VOS® 5.1 (VirTra Operating Station)

USER MANUAL

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HOW TO USE THIS MANUAL

This manual was designed and created for quick and easy navigation when viewed electronically. First, read the introductory table of contents. The table of contents is designed to group related topics together in one section of the manual. Forms are cross-referenced and a copy of the form is in the appendix to each manual where applicable.

For quick navigation, locate the **TABLE OF CONTENTS** page. Simply click on the topic of interest and the manual will direct the user to that page, eliminating the need for scrolling.

Table of Contents

1. General Statistics System

Statistics Data Tracking

Statistics data is only tracked for trainees which are marked ranked.
By default no statistics tracking occurs for any trainee.

To enable the ranked status, select the **Ranked** checkbox in the **Trainees Administration** tool and save the trainee:

Note that the option to set a trainee to **ranked** is only available when the system is set to using a **SQL Data Provider** type.

All displays showing a trainee image logo are annotated with a statistics icon indicating that the trainees actions in the simulator are being stored in the database for statistics tracking:

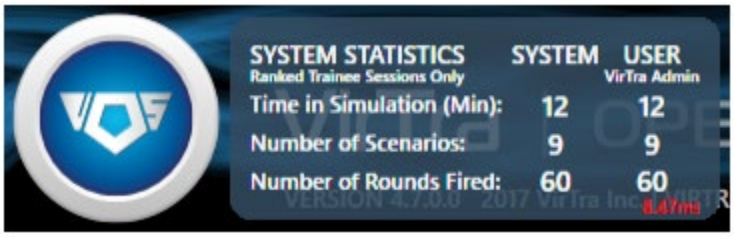
Trainee Carol Thompson is **ranked**, Trainee 5 is not.

When running a simulator, only sessions that have at least one trainee that is ranked are being stored in the database. Sessions with no ranked trainee are not stored, not counted and won't show up neither in the session count nor accumulated session time in the trainer or system statistics.

List of all available Statistics views provided in VOS

System Statistics

When opening the VOS main menu the system statistics show up next to the main VOS menu button.



The System Statistics show under **System**:

- The total time spent in the simulator of all ranked trainees
- The total number of scenarios run by all ranked trainees
- The total number of shots fired by all ranked trainees

The System Statistics show under **User**:

- The same values as under system but only for all sessions that were run while the current VOS user was logged in.

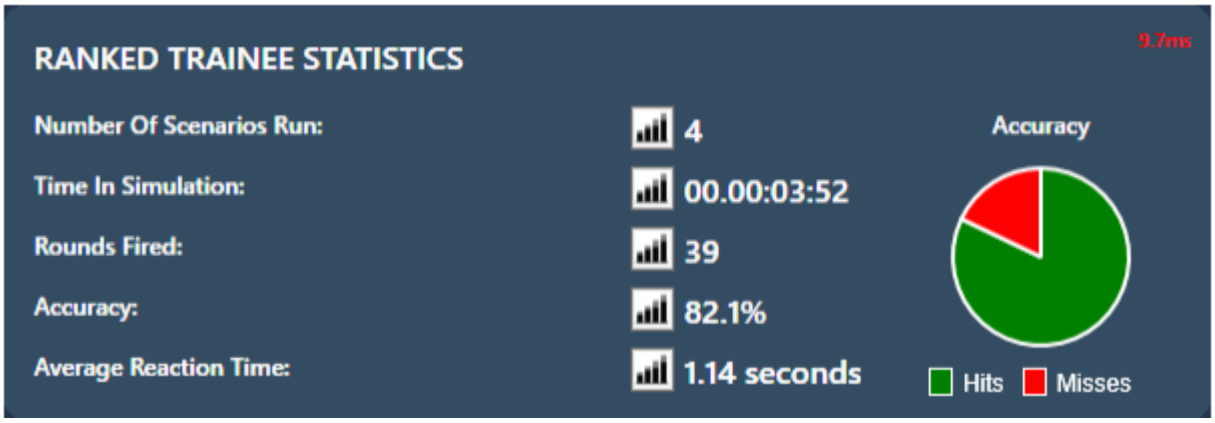
Trainee Statistics

The trainee statistics are available in the following views:

- On the **Administration Trainees** edit page
- When clicking the trainee image in the **Trainee Device Control**

The **Trainee Statistics** show:

- The total number of scenarios run by this trainee
- The total time spend in a simulation by this trainee
- The total number of rounds fired by this trainee
- The accuracy of this trainee as a ratio between hits and misses, score is not taken into account
- The average reaction time of this trainee, this is only tracked in specific scenarios



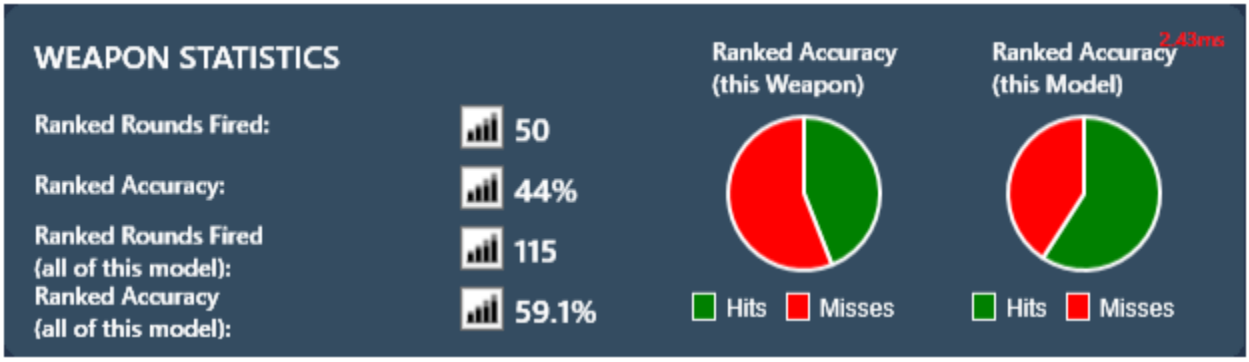
Weapon Statistics

The weapon statistics are available on the following views:

- On the **Administration Weapon** edit page
- When clicking the weapon image in the **Trainee Device Control**

The **Weapon Statistics** show:

- The total number of round fired by this weapon
- The accuracy as a ratio between hits and misses for this particular weapon
- The total number of rounds fired by all weapons with the same type and model as this weapon
- The accuracy as a ratio between hits and misses of all weapons with the same type and model as this weapon

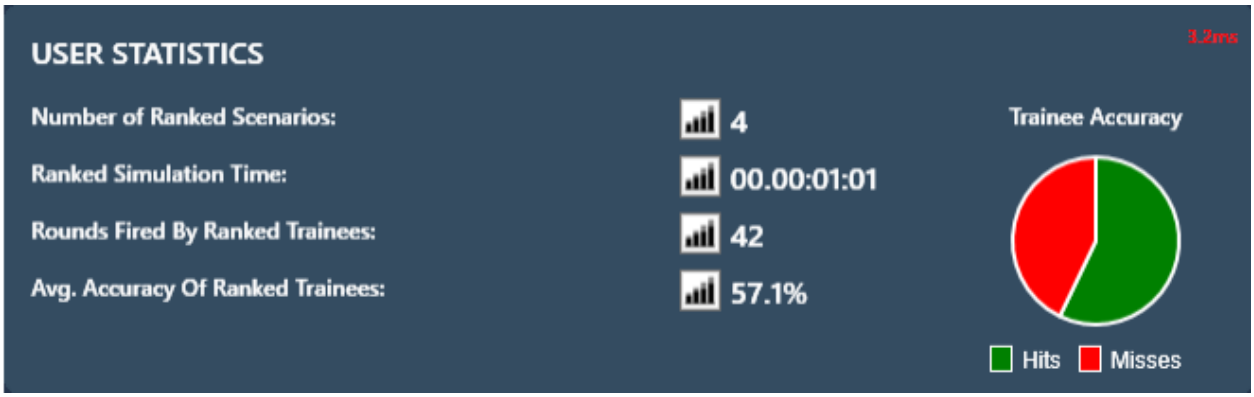


User Statistics

The user statistics are available on the **Administration Users** edit page

The **User Statistics** show:

- The number of sessions run while this user was logged in
- The accumulated simulation time of all ranked sessions while this user was logged in
- The number of rounds fired by ranked trainees while this user was logged in
- The average accuracy as a ratio between hits and misses of all ranked trainees while this user was logged in



Simulation Statistics

The simulation statistics are available under the **Simulation** main menu for all simulations listed

The **Simulation Statistics** show:

- The number of ranked sessions run in this simulation
- The total time spent by ranked trainees in this simulation
- The average accuracy as a ratio between hits and misses of all ranked trainees while in this scenario
- The number of ranked trainees who ran this scenario
- The total number of rounds fired by ranked trainees in this scenario
- The average number of rounds fired per session in this scenario

The Statistics Comparison Button

All statistics views expose a comparison button for each statistic value tracked:

Pressing this button will open a dialog box showing a comparison of all other Trainees, Weapons, Users or Simulation depending on the originating Statistics view:

Use the **Toggle Bar/Pie Chart** button to toggle between the different graph options.
Hit **Close** to close the dialog

2. Statistics Reporting Tool

Statistics Reporting Tool Access

The **Statistics Reporting Tool** can be accessed through the **VOS Administration** view:

Statistics Reporting Tool Overview

The Statistics Reporting Tool view is split into two areas.

- On the left are various controls to add data to the report
- On the right is a preview of the Statistics Report being created

Creating a Statistics Report

To add data to the report:

- Under **Select Data Type** select the type of data you want to present. The type selection will populate the **Data Query** and **Data Subset** lists accordingly.

The following data types are available:

- Instructor
- Simulation
- Trainee
- Weapon

Under **Select Data Query** select the desired data query. Queries are based on the individual statistics views as described on the General Statistics page.

Under **Select Data Subset** select the desired entries for the report. By default all entries are selected and will be considered for the report. If a selected items query result is 0 it will be omitted on the report.

Use the **Clear All** and **Select All** buttons to quickly toggle entry selection in the **Select Data Subset** list box.

Use the buttons to add the selected data type query to the report:

- **Add Bar Chart** adds a new bar chart to the report
- **Add Pie Chart** adds a new pie chart to the report
- **Add Table** adds a new table to the report

- **Merge To Last Entry** merges the selected type query data to the previously added bar chart, pie chart or table. This feature allows for direct comparison of different data types in the same graph.
- **Clear Page** clears the entire report page
- **Save Report** saves the report to an HTML file. The HTML file contains all the data required to recreate the report in an Internet browser

3. Overlay Layout Management Tool

The Overlay Layout system is responsible for placing information shared with the trainees on any of the available downrange simulation displays.

Such items are:

- Presentations
    - Any external materials and reports presented downrange to the trainee (see section V. F. Presentations)
- Heart Rate monitor displays
    - Heart rate data displayed to the trainee
- Mantis X displays
    - Mantis X result graphs displayed to the trainee
- Pro Timer widgets
    - Various Pro Timer result displays shared with the trainee

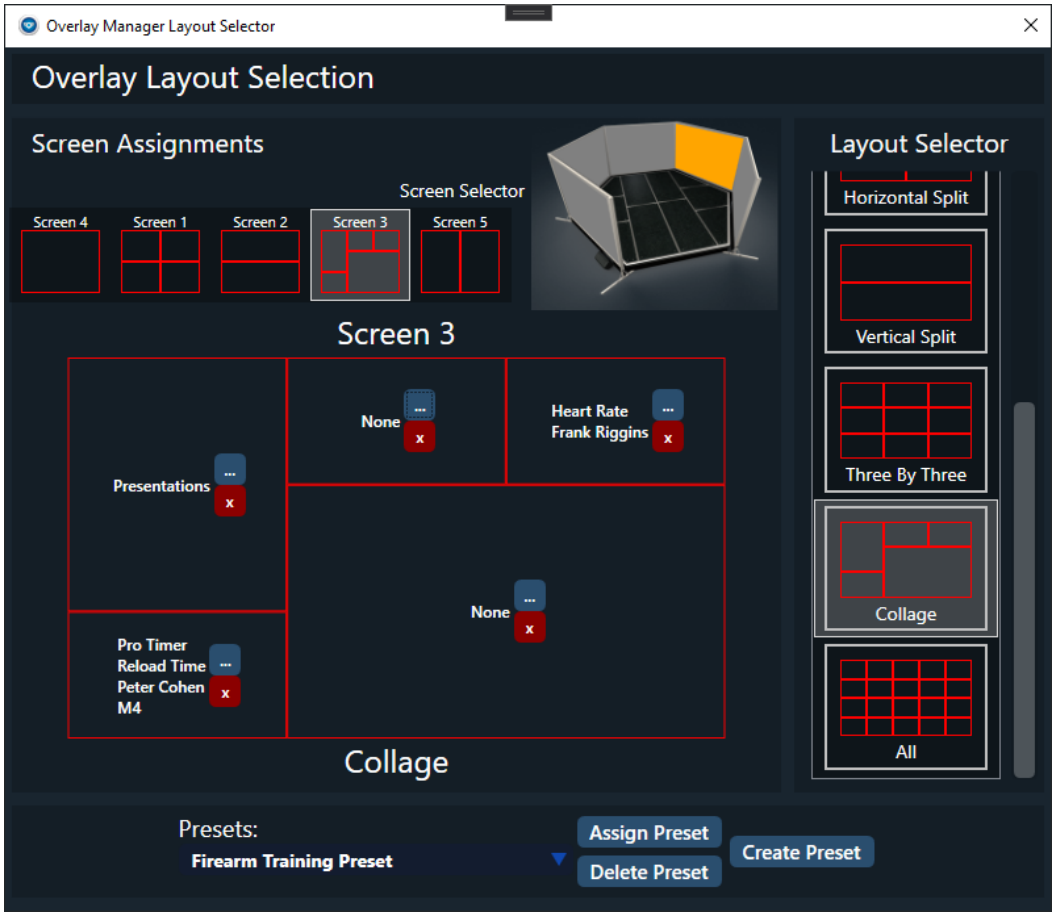
Using the **Overlay Layout Selection** dialog, the information can be organized in various arrangements and distributed between multiple downrange screens as desired.

VOS is installed with several predefined layouts. Custom layout can be defined using the **Overlay Layout Editor** described later in this section.

Overlay Layout Selection

Open the **Overlay Layout Selection** dialog using the **Overlay Layout Selection Toggle** button in the VOS main menu.

The Overlay Layout Selection dialog may remain open in order to adjust or modify the current layout at any time.



The **Overlay Layout Selection** dialog is used to assign layouts to specific screens and to assign content to layout cells specific to each screen. The red boxes indicate the grid layout and their content as it will be applied to the downrange screen.

Screen Selection

Either of the two **Screen Selector** controls on the top can be used to select a specific screen to modify the layout for. The **Screen Selector** control on the left shows the layout type assigned to each screen, the **Screen Selector** control on the right shows the simulator screen setup.

Layout Selection

The **Layout Selector** on the right side lists all available layout templates. More layouts can be created using the **Overlay Layout Editor** (see below).

The template used for the currently selected screen is highlighted in the **Layout Selector**. Clicking on another layout in the **Layout Selector** replaces the current layout of the currently selected screen with the new selection.

Notes:

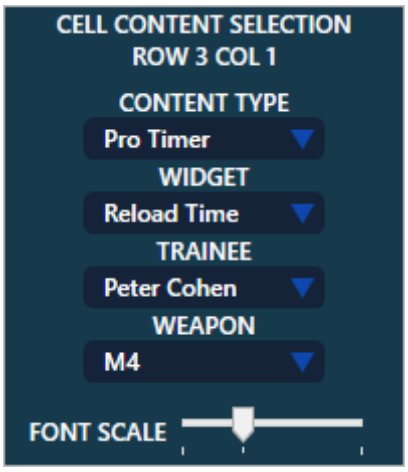
- Changing the layout will clear out all already assigned layout cell assignments.
- Any layout and cell assignment will be applied immediately to the downrange screens.

Cell Selection

The large layout view in the center is used to assign the cell content for the layout of the selected screen.

Each layout cell contains two buttons used to specify the content of the particular cell when viewed downrange.

- **…** – The blue button opens a popup window with selection options depending on the content type.
    - Content Types:
        - **None**: No data will be displayed in the cell.
        - **Presentations**: Presentation Manager content for the particular screen will be displayed in the cell.
        - **Heart Rate**: Heart rate data of the selected trainee will be displayed in the cell.
        - **Mantis X**: The Mantis X results graph for the selected trainee will be displayed in the cell.
        - **Pro Timer**: A Pro Timer widget for selected trainee(s) and selected weapon(s) will be displayed in the cell.
- **x** – The red button clears the content selection for the cell.
    - This is the same as selecting content type None.

