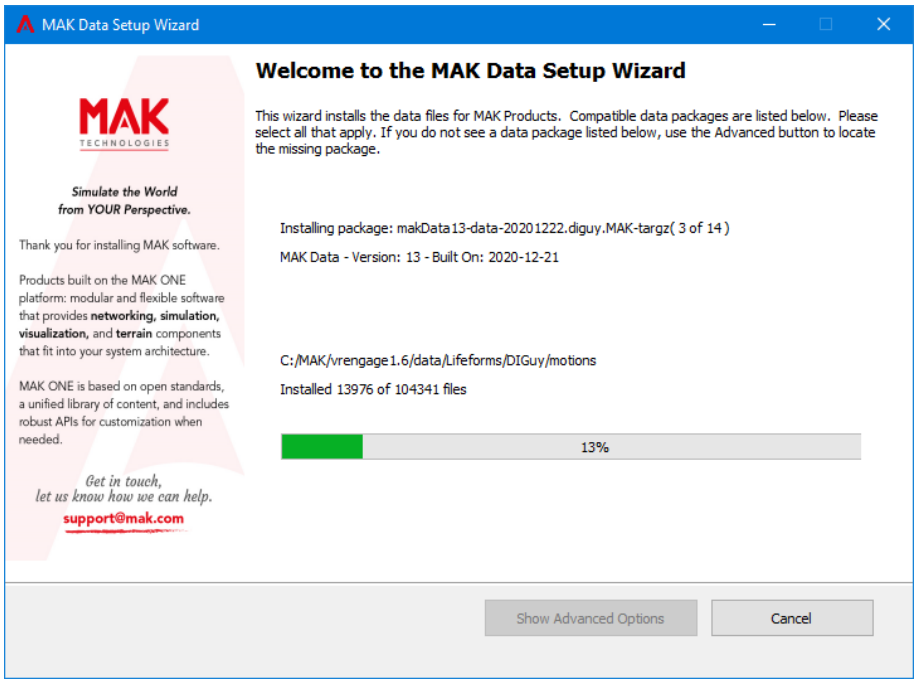
1. Run the VR-Engage application installer. It opens an installation wizard.
2. The default installation directory displays. If necessary, change the location. Click Next.
3. Click Next in the Select Components page.
4. The default directory for the shortcut displays. If necessary, change the location. Click Next.
5. When the installation wizard asks how you want to install the application data package (Figure 43), select the default: **Install the recommended data package automatically**. Click Next.

Figure 43. Data installer selection page



6. Continue with the installation wizard by clicking Install.
7. When the application installer finishes, the MAK Data Setup Wizard (Figure 44) opens automatically and installs the data.

Figure 44. MAK Data Setup Wizard



8. When the installation is complete, the wizard informs you how to install the VR-Forces plug-ins. Click Next.
9. Click Finish.
10. Optionally, install the VR-Forces and VR-Engage plug-ins as described in "5.1.1 Installing Compatible VR-Forces and VR-Engage Add-ons" below.

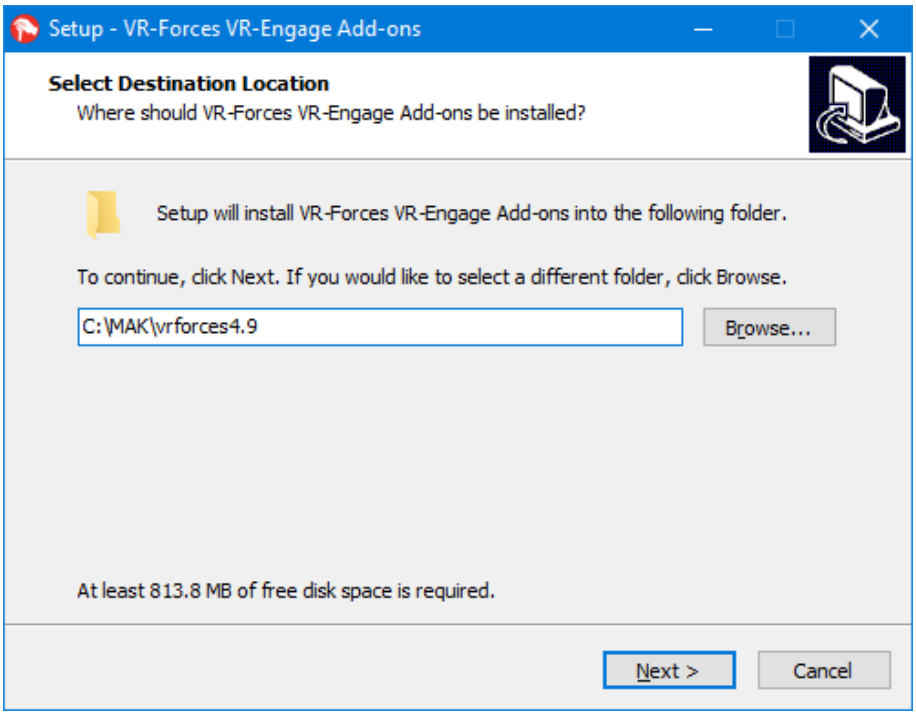
5.1.1 Installing Compatible VR-Forces and VR-Engage Add-ons

VR-Engage is a standalone application that can interoperate with any simulation using DIS or HLA. If you have installed a version of VR-Forces that is compatible with VR-Engage and you install the VR-Engage plug-ins, however, you can control VR-Forces simulation objects from VR-Engage.

➤ **To install VR-Forces and the VR-Engage add-ons:**

1. Run *VR-ForcesVR-EngageAdd-ons.exe*. If the add-on installer cannot find the VR-Forces directory, it displays a message. (If you installed VR-Forces on a different computer than the one on which you installed VR-Engage, copy *VR-ForcesVR-EngageAdd-ons.exe* to the computer that has VR-Forces and run it there.)
2. You are prompted to specify the VR-Forces directory to install into (Figure 45). Specify the VR-Forces directory.

Figure 45. VR-Forces VR-Engage Add-ons Wizard



3. Click Next.
4. Complete the installation wizard.

5.2. Setting Up the License Manager

To use a MAK product, you must install the MAK License Manager and get a license for your product. Before you can use a MAK product, you must obtain a valid license file and specify the license server.

➤ To install the MAK License Manager, run the installer.

The general procedure for configuring license management is as follows:

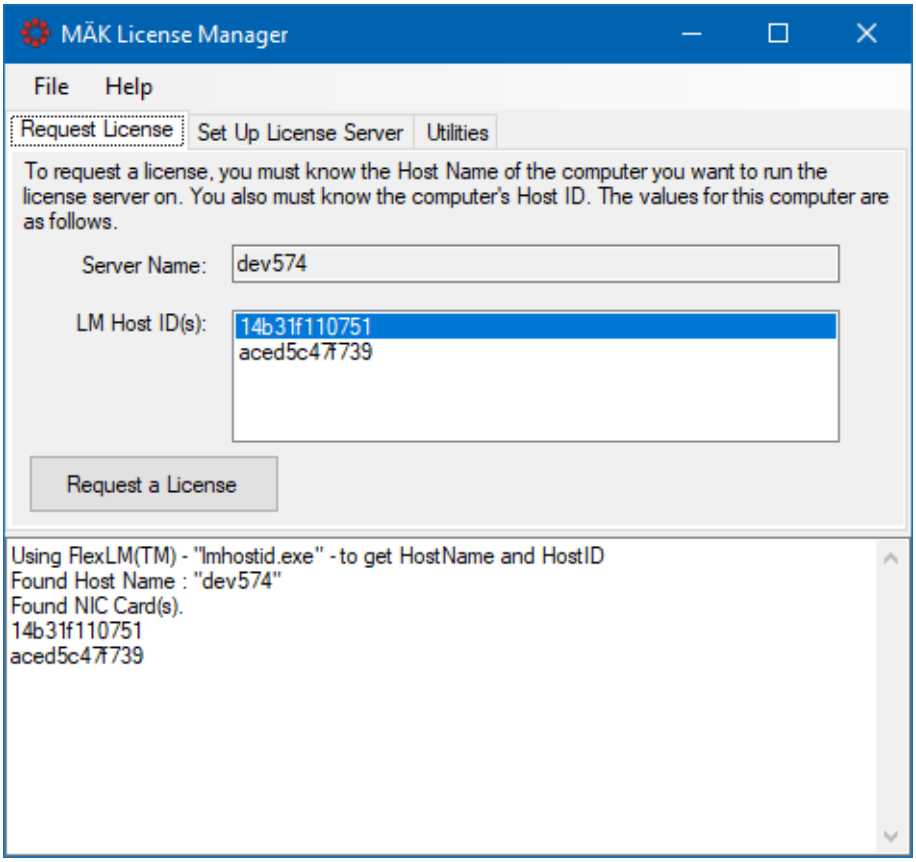
1. Identify the name and ID of the license server and request a license file.
2. Put the license file in the *MAK/MAKLicenseManager* directory on the license server.
3. Run the license server.
4. Specify the license server location.