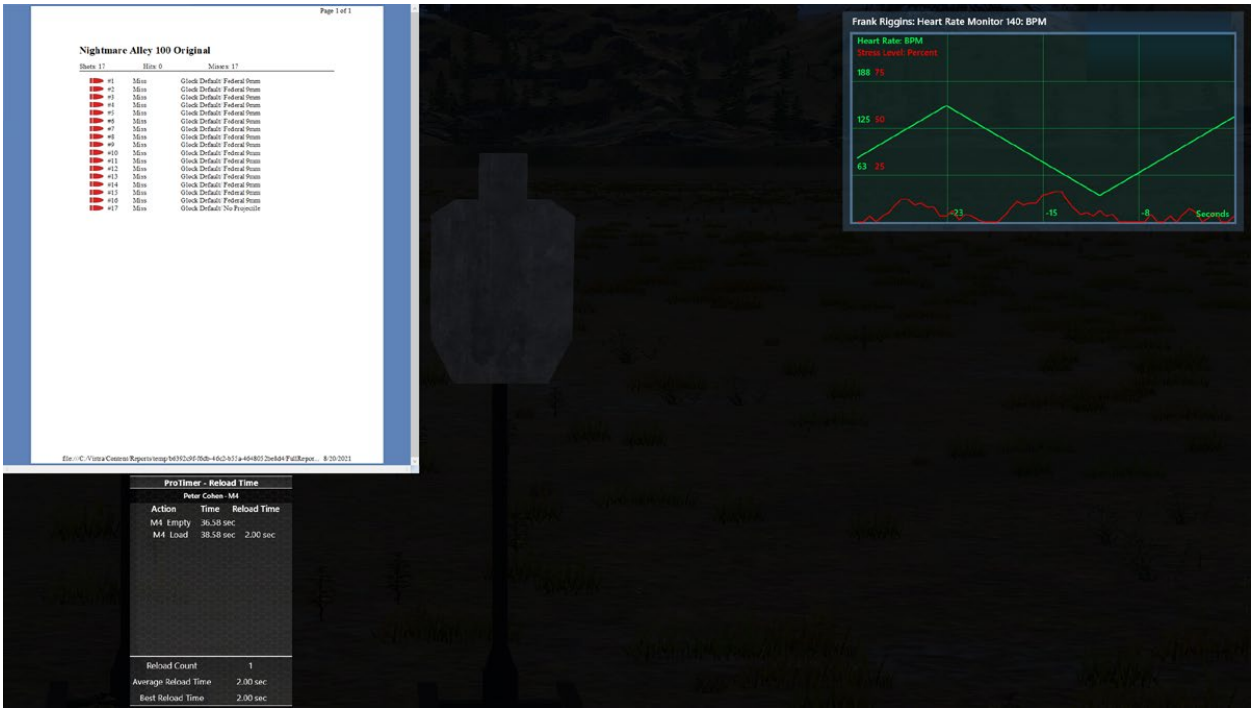


Cell Selection Popup

Depending on the selected content type, the following additional options become available in the popup:

- **WIDGET**: Pro Timer specific widget type (for more information see section V. A. Pro Timer)
- **TRAINEE**: Trainee selection based on the current trainee set (available for Heart Rate, Mantis X and Pro Timer)
- **WEAPON**: Weapon selection based on selected trainee (available for Pro Timer only)
- **FONT SCALE**: Font scale slider to improve readability (for Heart Rate monitor and Pro Timer)

The selection shown in the **Overlay Layout Selection** dialog above would show downrange as in the following screenshot:



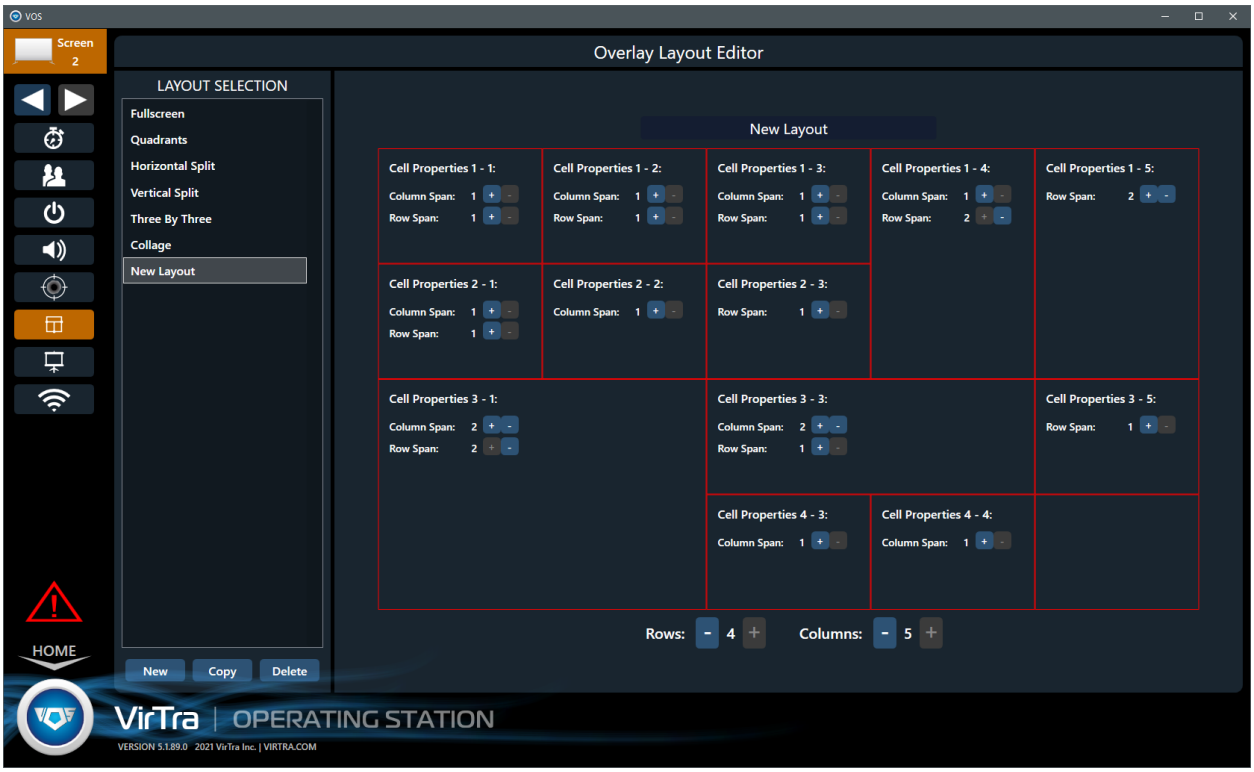
Layout Presets

The bottom of the **Overlay Layout Selection** dialog exposes the option to store layout presets spanning all screens.

- **Create Preset** - Use this button to save the current layout of all screens including all cell content assignments to a new preset. Once saved, the new preset name will be added to the preset combo box on the left.
- **Assign Preset** – Select a preset from the preset combo box and click this button to assign the selected preset. This will replace all screen layout and cell assignments with those from the preset.
- **Delete Preset** - Select a preset from the preset combo box and click this button to delete the selected preset from the preset library.

Overlay Layout Editor

To create additional overlay layouts open the **Overlay Layout Editor** in VOS under **Administration**



The **Overlay Layout Editor** exposes the following features to allow for creating complex layouts required to address specific user needs:

Left Side (selection)

- **LAYOUT SELECTION**: Click on the layouts listed to assign it to the editor area on the right.
- **NEW** button: Creates a new layout that is added to the layout list.
- **COPY** button: Copies the currently selected layout to be used as a template for a new layout.
- **DELETE** button: Deletes the currently selected layout permanently.

Right Side (editor)

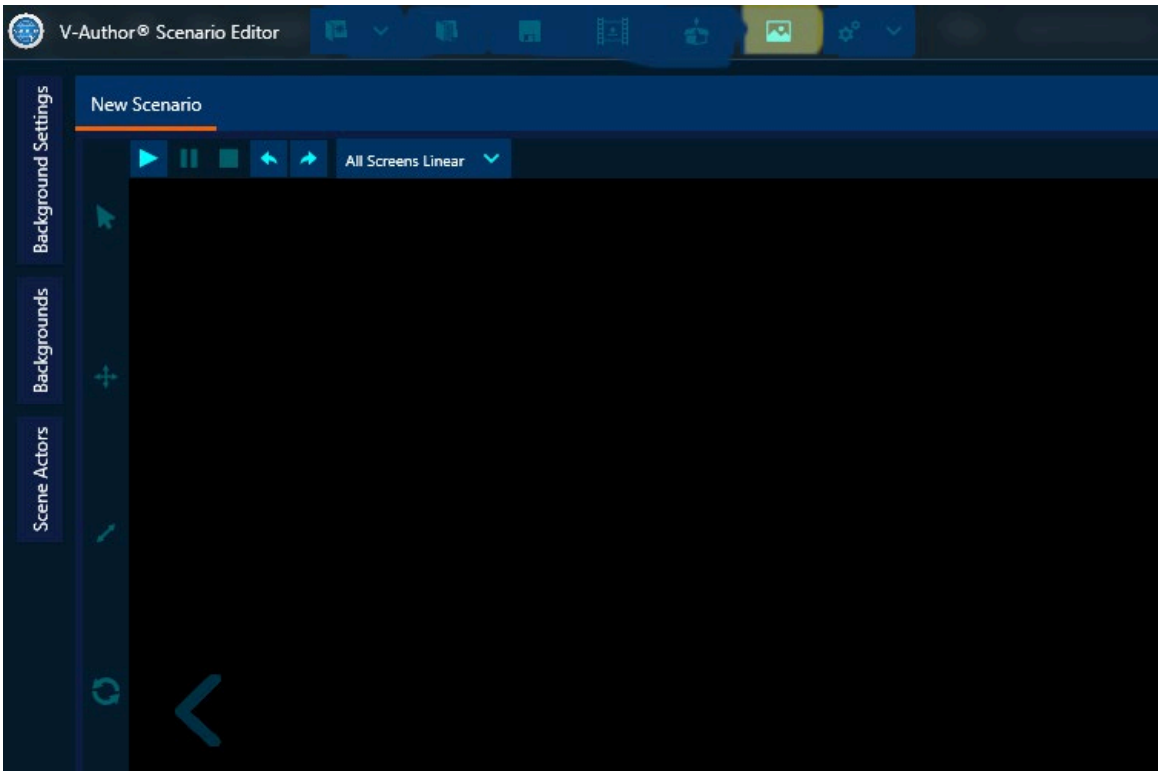
- Title area: Click on the title area to edit the name of the selected layout.
- Layout controls:
    - ROWS buttons: Use the + and – buttons to increase or decrease the number of rows in the layout. The maximum number of rows supported is 4.
    - COLUMNS buttons: Use the + and – buttons to increase or decrease the number of columns in the layout. The maximum number of columns supported is 5.
- Cell controls:
  Each cell contains controls to modify the shape and size of individual cells in the layout.
    - COLUMN SPAN buttons:
      Use the + button to increase the width of a cell by merging it with the next cell to its right.
      Use the – button to decrease the width of a cell by splitting it horizontally.
    - ROW SPAN buttons:
      Use the + button to increase the height of a cell by merging it with the cell below.
      Use the – button to decrease the height of a cell by splitting it vertically.

All changes are automatically saved and reflected immediately in the **Overlay Manager Layout Selection** dialog if it is open. They can then be assigned immediately to the desired screen.

4. Pano Tool

Purpose of the Pano Edit Tool: This tool allows the user to create edit backgrounds to use in scenarios. With this tool the user can set the depth of the background, create layers that have material settings, and set the layer depths.

To start up the Pano Edit Tool press this highlighted button in the V-Author Editor.

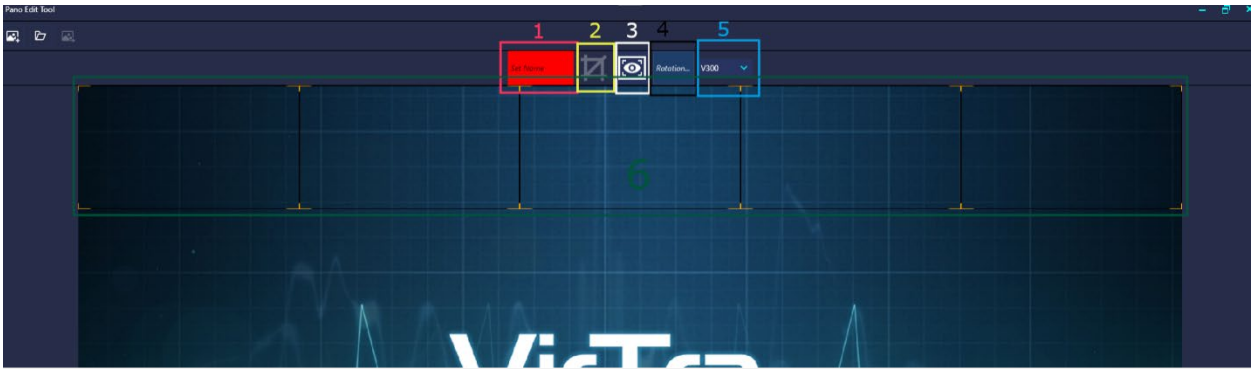


When starting up the Pano Edit Tool the user is met with this screen. The following buttons are in the top left of the screen.

1. New Background: When choosing new a image for your new background you'll be met with this screen. You're limited to choosing the following file types: bmp, jpg, jpeg, png.
2. Load a Previous Background: When choosing to load a previous background you need to navigate to where the backgrounds are saved. Usually this is C:\VIRTRA\CONTENT\VSA\BackgroundLibrary\. From here you will need to find a .pano file in the folder you're looking for. These files might not exist for older backgrounds and those can't be edited.

3. Export Pano: This button will be grayed out until you crop your background. This is how you save your background. Be sure to save often.

Background Cropping View

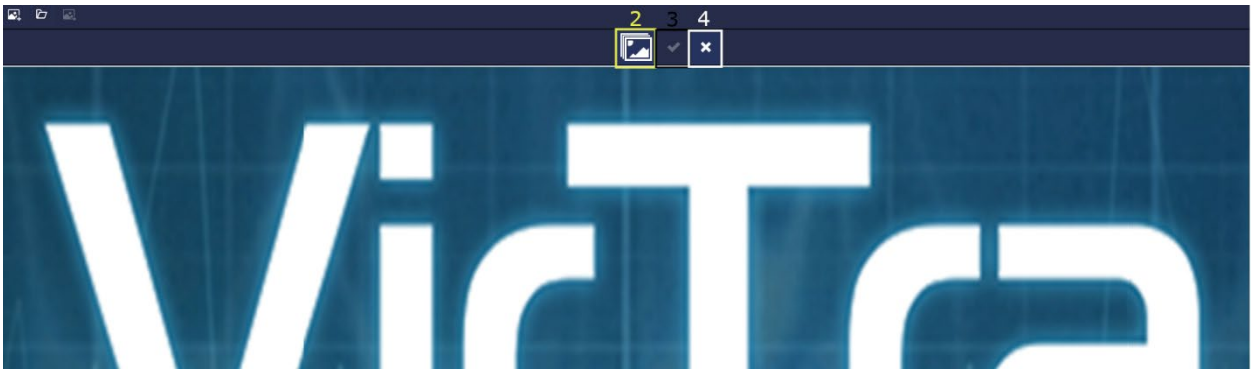


1. Name Box: This appears in red and needs to be set to crop the image.
2. Crop Background: This button crops the image and sends you to the layer edit view.
3. Preview Crop: This button shows you what your background looks like before committing to the crop. This can be entered before setting a name. More on the Crop Preview View later on.
4. Rotation Box: Only accepts numbers and will rotate the image
5. System background Type: This will let you set the type of crop for the target system. Your choices are for V-100, V-300, and the Multi V-100. V-300 is the same dimension used for the V-180.
6. Image view: This shows you the image and the rectangle(s) used to place the crop. You can scale them from the corners and move them up, down, left and right. Whatever is inside the rectangles will end up being in the background. Whenever selecting a new target system, the rectangles are reset to their original scale and position.

Cropped Background Preview

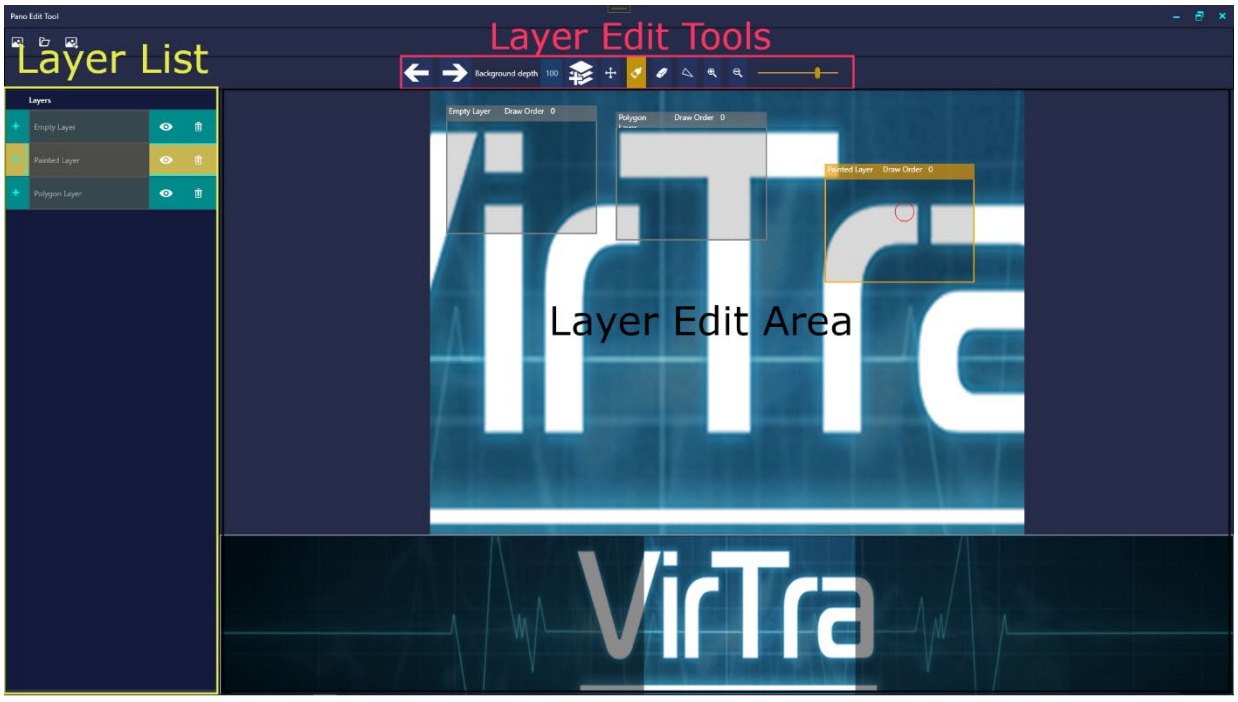
1. Left and Right Arrow Buttons: These change the current screen you're looking and will loop around.
2. Change Pano Preview View: This button will change between the Individual Screen View and Full Pano View

a. Individual Screen View: This will show each screen one at a time and then change screens via the left and right arrow buttons.
b. Full Pano View: You'll be able to see the full background in one image and pan left and right using the arrow keys or dragging the mouse left and right while holding left click.



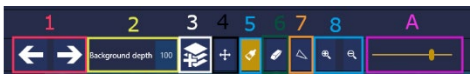
3. Check Mark Button: This will confirm that this I the background(s) you want and will move to the layer edit screen. If its grayed out you will need to go back to the Cropping View and enter a name.
4. X Button: This exits the preview view and goes back to the cropping view.

Layer Edit View



The Layer Edit View is where the majority of your work will be done and broken into 3 different pieces. The Layer Edit Tools, the Layer List, and the Layer Edit Area.

Layer Edit Tools



1. Left and Right Arrow Buttons: These arrow buttons allow you to move between screens
2. Background Depth: This sets the depth for the entire background. The default and for most backgrounds are 100 meters.
3. New Layer Button: Click this button to add a new layer. You'll see a new row in the layers list and a new window pop up on the background.
4. Transform Layer Button: This is used to move and resize the layers.
5. Paint Brush Button: This activates the brush mode and allows you to paint in the layer.
    a. Pain Brush Size Slider: When you select the brush tool this will appear in the right most tool section. You can move the slider to the right to increase the size of the brush or to the left to decrease the size. This is an entirely different slider than the on the eraser uses so the brush sizes will be separate.
6. Eraser Button: Very similar but the complete opposite of the brush tool this will erase any markings done in the layer either from the brush or the polygon tool.
    a. Eraser Size Slider: When you select the eraser tool this will appear in the right most tool section. You can move the slider to the right to increase the size of the eraser or to the left to decrease the size. This is an entirely different slider than the on the paint brush uses so the brush sizes will be separate.
7. Context Menu: You can right click almost anywhere in the layer window and then select any of the tools this way as well. The exception to this is if the polygon tool is activated. There will be more on this later.
8. Polygon Tool: When activating the polygon tool, you'll be met with four squares connected by a perforated line. You can move these points, add points, and delete points. You'll want to arrange these points in a way to make a shape then you'll need to click the fill button to fill in the polygon.
    a. Fill Button: When activating the polygon tool, you'll notice in the right-hand side of the tools there is a button that says fill. You can also right click in the polygon to open the context menu and select fill.
    b. Add Points: You can add points in 2 ways. You can either double click inside the polygon and it will add a point based off what the closest line is. You can also right click to open the context menu and select add point.
    c. Delete Points: To delete a point you'll need to hover over a point and then right click to open up the context and select delete point.
    d. Context Menu: As mention before you can open up the context menu on the polygon or above a point to access different options including, adding a point, fill the polygon or a delete point. If you are not over a point and select delete point it does nothing.
    e. Move single point: You can hover over a point then click and hold the left mouse button move the point around.
    f. Move entire polygon: Similar to moving a point you can move the entire polygon you've shaped if you want. Hover over the center then click and hold the left mouse button move the polygon around.
9. Zoom in and Zoom Out buttons: Very simply zooms in and out.
    a. An alternate way to using the buttons is to hold either left or right ctrl keys on the keyboard and then scroll up on the mouse wheel to zoom in or scroll down to zoom out.

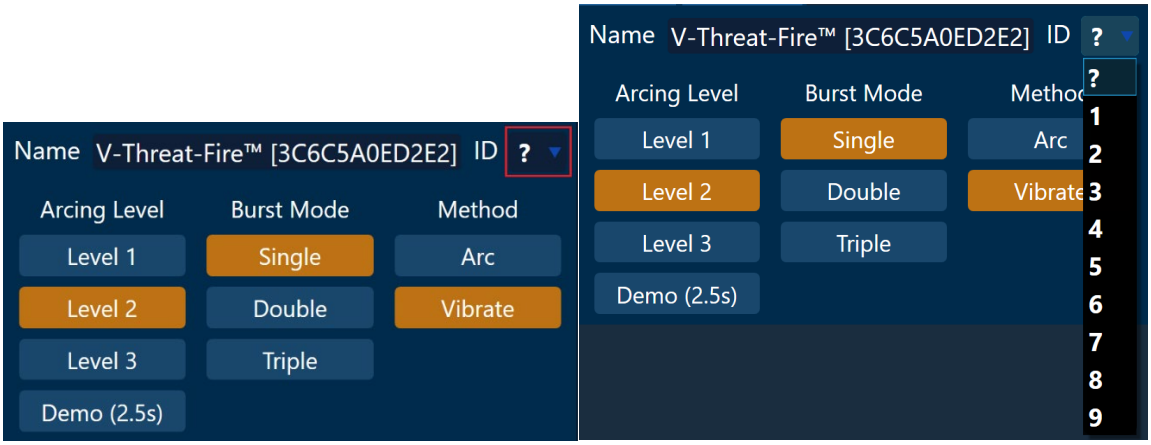
Layer List: The layer list shows all the layers on the current background. From here you can select layers, hide them, delete them, change the name, change layer distance, and the layer draw order.

5. V-Threat-Fire New UI

Identifier

In the V-Threat-Fire settings, there is now an identifier which allows you to set the number shown on the device in VOS.

1. Click on the drop-down in the top right of the menu and choose the identifier that matches your device.



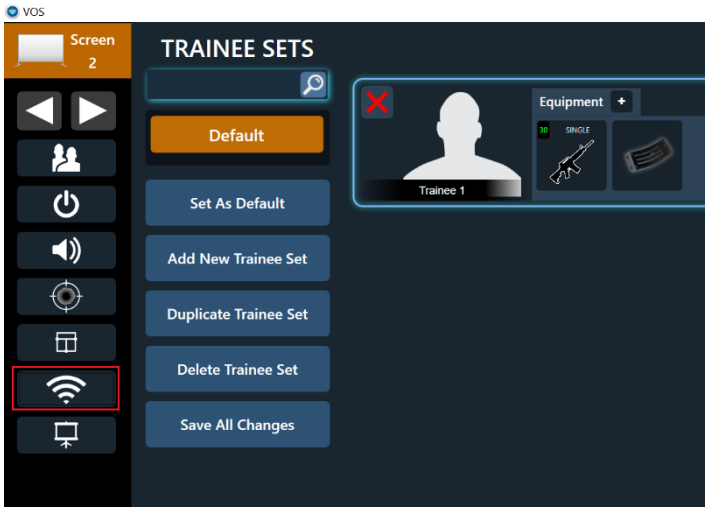
2. Once set, the device icon will update with the new ID.

Flyout Menu

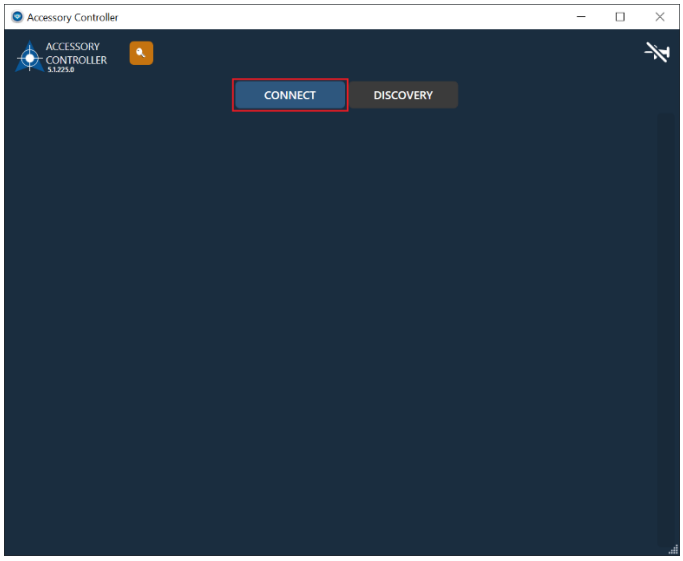
In the trainee set flyout menu, the icons have been updated to show the device instead of the lightning bolt as devices may be in vibrate mode.

6. Accessory Controller BLE Discovery

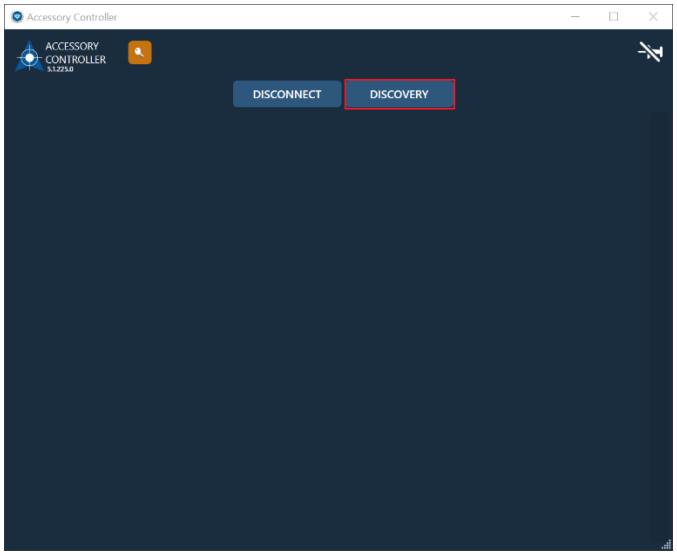
1. Open Accessory Controller



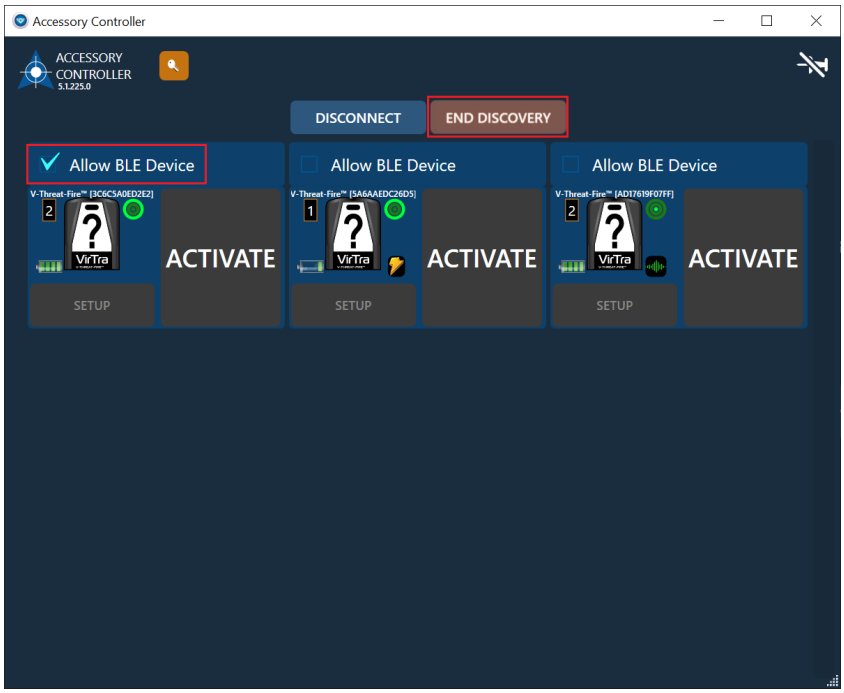
2. Click Connect



3. Click Discovery



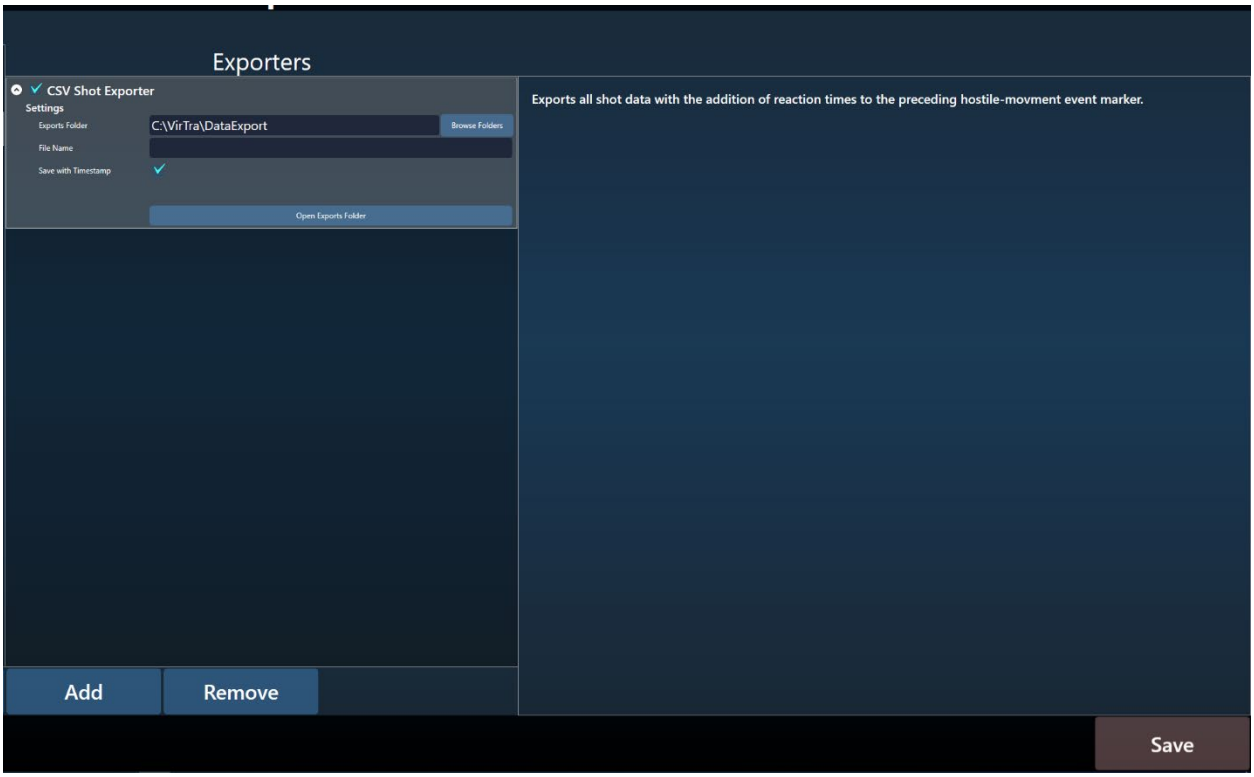
4. Check the “Allow BLE Device” checkbox on the devices you want on your system and then click End Discovery.



7. CSV Shot Exporter

The CSV Shot Exporter will export all shots and all data columns in the CSV format (comma separated value). It will also include a column which calculates the reaction time from the

previous Hostile Movement event marker. If there was no Hostile Movement event marker this column will contain no data.

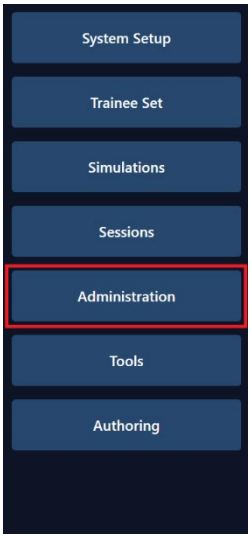


8. Data Export Overview:

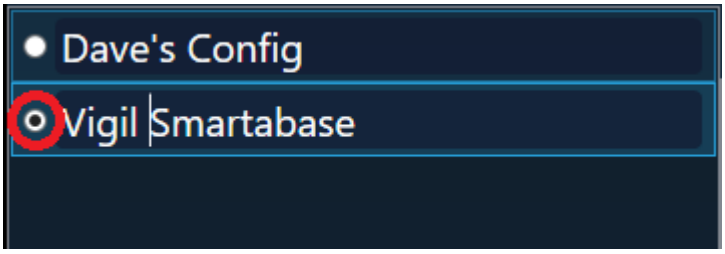
The Data Export Module provides functionality for exporting data from a session to a local machine or external source. Currently we support exporting data to a Smartabase database engine.

Getting Started:

First, you will need to set up a configuration in the Data Export administration page. This can be located by clicking VOS Home -> Administration -> Data Export

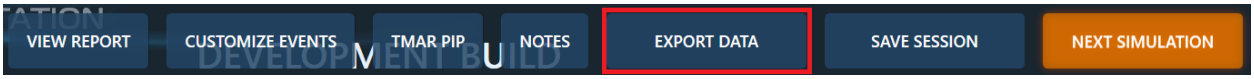


In order to export with a configuration, check the radio button located near the configuration name. This will mark the given configuration as the Active Configuration for use when exporting.