5.2.1 Identify the Host ID and License Server Name

For simplicity, use the computer on which you installed VR-Engage as the license server. To find out the host ID and license server name:

1. On the Start menu, choose **MAK Technologies > MAK License Manager**. The MAK License Manager utility opens (Figure 46).

Figure 46. License Manager



2. Select the Request License tab. It displays the server name and the IDs for your network cards.
3. If you have more than one network card, select the one that you want to use as Host ID.
4. Send the host ID and hostname to your MAK salesperson. MAK will e-mail you a license file.

5.2.2 Put the License File in the *MAKLicenseManager* Directory

When you receive your license file, put it in the *MAKLicenseManager* directory on the license server. The file should have the extension *.lic*. If it does not, please contact keys@mak.com to clarify why it did not follow this convention.

5.2.3 Run the License Server

➤ To start the license server daemon, on the server machine only, execute **runLm** from the *MAKLicenseManager* directory.

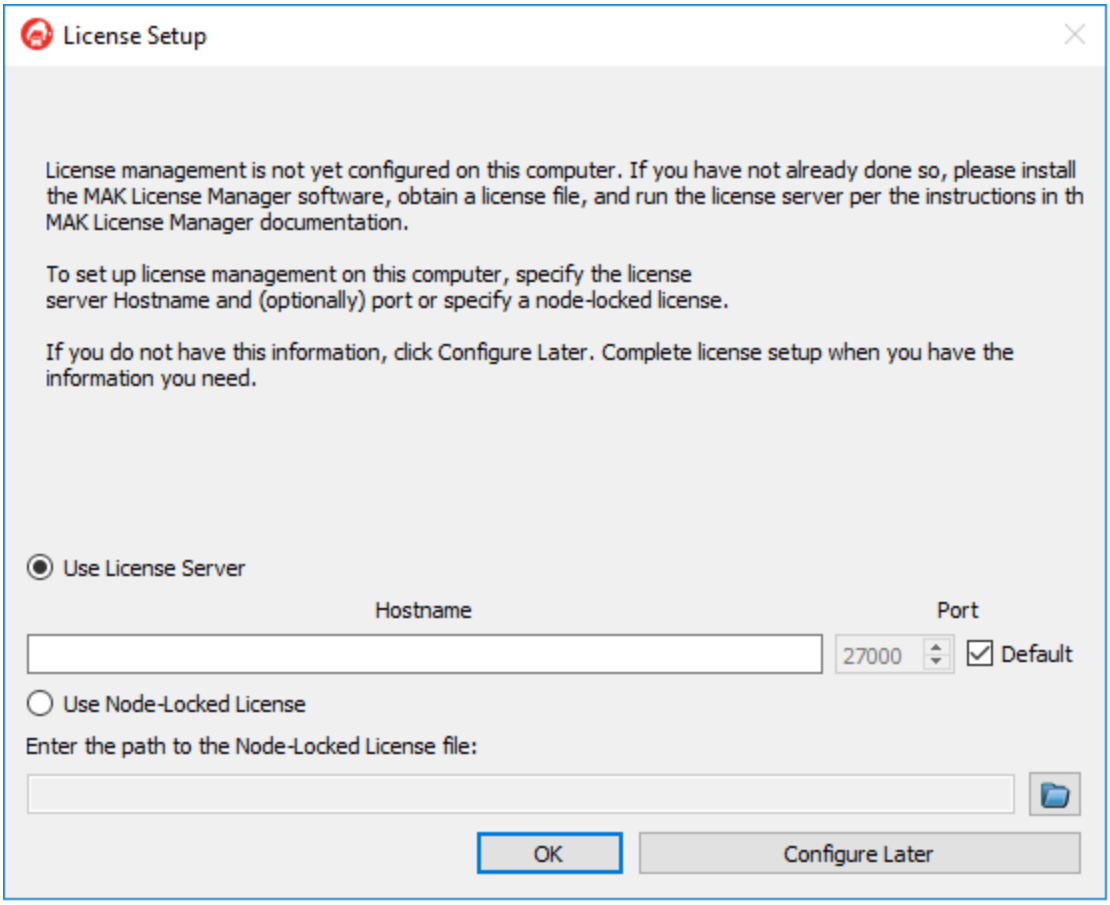
Shutting Down the License Server

➤ To force all applications to check in their licenses and shut down the license server daemon, run **lmdown**.

5.2.4 Specify the License Server

The first time you run a MAK application on a computer, the License Setup dialog box opens (Figure 47). It prompts you to enter the hostname of the license server and optionally, a port number.

Figure 47. License Setup dialog box



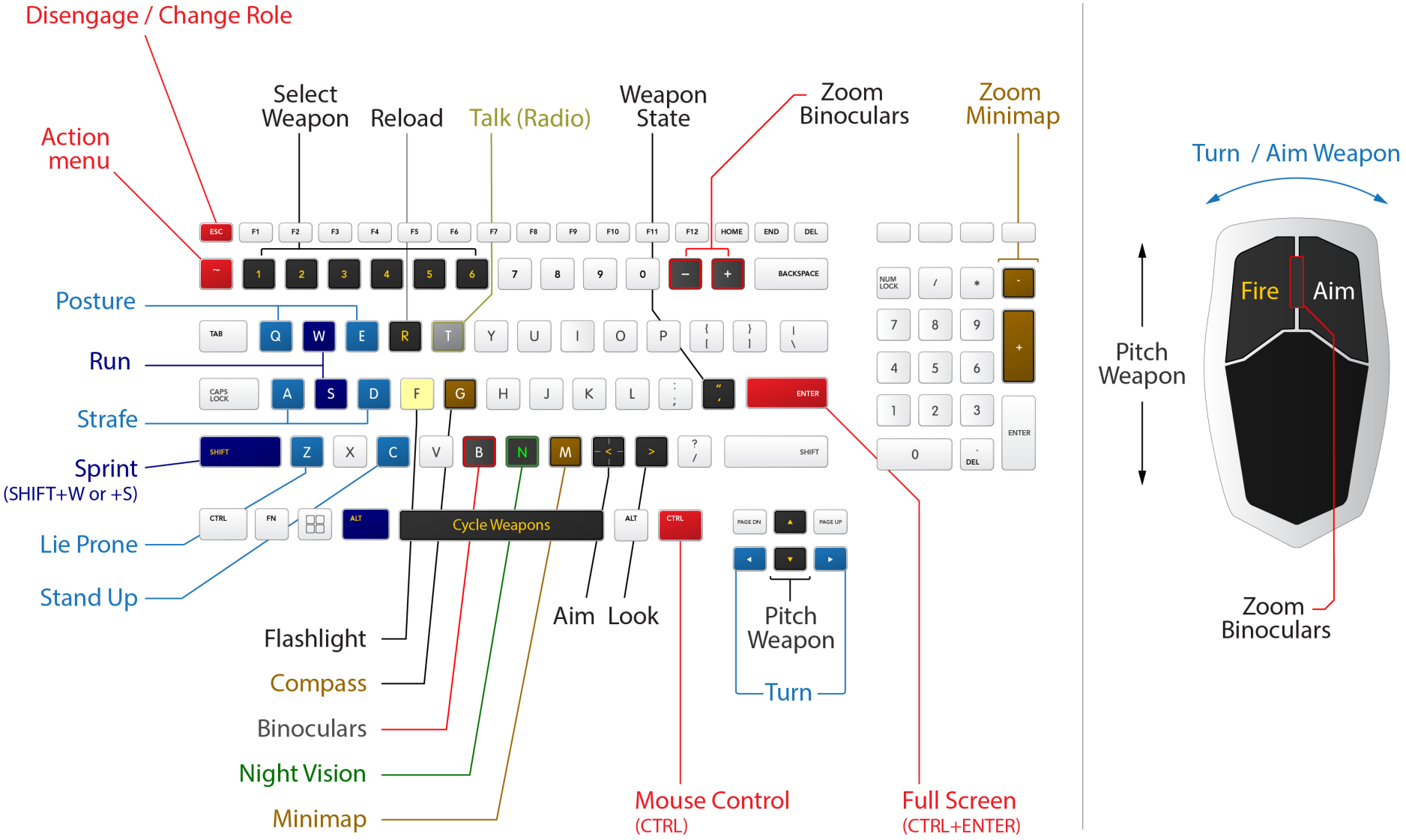
1. Type the hostname in the Hostname box.
2. Click Add License Server. The application starts.