Exporting Data:

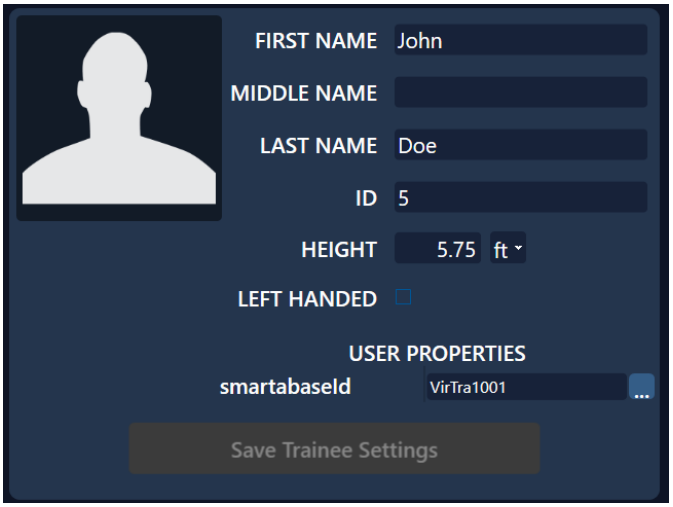
Exporting data happens on the Debrief screen of a session. This Debrief can be a scenario that was recently run, or a session that has been loaded from a previously saved scenario. Clicking Export Data will run the export based on the settings in the currently Active Configuration.



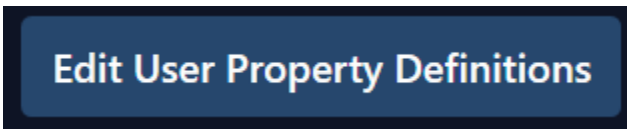
After clicking Export Data, a dialog will appear with information about the export either confirming success or explaining what errors were encountered.

Smartabase Athlete / VirTra Trainee Link:

You will need to add a custom User Property to the Trainees in VOS in order to link them to their Athlete Profile in Smartabase. Select a Trainee from the Trainee Editor and add or edit the smartabaseId User Property so it looks like the example. The User Property must be named "smartabaseId" (no quotes) and the value provided will be the Username of the matching Athlete Profile in Smartabase.



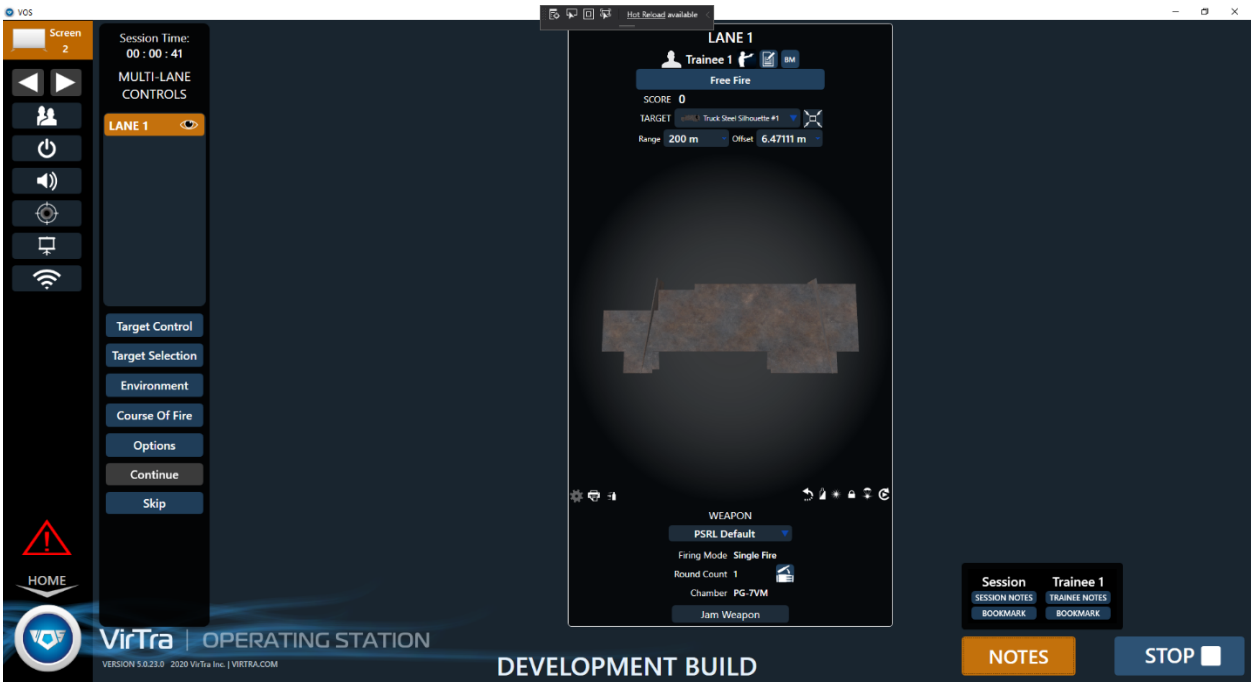
If the "smartabaseId" property is missing, you can add the custom User Property by clicking the Edit User Property Definitions button.



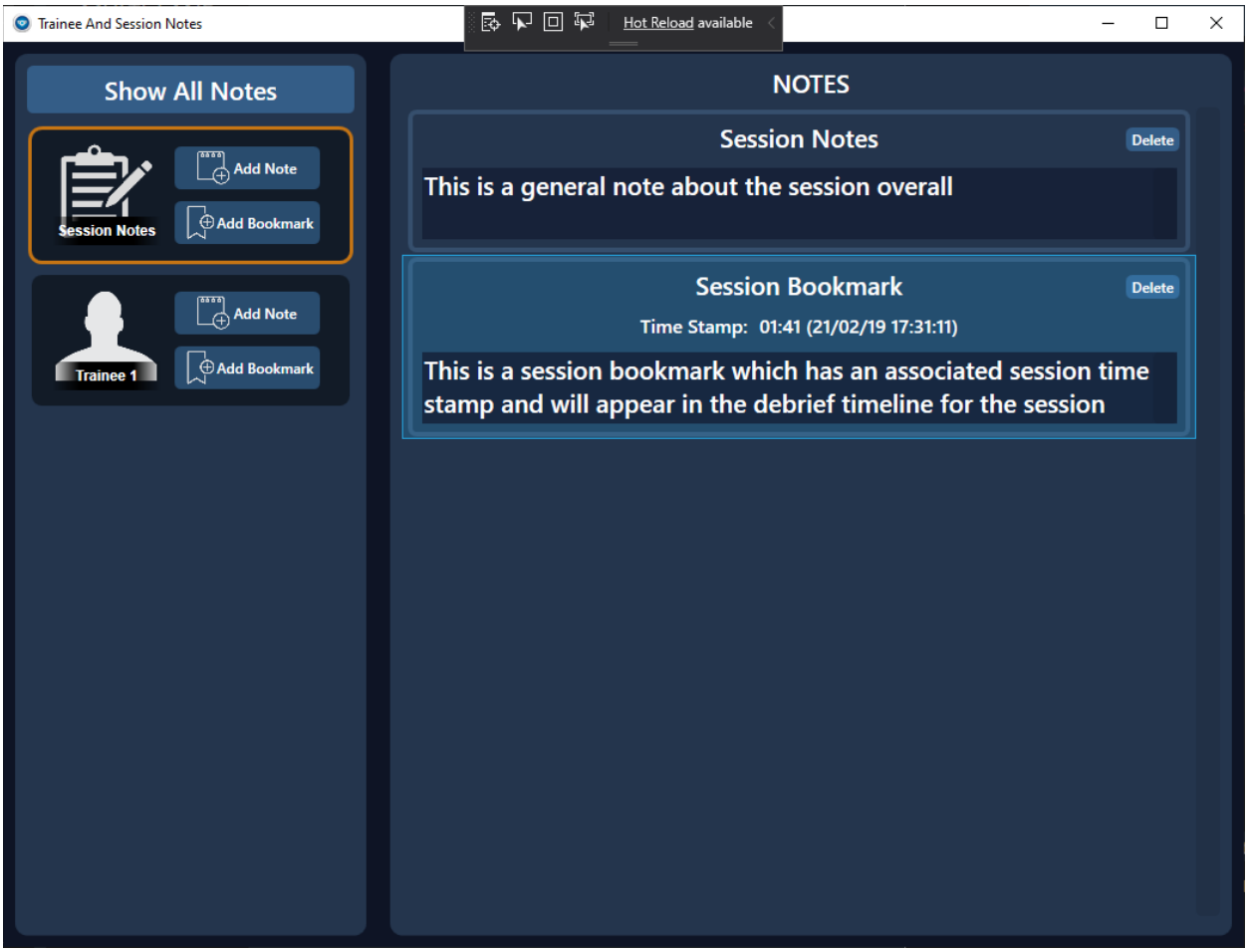
Click new and setup the property like this:

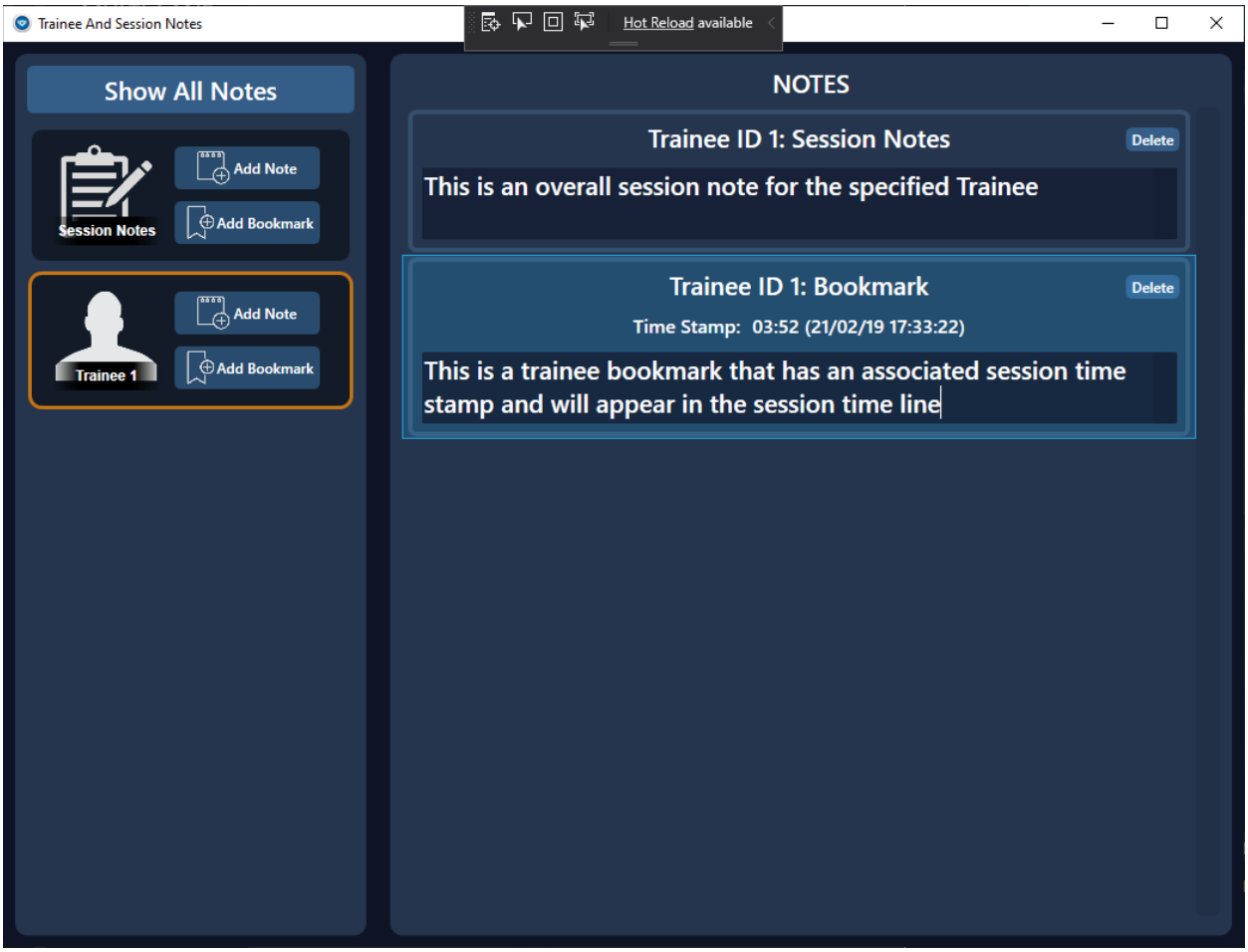
9. Session / Trainee Notes and Bookmarking

The VOS simulator control and debrief views now have a button to bring up and add or edit session and trainee notes and bookmarks. A note is defined as overall notes about the session or trainee not necessarily at a specific point in time during the session. Bookmarks are notes that are tied to a specific point in the session timeline and will appear on the debrief timeline. The notes button in the run view allows the operator to add or edit new notes or bookmarks as shown here:



Clicking on the notes or bookmarks button will bring up the Trainee Notes window which can be left up if desired to continue editing / adding new notes and bookmarks.


Trainee And Session Notes
Hot Reload available
Show All Notes
Session Notes
Add Note
Add Bookmark
Trainee 1
Add Note
Add Bookmark
NOTES
Session Notes
Delete
This is a general note about the session overall
Session Bookmark
Delete
Time Stamp: 01:41 (21/02/19 17:31:11)
This is a session bookmark which has an associated session time stamp and will appear in the debrief timeline for the session

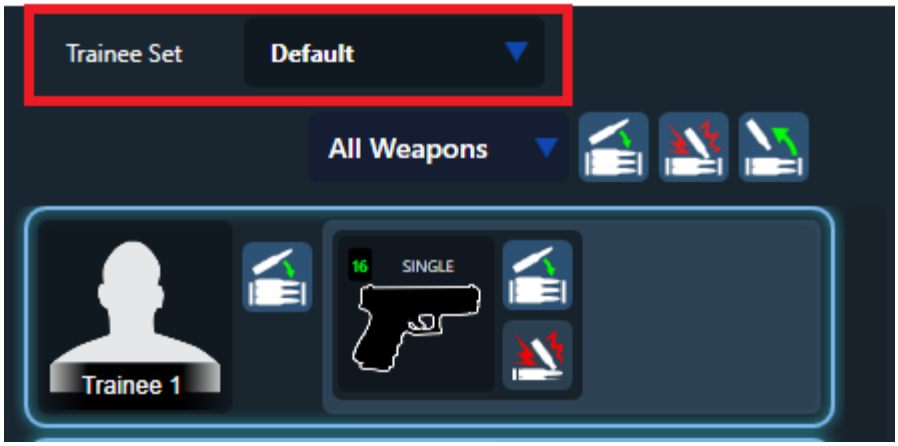


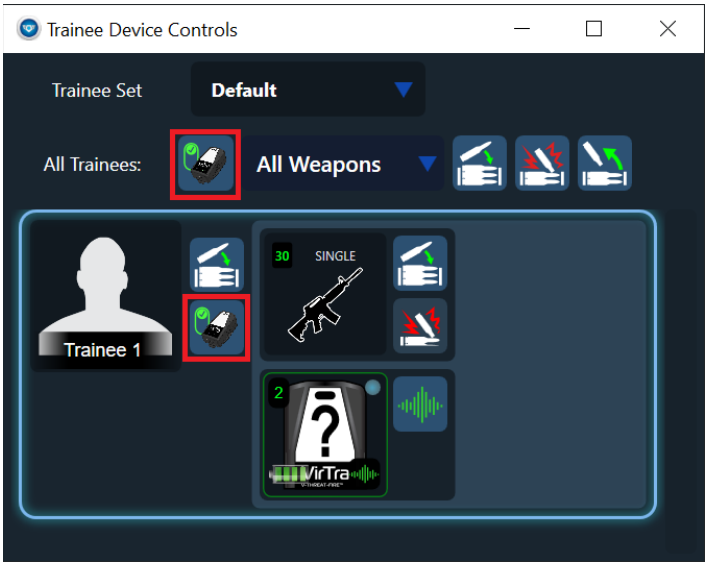
The Notes button is also available in debrief where notes / bookmarks can continue to be added / edited. Bookmarks will appear on the debrief timeline as shown below.

10. Trainee Set Flyout and Device Controls

The Trainee Device Controls allows the trainer to quickly change the selected Trainee Set. You can only change the current Trainee Set while not running a simulation. In order to change the Trainee Set from the Trainee Device Controls:

1. Open the Trainee Device Controls using  button on the left side in VOS.
2. Then pick the desired Trainee Set from the dropdown at the top of the Trainee Device Controls menu:





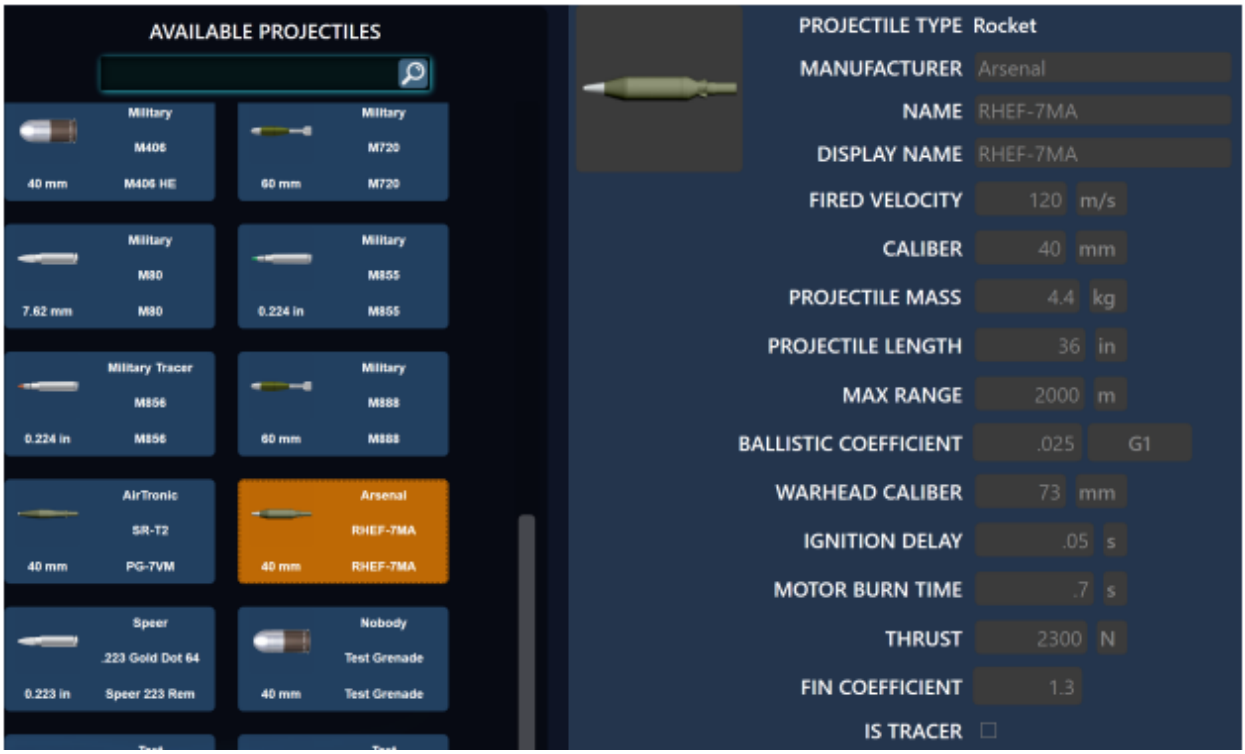
11. VirTra RPG Operation

VirTra RPG capabilities were initially developed to train the AirTronic scope calibrated for the PG-7VM rocket. The default RPG weapon is based on the AirTronic PSRL as shown following:

Note default Laser ID is 3 so this weapon would need to be duplicated for weapons that fire other laser IDs. Also note the specific zero projectile SR-T2 which is the AirTronic PG-7VM rocket model. This is set because the AirTronic scope is specifically calibrated for this rocket.

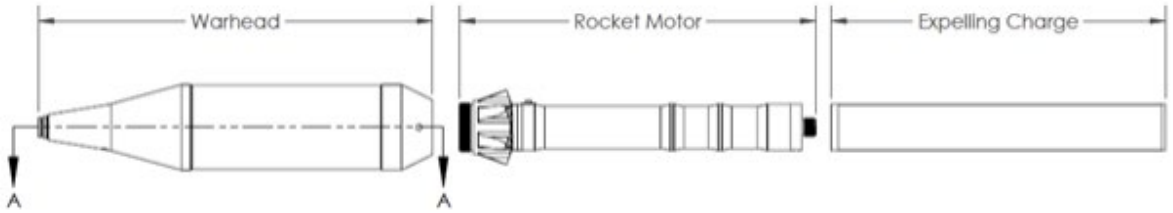
Rocket projectiles can now be defined with new parameters.

The default rockets are shown following:



New rocket parameters are:

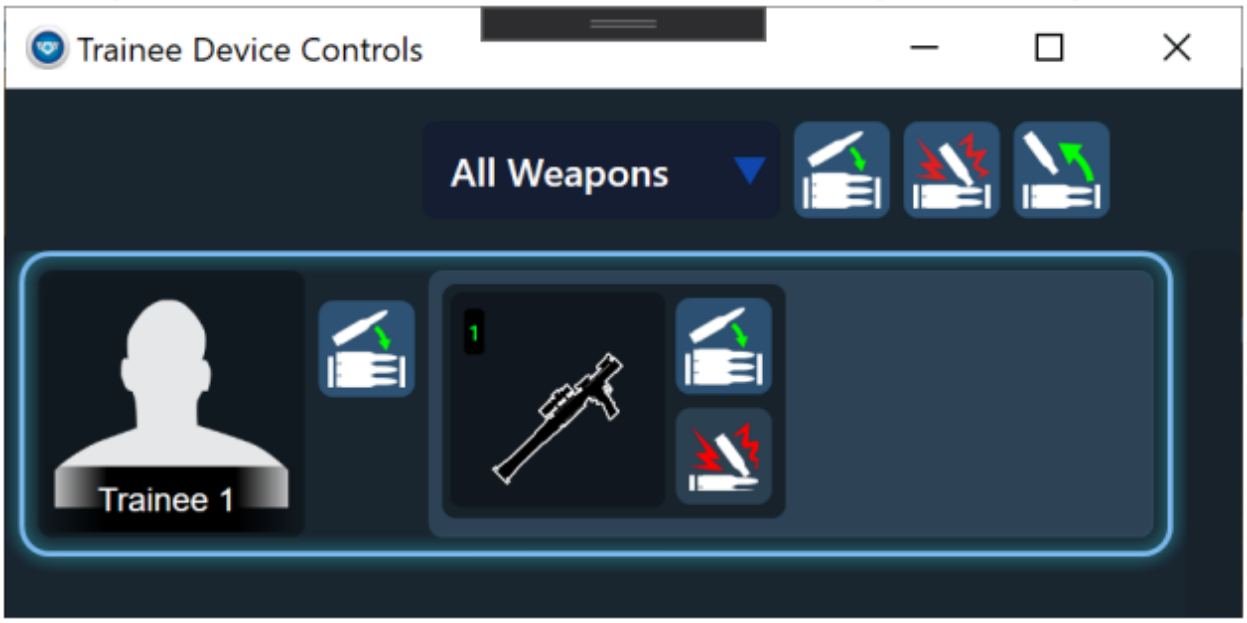
- **Warhead Caliber:** The normal projectile caliber is the caliber of the motor insert that matches the barrel diameter of the rocket launcher. Warhead caliber is the diameter of the warhead itself which will generally be larger.

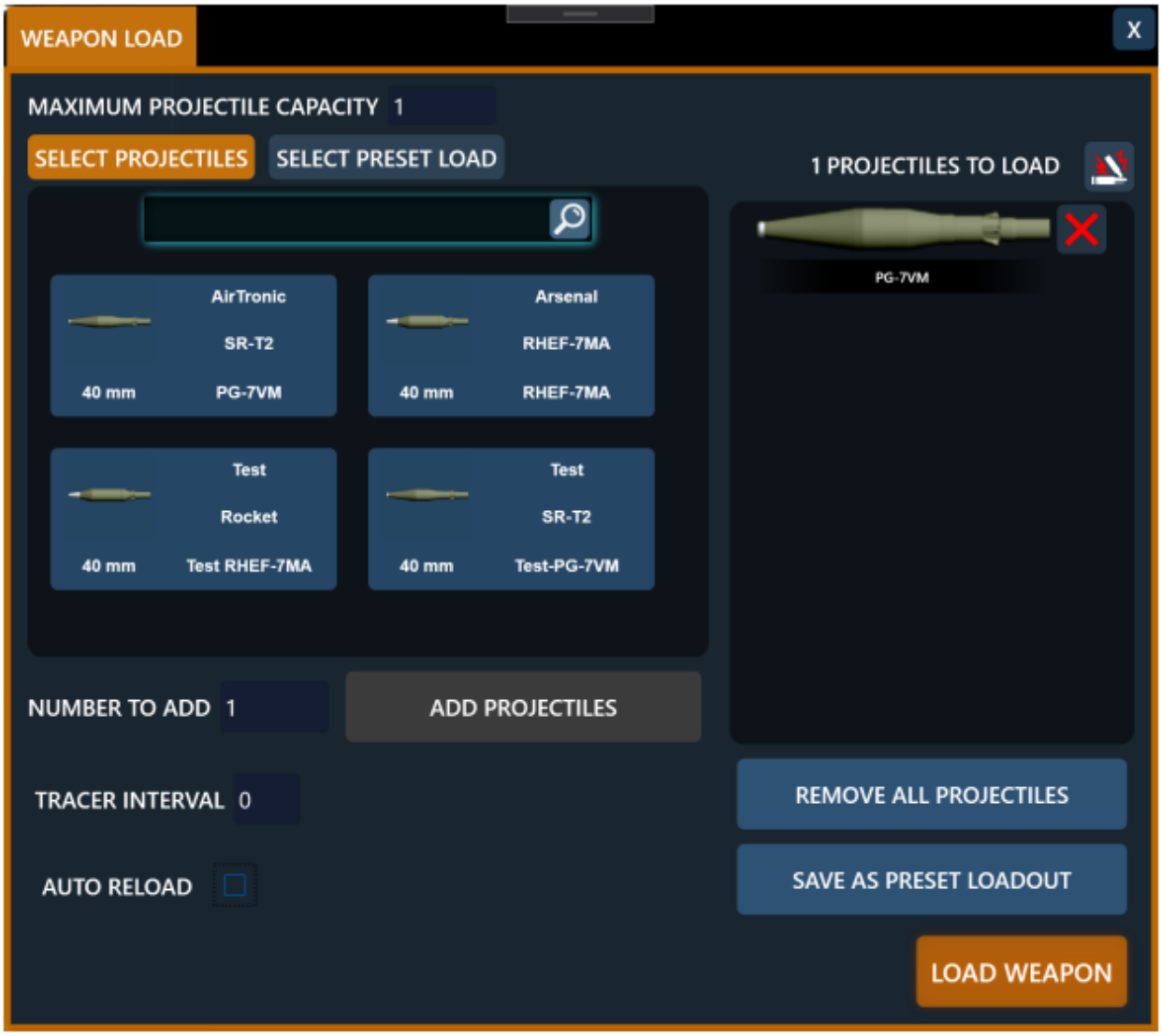


- **Ignition Delay**: The rocket motor starts after this amount of time has passed from initial launch.
- **Motor Burn Time**: Once the rocket motor starts, it will burn and generate thrust for this amount of time. Thrust: The force generated by the rocket motor while it is active
- **Fin Coefficient**: Rockets have a counter-intuitive behavior when firing into a cross wind. The rocket fins cause the orientation of the rocket to weather vane during flight pointing the rocket into the cross wind. When the rocket fires in this orientation there is a thrust component that pushes the rocket into the cross wind so the rocket flies into rather than with the wind while the motor is burning. The wind model for rockets uses this fin coefficient to scale that effect. The higher the fin coefficient, the more the rocket is oriented into a cross wind. If this parameter is set to 0, the rocket will not weather vane at all and only normal bullet style wind drift will apply.

System Setup for RPG Training

Equip trainee with the rocket launcher they will be training with:

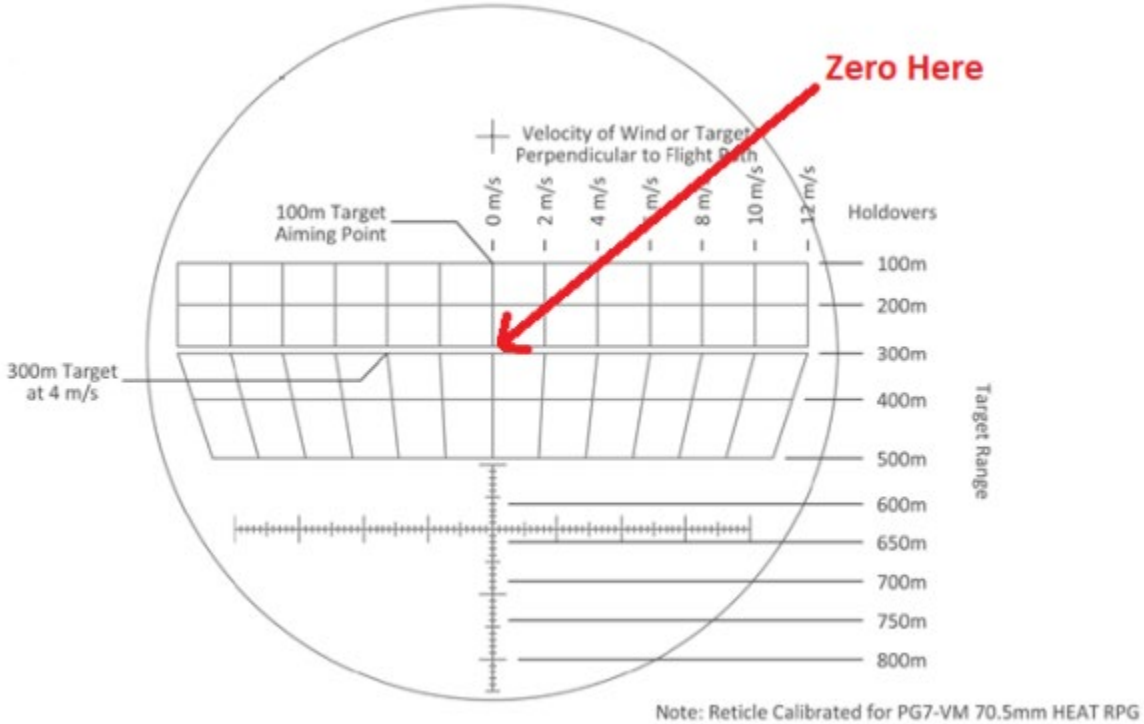




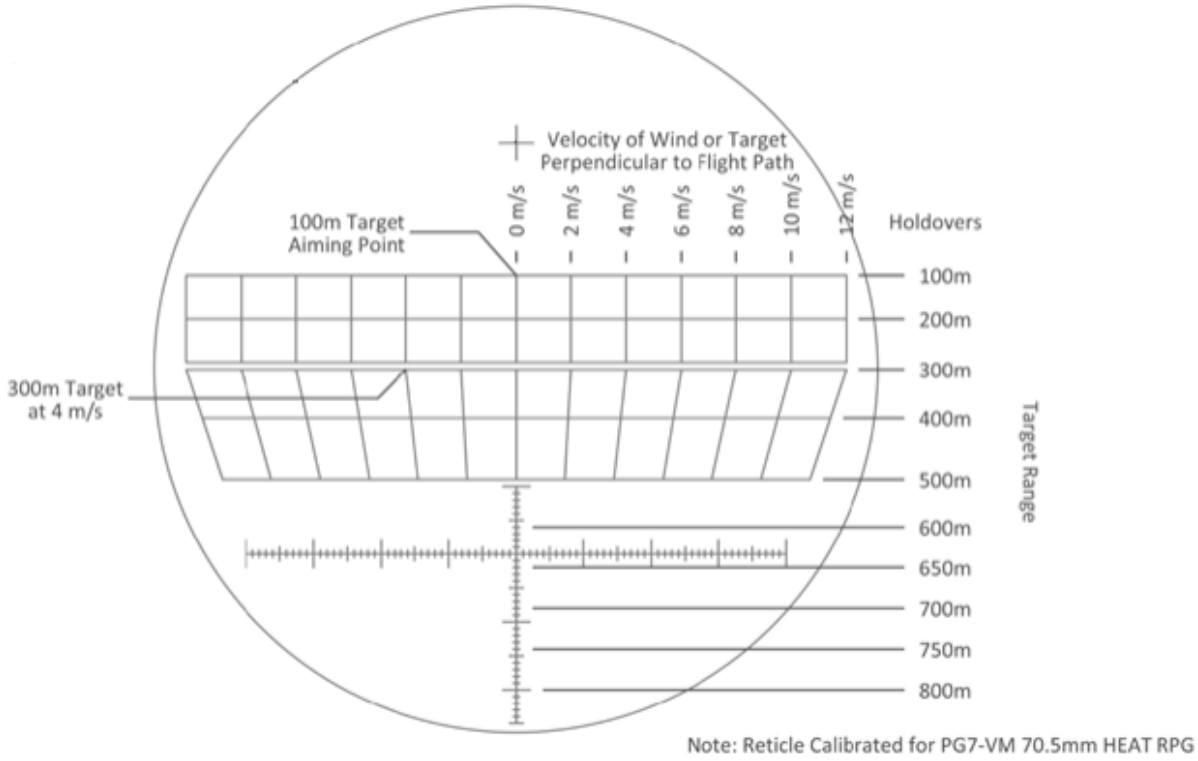
Currently only Marksmanship supports RPG. Firing line needs to be sufficiently distant to allow clear visuals through the AirTronic powered scope. Development was done with an 8m firing line on a 14ft screen with 4K projection. The flight characteristics modelled for the rockets is based on an environment at sea level at 60 F with 0% humidity. Recommended test range is Sonoran 2000m range. Operator will need to go into advanced environmental settings to set the temperature, altitude and humidity appropriately for test flight against scope calibrations. Also recommend using steel truck torso as targets to see rocket impacts, rockets will fly right through paper / cardboard targets.

RPG Zeroing

Like any weapon the RPG will need to be zeroed to the user. The PSRL launcher is configured with a 300m zero for the PG-7VM rocket. So the zeroing needs to be done using the 300m line in the AirTronic scope.