Keyboard and Mouse Controls

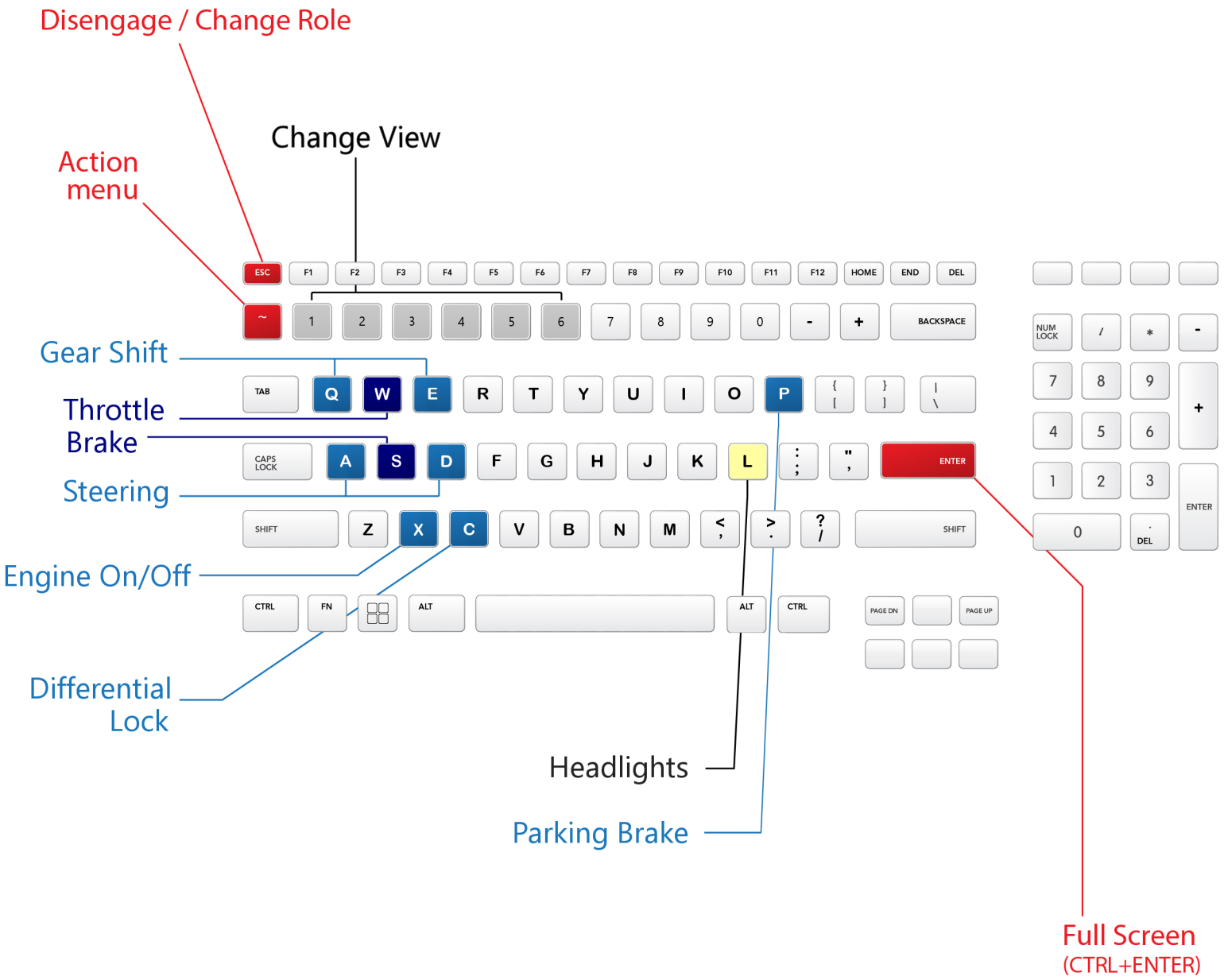
VR-Engage Soldier Controls for Keyboard and Mouse 64
VR-Engage Driver Controls for Keyboard 65
VR-Engage Gunner Controls for Keyboard and Mouse 66
VR-Engage Commander Controls for Keyboard and Mouse 67