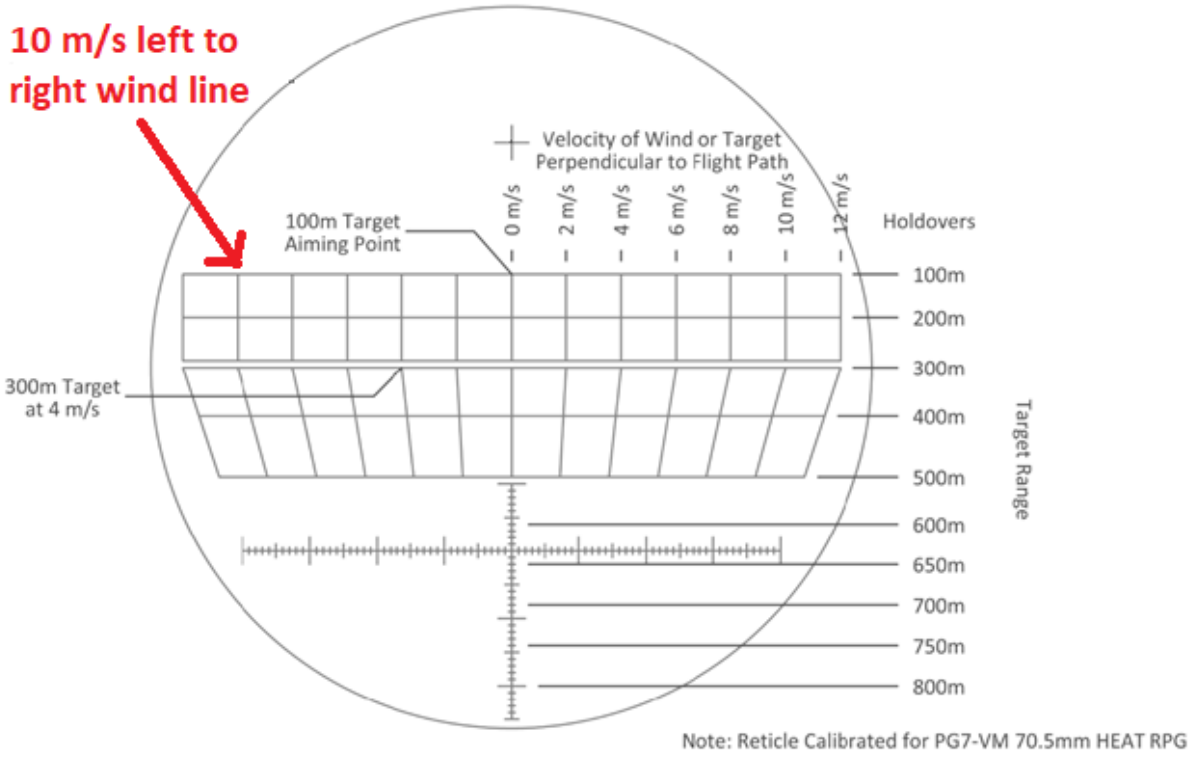
Once the zeroing process is complete, shooter should be able to put targets at a given range on the corresponding scope line (assuming SR-T2 PG-7VM rocket is used under the correct environmental conditions) and hit the target. Range lines are as follows:



NOTE: These range lines are specifically for the PG-7VM rocket under environmental conditions of 60 F sea level with 0% humidity. Other rockets and/or alternate environmental conditions will not match these scope marks.

Testing Windage

The AirTronic scope includes windage markers which the system can exercise. VirTra is able to model windage accurately out to about 400m, beyond this simulated windage starts to drift from scope marks. The scope line that should be used for a 10m/s left to right wind would be as follows:



Note this is a meter/second wind speed not mph. So to test on the system the operator will need to go into advanced environmental settings to set the 10m/s wind speed. The basic wind settings use mph. To hit a target within 400m under these conditions it should be placed vertically on its corresponding range line and horizontally at the 10m/s wind line.

12. Marksmanship Authoring & Target Import

Introduction

The purpose of this manual is to outline and explain the processes involved with authoring custom *V-Marksmanship* courses of fire, and importing custom *V-Marksmanship* targets.

Introduction: Marksmanship Authoring

The *V-Marksmanship Authoring* application allows users to author custom V-Marksmanship courses of fire, using common logical scripting constructs like, variables, branching, and looping, as well as domain specific constructs like target creation and movement. To access the Authoring application, go to the *VOS* start button, *Administration*, and *V-Markmanship Authoring*.

Introduction: Target Import

The *V-Marksmanship Target Import* application allows users to import custom paper target images from common file types, and make them useable in the *V-Marksmanship* simulator. Target hit-zones can either be painted directly within the *V-Marksmanship Target Import* application, or they can be imported from well-formatted images produced from third party applications like *Adobe Photoshop*.

Introduction: User Interface

Figure 1 shows the user interface for File menu in *V-Marksmanship Authoring*. From this view users can:

1. Selecting the “New Course” button creates an empty course of fire.
2. Selecting the “Open Course” button opens a file dialog where users can open a previously saved course of fire.
3. Selecting the “Save Course” button opens a save file dialog where users can save a currently opened course of fire.

Figure 1

4. Selecting the “File” header button opens the menu shown in *Figure 1.*

5. Selecting the “Course Authoring” header button opens the user interface used to create/modify courses of fire.
6. Selecting the “Target Import” header button opens the user interface used to create/modify custom paper targets.

Marksmanship Authoring

The *V-Marksmanship Authoring* application allows users to create and modify custom *V-Marksmanship* courses of fire.

User Interface

Figure 2 shows the user interface for the Course Authoring menu in *V-Marksmanship Authoring*. From this view users can:

1. The "Operations" section provides a searchable list of all commands, or operations, available for use in the course of fire (e.g. "New Stage", "Move Target", etc.). These operations can be added to the course of fire by selecting-and-dragging them to the design stage, or by selecting the add button ("+").

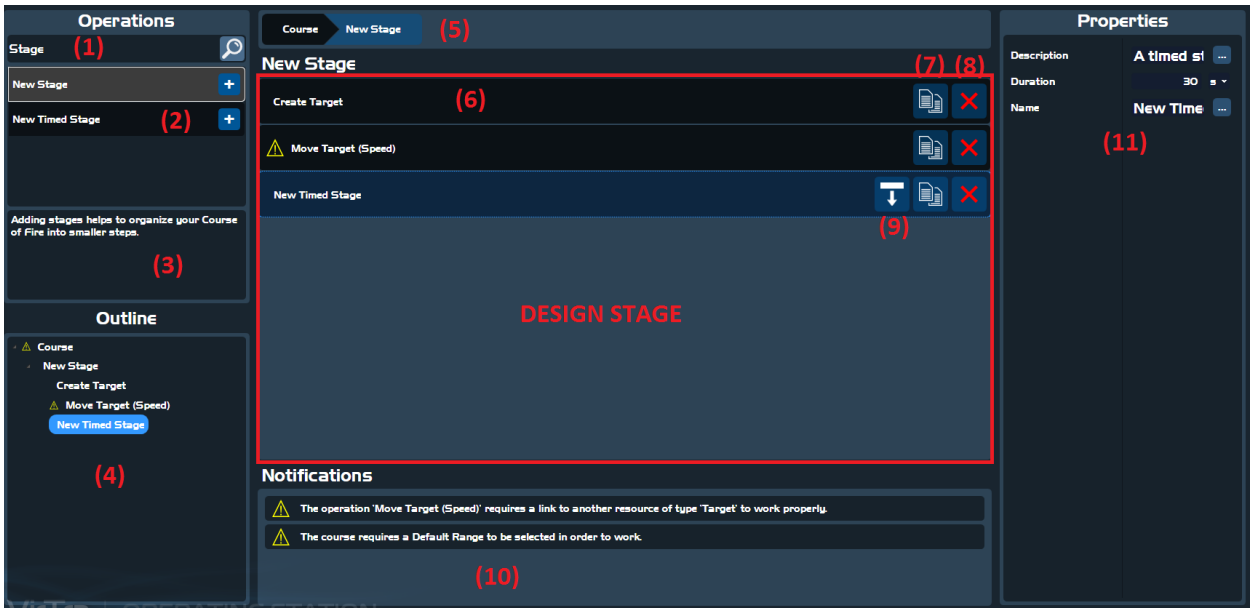


Figure 2

2. By selecting an operation from the operations list, the description of the operation appears in the description window (*#3*), and the available settings, or properties, can be viewed in the properties window (*#11*).
3. The description window offers helpful text about the capabilities of the selected operation.
4. The "Outline" section provides a hierarchical view of the course of fire, making it simple to navigate to different stages and logical branches. Clicking any item in the outline will cause the bread crumb (*#5*), design stage, and properties window (*#11*) to update accordingly. Additionally, any warning notifications are also displayed next to the name of the items in the outline making it easy to diagnose problems in the course of fire.

5. The bread crumb control displays the logical path taken to arrive at the currently selected stage in the course of fire, making it easy for the user to understand the current position in, as well as navigating backward/up, the course hierarchy. The light blue item is the currently visible stage in the design stage, and the darker items are the hierarchical ancestors of the currently visible stage. Selecting an ancestor updates the outline (*#4*), design stage, and properties window (*#11*) accordingly.
6. Operations that have been added to the currently selected stage in the course hierarchy are visible in the design stage. Each item is displayed in the order they were added, unless reorganized. To organize operations inside the design stage: Select-and-move up or down an operation until the selected operation is in the desired position. The currently selected operation is highlighted in blue, all other operations remain dark.
7. By selecting the duplicate button, the user can duplicate/clone an operation.
8. By selecting the delete button, the user can delete an operation.
9. By selecting the dive-down button, the user can navigate to the child stage of an operation.
10. The “Notifications” section provides a list of notifications important to solving problems in the course of fire. Selecting any of these items navigates the user interface to the operation producing the warning notification.
11. The “Properties” section provides a tabular set of configurable settings for an operation. In each row the left column provides the name of the property, and right column contains the interface for configuring the property value.

Basic Usage

This section covers primitive usage of the Course Authoring portion of the *V-Marksmanship Authoring* application. See *Section 2.3* for coverage of more advanced course authoring topics.

Configuring the Course of Fire

To configure the course of fire, select the root item in the course outline. This can be seen in *Figure 3*.

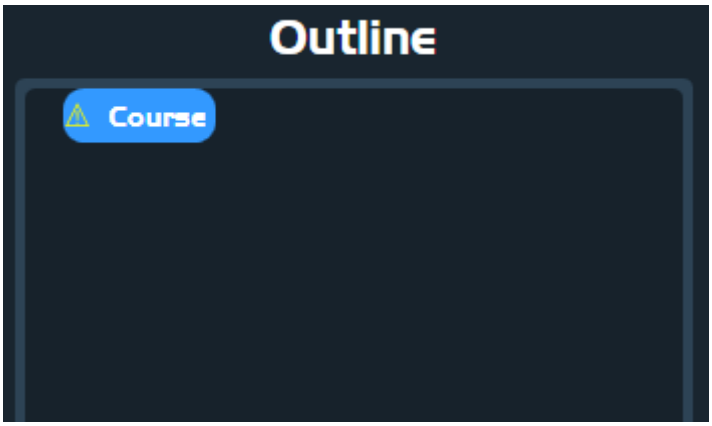


Figure 3

Note: If the course of fire has been renamed the root element will appear as having that name, however the course is always represented by the first (root) element in the outline.

In order for the course of fire to work properly it must have a unique name and a range environment.

Note: If the course of fire is named the same as any other course of fire, the previous course will be overwritten when this course is saved. Only name it identically if the intent is to overwrite the previous course.

By default the course of fire has the name “Course”, and no range environment selected. This can be observed by looking at the properties window shown in *Figure 4*:

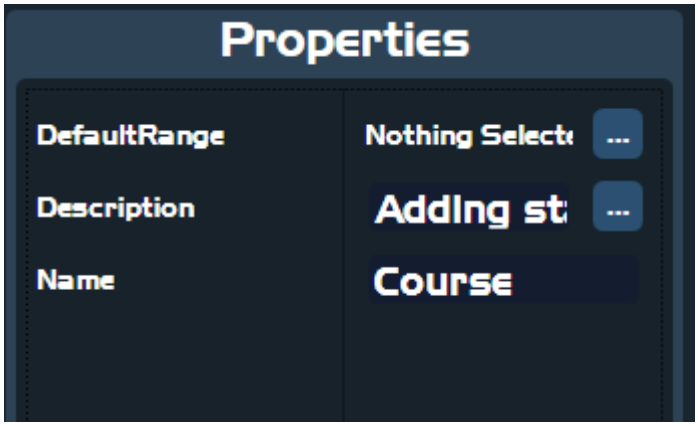


Figure 4

As indicated by the warning notification (see *Figure 5*), the default range must be changed. This can be accomplished by selecting the ellipsis button in the column to the right of “Default Range”; doing so will open up a range environment selection menu (see *Figure 6*). From this menu select the range environment that is desirable for the course of fire, and then select the “Close” button.

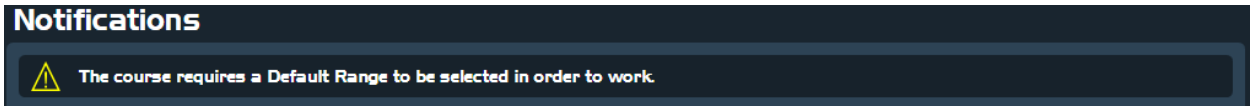


Figure 5

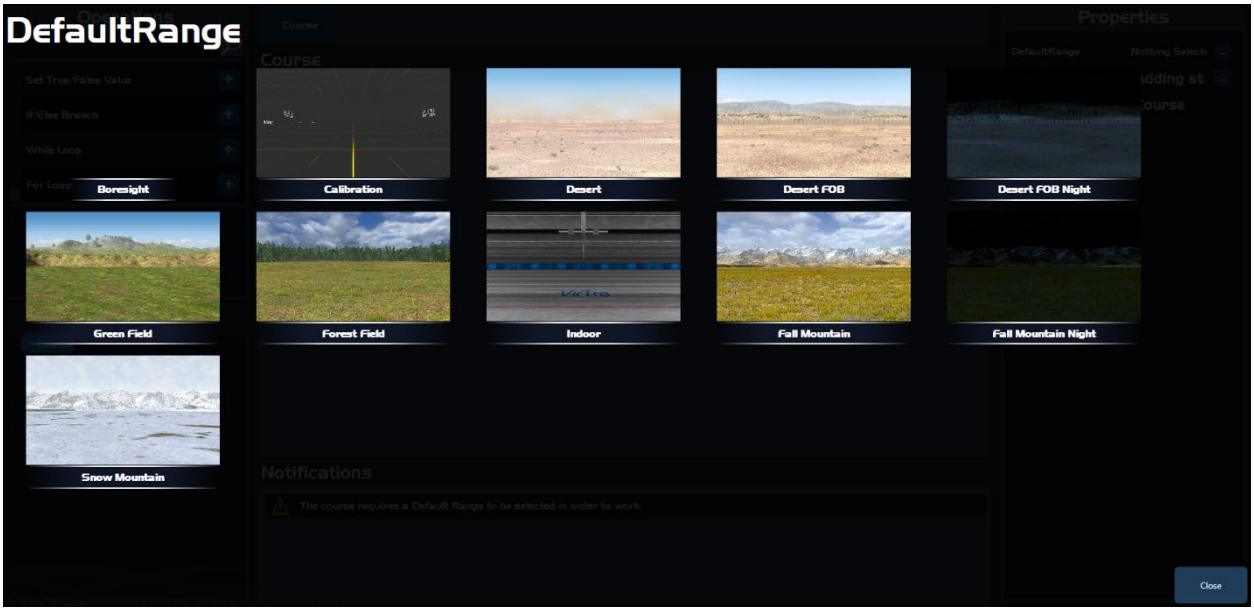


Figure 6

Observe that once the range has been selected, the warning notification for this problem disappears.

Note: A course of fire is invalid if any warning notifications are present.

After the “Default Range” property has been set, the course “Name” property should be changed to appropriately match the training objective (e.g. “Shapes Drill”, see *Figure 7*).

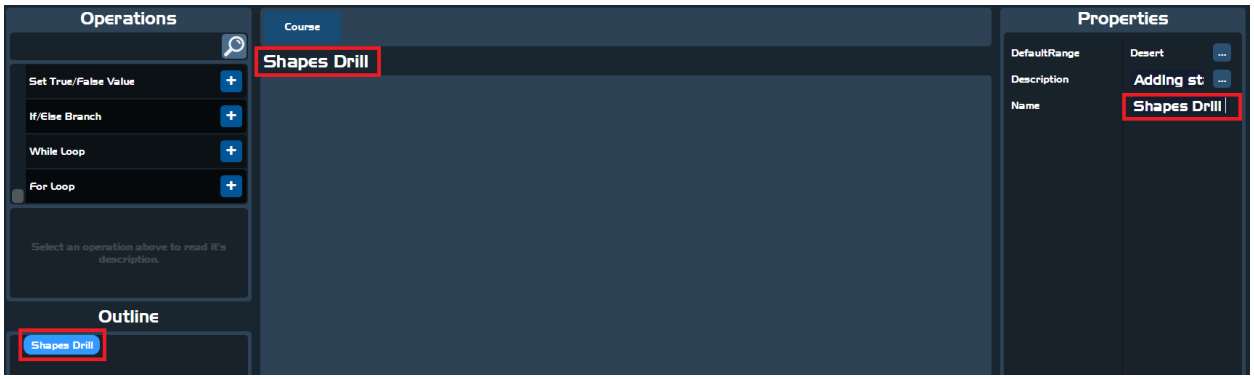


Figure 7

Observe that once the course “Name” property is set, this change is reflected throughout the user interface. This is true for changing the “Name” property on any operation in the course of fire.

With the course uniquely named, and a default range set, the course of fire is ready to be authored and saved for use in training.

Creating & Moving Targets

Before a target can be moved, it has to be created. To create a target follow these steps (see *Figure 8*):

1. Type “Target” into the operations list search text box
2. Scroll through the list until “Create Target” appears
3. Select the “+” button.
4. Clear the text from the operations list search text box.

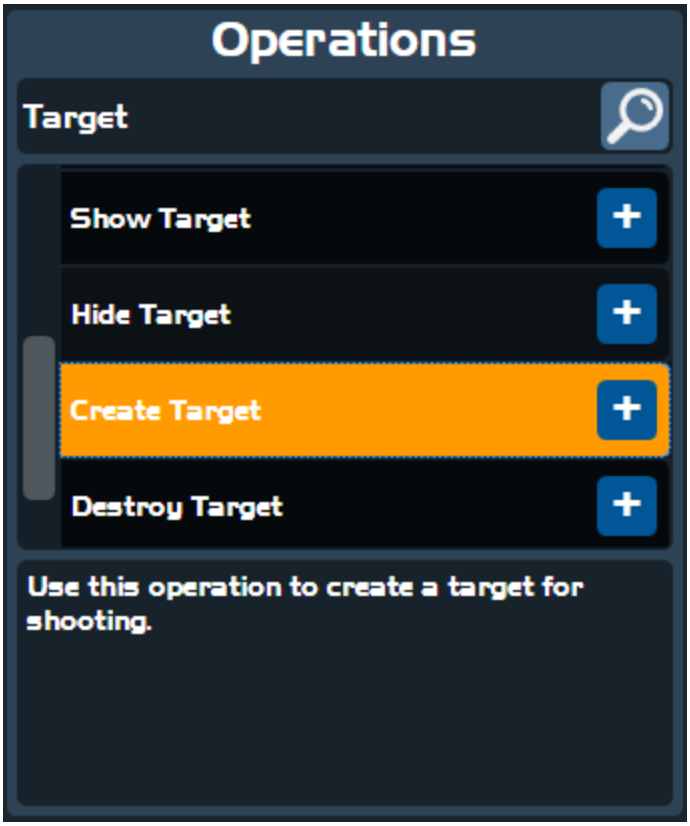


Figure 8

Observe that the “Create Target” operation has been added to the design stage (see *Figure 9*).

Figure 9

For this operation to work properly, the “Target” property must be set. To do this, select the newly created “Create Target” operation in the design stage and click the ellipsis button to the right of the “Target” property in the properties window (see *Figure 10*); this will open a target selection window (see *Figure 11*). Select the desired target, and then select the “Close” button.

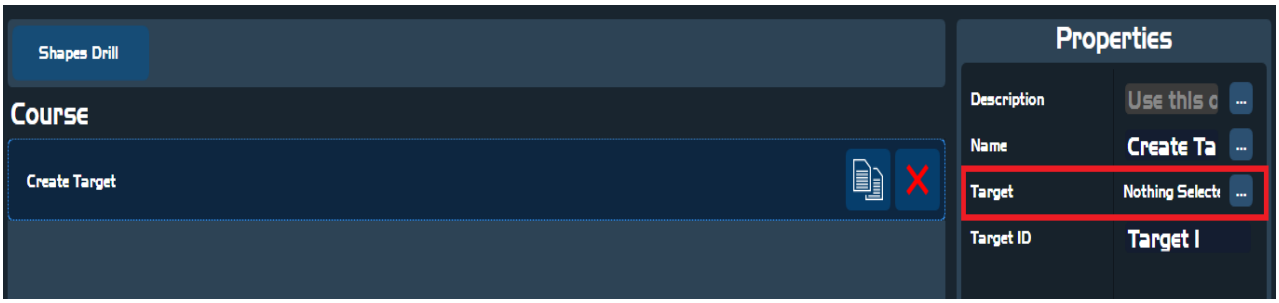


Figure 10

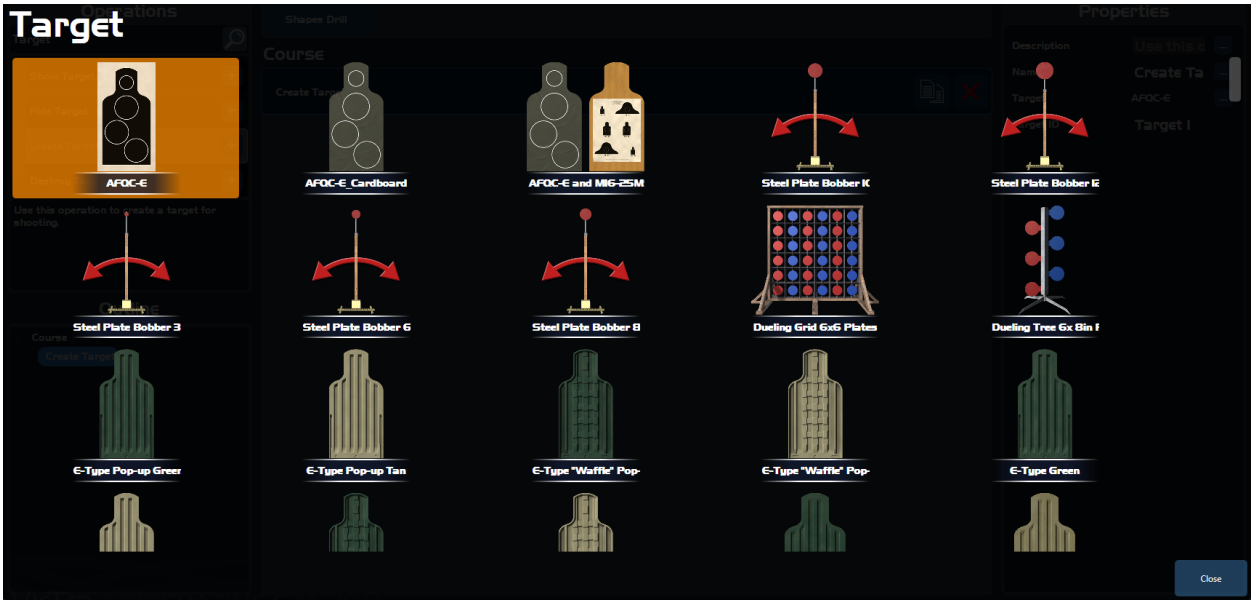


Figure 11

Note: At this point the target has been created, but the target will not appear when the course of fire is run. This is because the target needs to be positioned down range before it can be used. Targets that are created, and not positioned down range can cause undesired effects during training. Make sure to always position targets downrange immediately after they are created.

To position the newly created target, add the "Move Target (Time)" operation to the design stage (see *Figure 12*). Observe that there is a new warning notification that reads: "The operation 'Move Target (Time)' requires a link to another resource of type 'Target' to work properly". This means that there is a property on the newly added "Move Target (Time)" operation that requires a target. In the case of the "Move Target (Time)" operation, the property that requires a resource link to a target is named "Target ID" (see *Figure 13*). To fix this problem, select the "Move Target (Time)" operation, and set the "Target ID" property to "Target 1".

Note: Resources and links to resources are explained in more detail in the section 2.3.1 Advanced Usage: Resource & Stages. For now it is sufficient to understand that some operations depend on knowing about which target they are affecting during the course of fire.

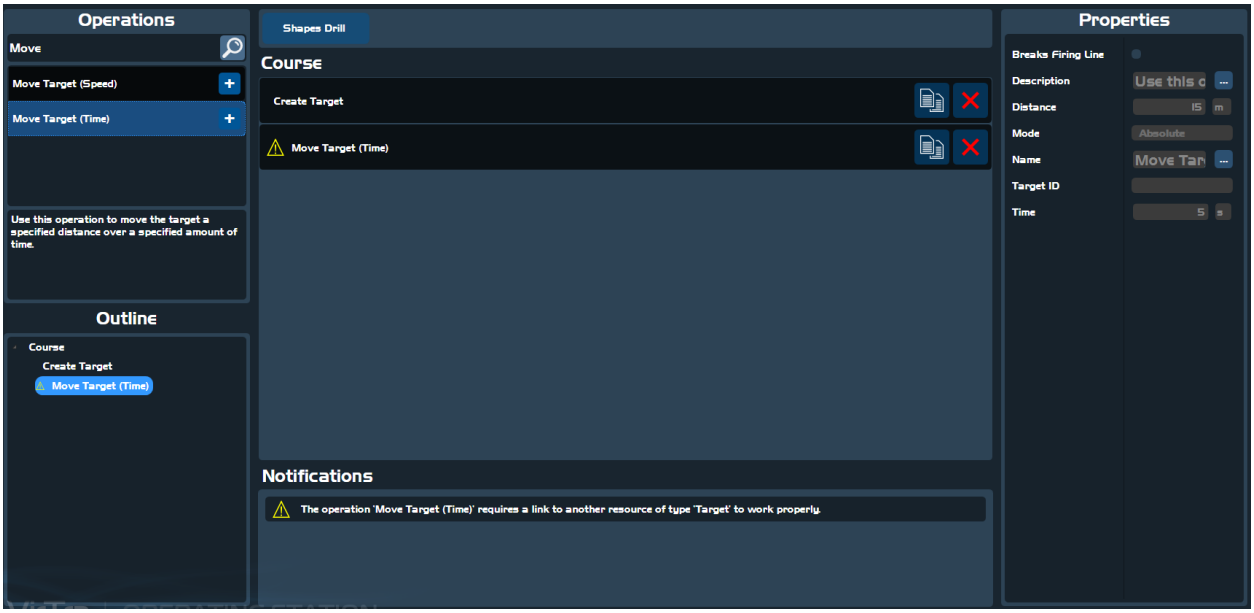


Figure 12

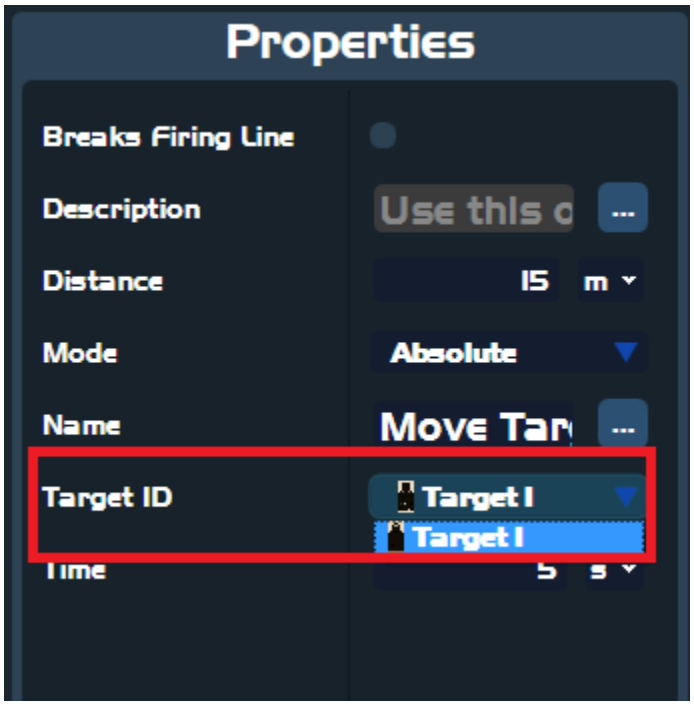


Figure 13

Observe that once the “Target ID” property has been set on the “Move Target (Time)” operation, the warning notification for this problem disappears.

The next step is to change the time it takes for the target to arrive at the desired down-range position. By default it takes five seconds for the target to gradually move to the desired down-range position. Both the “Distance” property, and the “Time” property are configurable (see *Figure 14*).

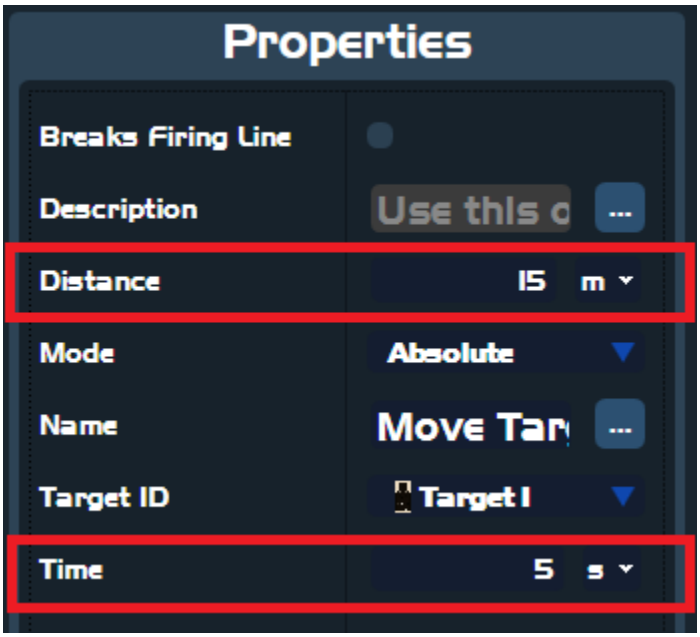


Figure 14

In the case of moving a target after it has been created, the best practice is to move the target to a distance down range that is at least the distance from the trainee to the projected image, and with a time of zero seconds (see *Figure 15*).

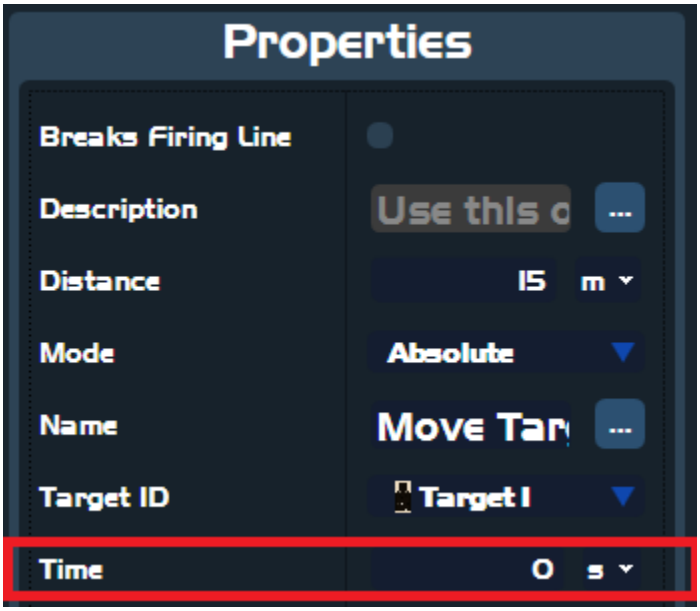


Figure 15

Save & run the course of fire. Observe that the target has been created and moved to the distance specified in properties of the “Move Target (Time)” operation.

The process for moving a target at a later point in the course of fire is exactly the same, except that it may be more aesthetically pleasing for the target to not "snap" to its position like it does with a "Time" of zero. Additionally, it may seem more intuitive to move a target to its desired location at a given speed and not over a period of time. To do this create a "Move Target (Speed)" operation, and configure its "Speed" property appropriately (see *Figure 16*). Notice that the "Time" property does not exist on the "Move Target (Speed)" operation, and instead has been replaced by a "Speed" property with a default value of five miles-per-hour.

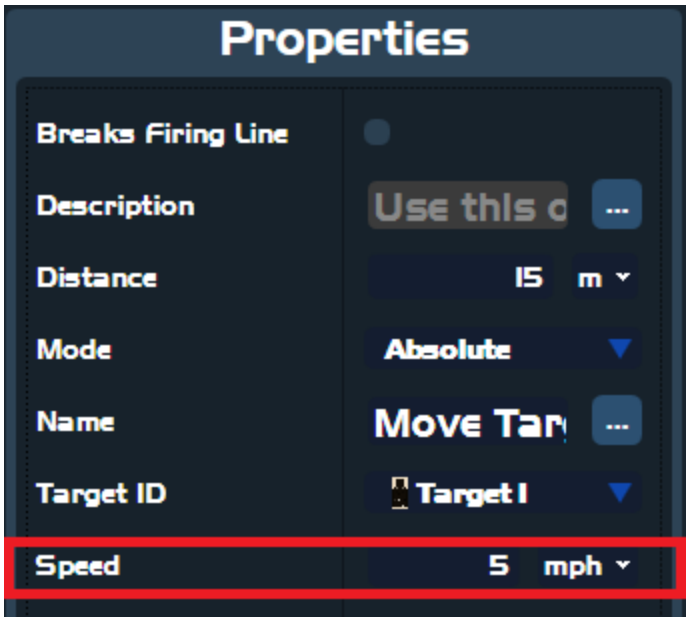


Figure 16

Displaying Messages & Instructions

Often it is useful to display a message or instructions to trainees. In *V-Marksmanship Authoring* Course Authoring, this can be done by showing "Messages".

Type "Message" into the operations list search text box. Observe that the resulting set of operations (see *Figure 17*) are all related to showing, and hiding messages in some manner. When a message is shown to the trainee it appears on screen until it is hidden. In the case of a timed message, the message is hidden after the passing of some specified amount of time. In the case of an input message, the message is hidden after the instructor has selected to continue the course of fire.

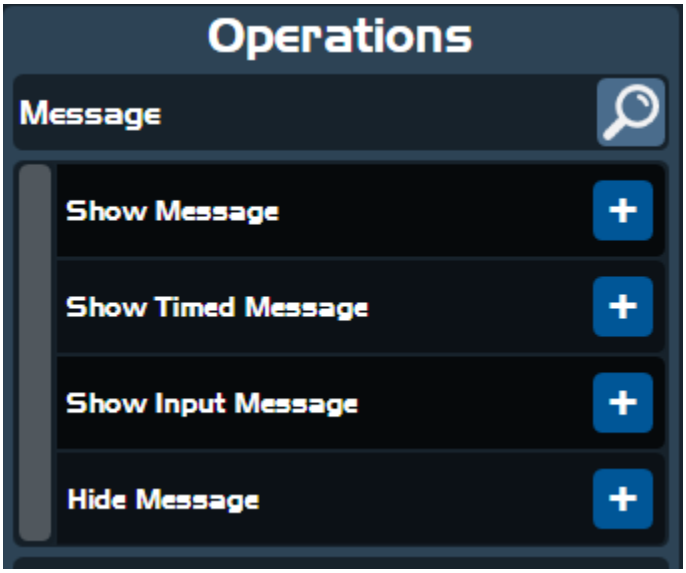


Figure 17

To show a message to the trainee, add the "Show Input Message" to the course of fire. Then, select the operation. Observe the properties for this operation (see *Figure 18*). Notice the "Message" property. This property is editable via a text box; this is where the message text is entered, and whatever text is entered here will be displayed to the trainee. If the message text gets too long, an ellipsis button will appear (see *Figure 19*). Try typing a lot of text until the ellipsis appears. Selecting the ellipsis button will open an expanded text editor (see *Figure 20*). Use the expanded text editor when editing a substantial amount of text.