VR-Engage Soldier Controls for Keyboard and Mouse



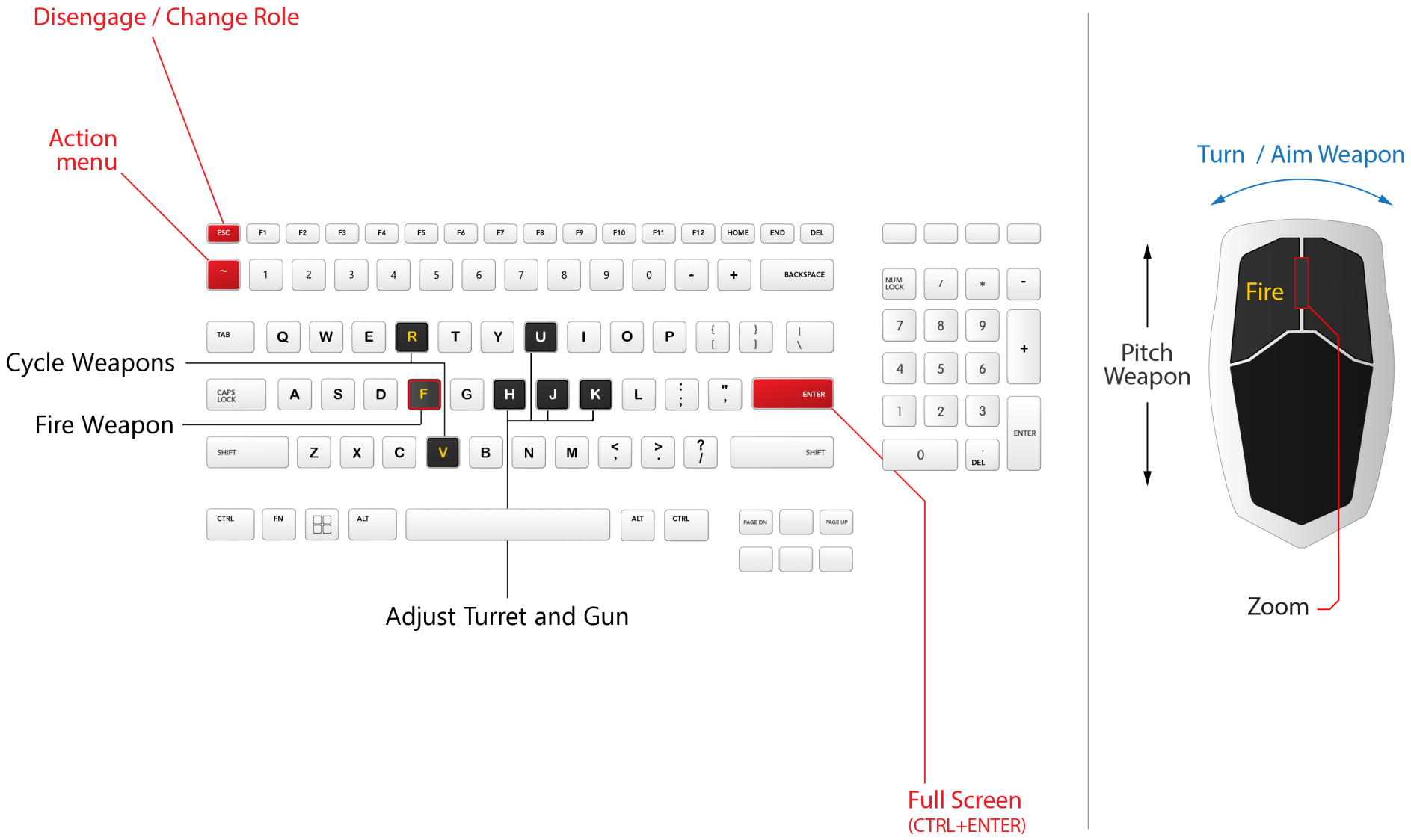
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VR-Engage Driver Controls for Keyboard



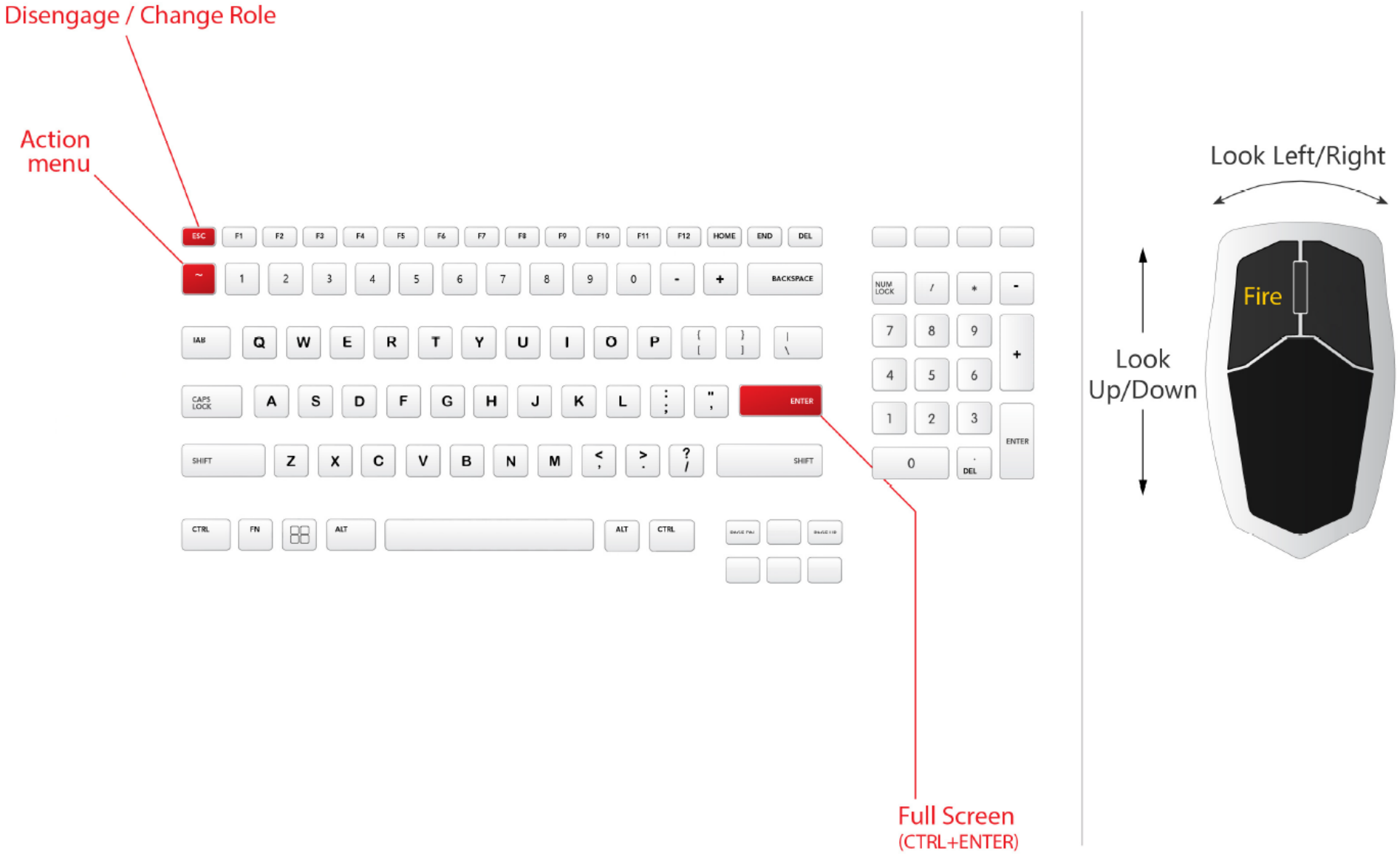
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