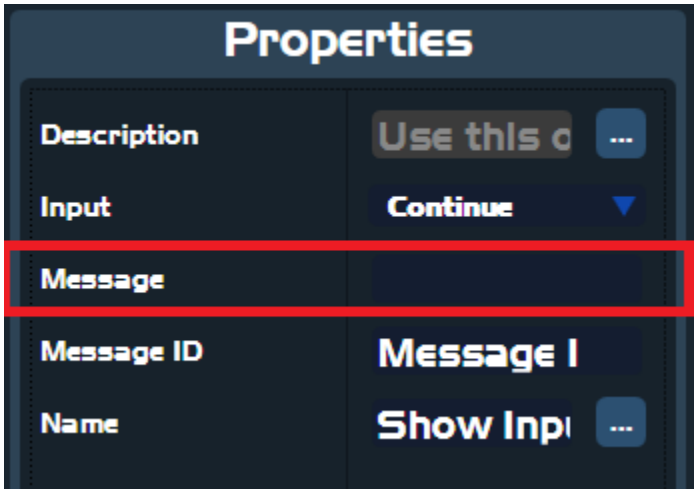


Figure 18

Figure 19

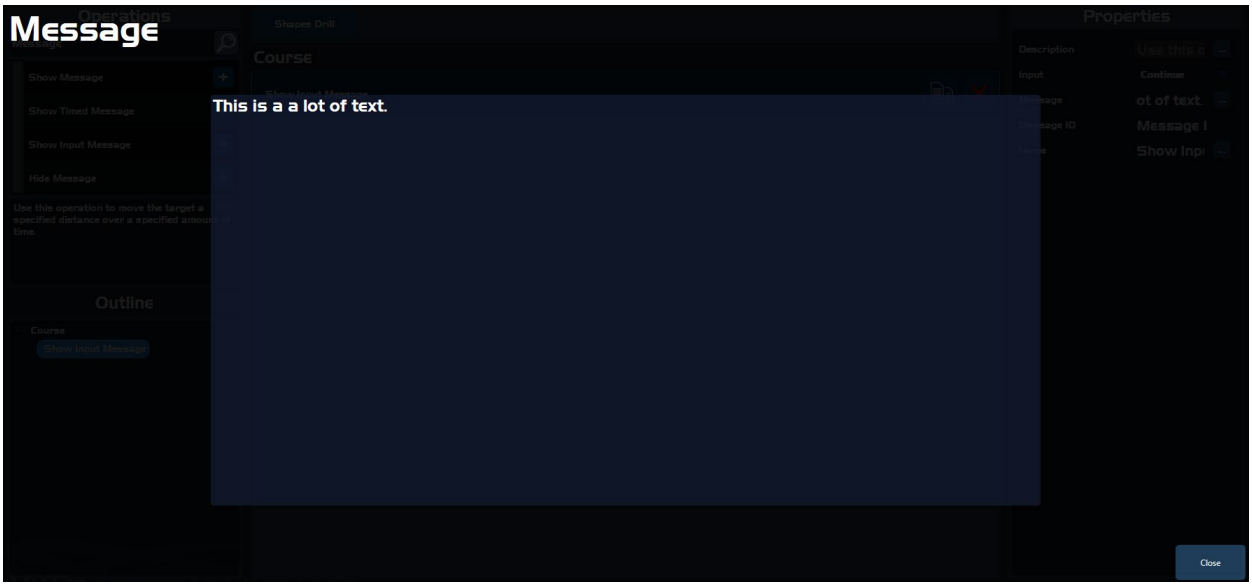


Figure 20

Save & run the course of fire. Observe that the message entered into the "Text" property of the "Show Input Message" operation appears and only disappears when the instructor "Continue" command is given.

Waiting for Instructor Input & Time

There are two ways to pause the execution of operations within a running course of fire: the first is to use a "Wait" operation, which will pause execution for a specified amount of time; the second is to use a "Wait for Input" operation, which will pause execution until the instructor has provided input to continue execution.

To illustrate how "Wait for Input" and "Wait" operations work, follow the provided steps:

1) Type “Wait” into the operations list search text box.
2) Add a “Wait for Input” operation to the course of fire.
3) Add a “Show Message” operation and set its “Message” property to “Hello”.
4) Add a “Wait” operation to the course of fire and set its “Time” property to 5 seconds.
5) Add a “Hide Message” operation and set its “Message ID” property equal to the “Message ID” property of the “Message ID” property in the “Show Message” operation.
6) Add a “Show Message” operation and set its “Message” property to “World”.

Done correctly, the design stage should look like *Figure 21*.

Figure 21

Save & run the course of fire. Observe that at first nothing is happening. Provide instructor input by selecting the “Continue” button in VOS. The message “Hello” will appear, then after 5 seconds, the message “World” will appear.

Showing & Hiding Targets

Paper targets, and some special targets (e.g. Ivans), can be programmed to turn-&-face, pop-up, etc. To do this, the “Show Target” and “Hide Target” operations are used. These operations require a link to a target, so one must have already been created in the course of fire before being used by these operations (see *Creating & Moving Targets*).

An example course of fire can be seen in *Figure 22*. In this example the following will occur:

1) The target will appear turned away on screen at the specified distance (default is 15 meters).
2) The course of fire will pause until instructor input is provided.
3) After instructor input is provided, the target will turn-&-face the trainee.

A “Wait for Input” operation is not the only option; a simple “Wait” operation could have been used to wait for some amount of time. This example illustrates that courses of fire can be programmed to allow instructors to decide when a target should turn-to-face or turn away from the shooter.

Figure 22

Zooming In/Out Targets

Often, after a trainee has completed a shooting drill, it is useful to present the target for review. To do this the "Zoom-In Target" and "Zoom-Out Target" operations are used. Searching the operations list search text box for "Zoom" will reveal these operations. These operations require a link to a target, so one must have already been created in the course of fire before being used by these operations (see *Creating & Moving Targets*).

An example course of fire can be seen in *Figure 23*. In this example the following will occur:

1) The target will appear facing the trainee on screen at the specified distance (default is 15 meters).
2) The course of fire will pause until instructor input is provided. During this waiting period the trainee can engage the target.
3) After instructor input is provided, the target will be presented for review, and the course of fire will be paused until further instructor input is provided.
4) After instructor input is provided again, the target will appear down range and is ready to be engaged by the trainee.

Figure 23

Changing Trainee Stance

In *V-Marksmanship* the trainee's stance (Standing, Kneeling, or Prone) affect both the perspective and ballistic accuracy of the simulation. To change the trainee's stance the "Set Trainee Stance" operation is used, and the "Stance" property is set to "Standing", "Kneeling" or "Prone".

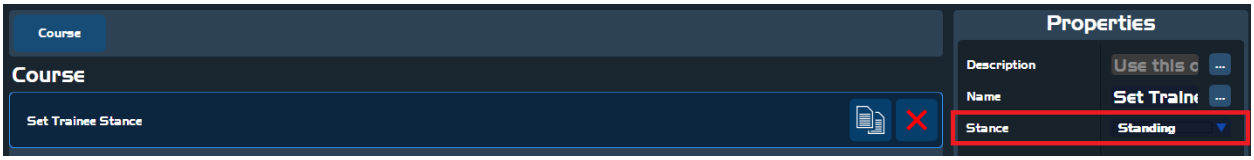


Figure 24

Basic Shooting

To require a trainee to shoot *N* number of rounds before continuing the remainder of the course of fire, use the "Require Shooting" operation and set its' "Number of Rounds" property to the amount of shots appropriate for the course of fire (see *Figure 25*).

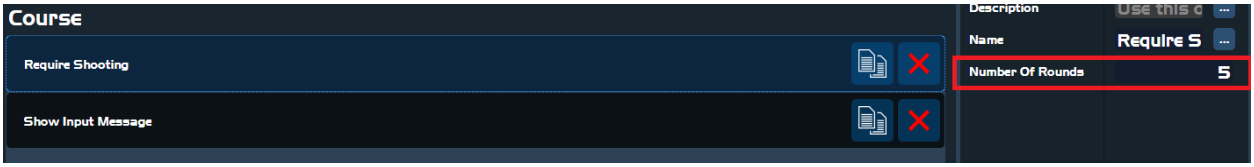


Figure 25

In this example, the "Show Input Message" will not execute until the trainee has completed shooting 5 shots.

Timed Shooting

Like the "Require Shooting" operation, the "Require Timed Shooting" operation will pause execution of the course of fire until the trainee has shot the required number of rounds; however, "Require Timed Shooting" will continue execution of the course of fire after an amount of time, specified by the "Time" property, has elapsed, regardless of the number of rounds shot by the trainee. *Figure 26* shows an example using the "Require Timed Shooting" operation.

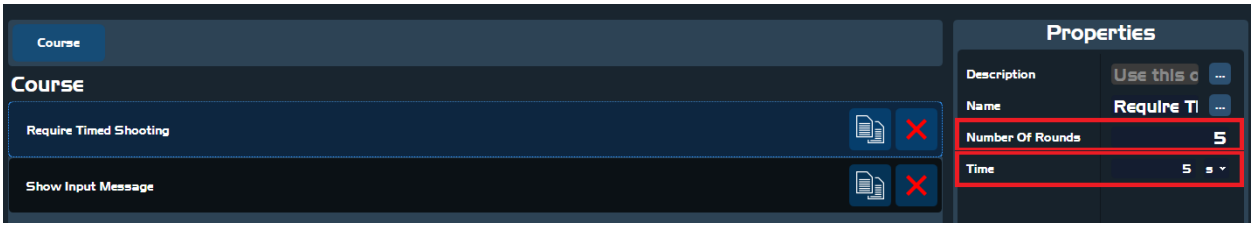


Figure 26

Notice the "Require Timed Shooting" operation still requires a "Number of Rounds" to be set, but additionally requires the "Time" property to be set.

Advanced Usage

This section covers advanced usage of the Course Authoring portion of the *V-Marksmanship Authoring* application.

Resources & Stages

In *V-Marksmanship Authoring, understanding* the concepts of *resources* and *stages* are critical to programming advanced courses of fire.

A *resource* is a type of data that encapsulates important course programming related information. Listed below are the *resources* supported by *V-Marksmanship Authoring* and a description of each.

Resource	Description	Example
Target	Targets are physically simulated entities within the *V-Marksmanship* simulator. These are the paper, steel, etc. that trainees shoot at during training.	E-9 Silhouette, E-Type, F-Type, Steel Torso Pepper Popper
Message	Messages are the pop-up user interfaces that appear in front of the trainee during training. Typically these are used to present instructions.	A user interface displaying instructions like: “When the target turns and faces, fire three rounds center mass.”
Audio/Sound	Sounds are custom audio files that can be loaded into the course of fire and played. Typically these are verbal instructions, or signal sounds for target-turns, shooting, etc.	Any well formatted audio file containing a custom sound.
Number	Numbers are a course programming construct where any integer number value can be stored in a named value (variable), and used later via a resource link.	X = 1, Y = 2, Shots = 3, Some Variable Name = 4
Decimal Number	Decimal Numbers are a course programming construct where any real number value can be stored in a named value (variable), and used later via a resource link.	X = 2.35 Y = 3.56 Shots = 3.67 Some Variable Name = 3.67
True/False	True/False is a course programming construct where any Boolean value can be stored in a named value (variable), and used later via a resource link.	X = True Y = False Successful = True Hit Target = False
Text	Text is a course programming construct where any textual value can be stored in a named value (variable), and used later via a resource link.	X = “Hello” Y = “World” Instruction1 = “Holster” Instruction2 = “Reload”

An example of a *resource* and *resource linking* can be seen in *Creating & Moving Targets*; the target that is created by the "Create Target" operation is a *resource*, and the operation "Move Target" uses the target via a *resource link*. This *resource link* is established via a property drop-down on the "Move Target" operation, in this case it is the "Target ID" property.

Note: Generally, any instance of "ID" after a property name (e.g. Target ID) indicates that this property is establishing a link to a resource.

A stage is an operation that has one or more sub-operations. For example, the root "course" node in the course of fire hierarchy shown in the outline is a stage. Sub-stages can be added by adding "New Stage" operations, which in turn can have sub-stages.

When the course of fire is executed it completes these stages in the order they are defined. Stages define a scope of work to be executed in the course of fire. Scope is a programming concept that lies outside the scope of this manual. However, it is important to know that resources created inside a stage are destroyed when the stage is completed.

2.3.2. Logical Branching

In certain cases, it can be useful to perform one set of operations instead of another based on some logical input. *V-Marksmanship Authoring* exposes this functionality in the form of logical branching via "If/Else Branch" operations which have a "Condition" property that links to a "True/False" variable.

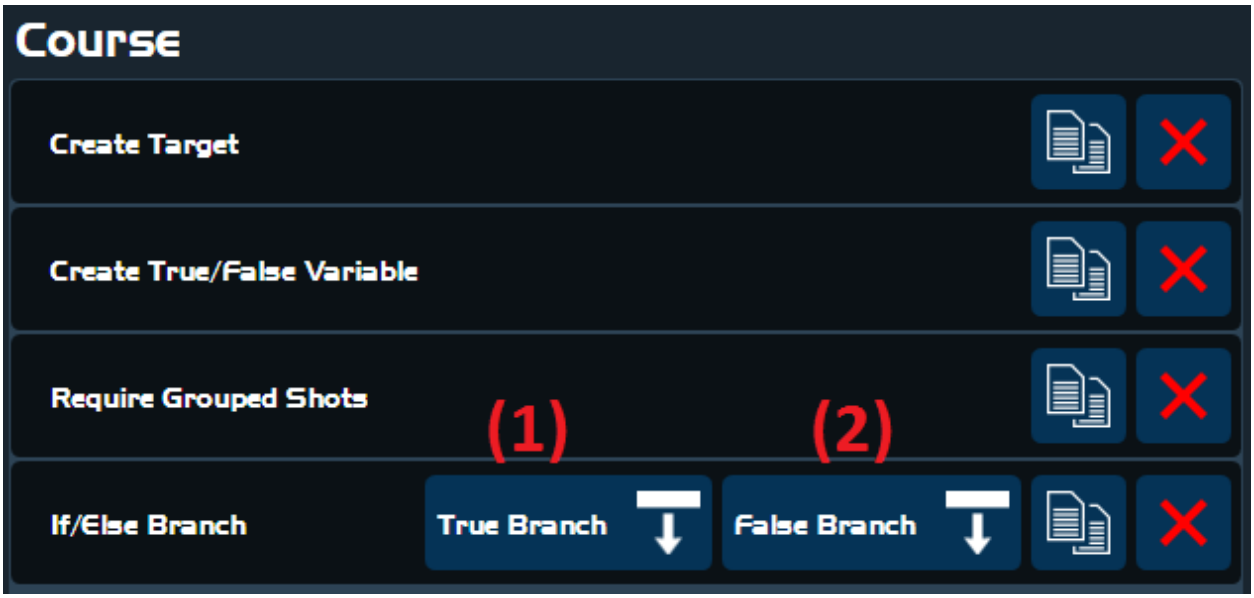


Figure 27

In *Figure 27* the "If/Else" branch has two new buttons "True Branch" (1) and "False Branch" (2). Selecting one of these buttons navigates the design stage to editing the true/false sub-stage. *Figure 28* shows that the course outline has updated to show that operations like "Show Message" can be added to the true/false sub stages. As an example, the "Show Message" operation in the true sub-stage might say "Success", and the false sub-stage might say "Failed".

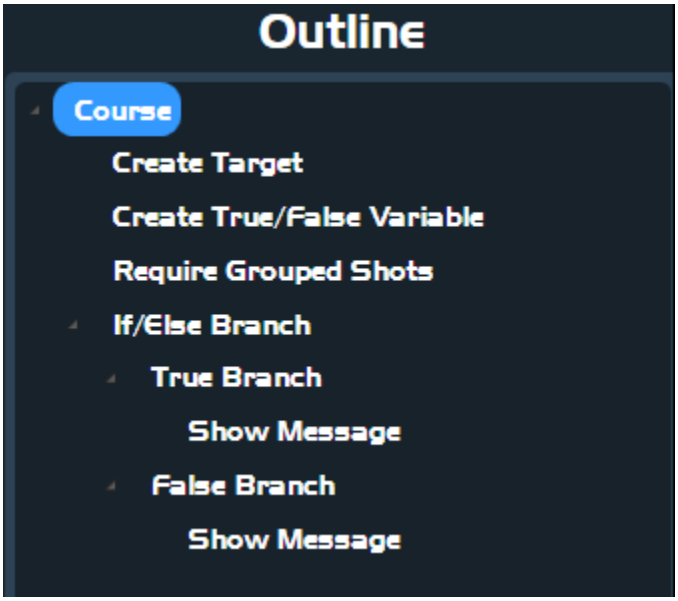


Figure 28

Repeat/Looping Mechanisms

When a course of fire should repeat certain operations the “While Loop” and “For Loop” operations are used. The “While Loop” will continue to execute a set of operations for as long as the condition is true (see *Figure 29*). The “For Loop” will execute operations a set number of times (see *Figure 30*).

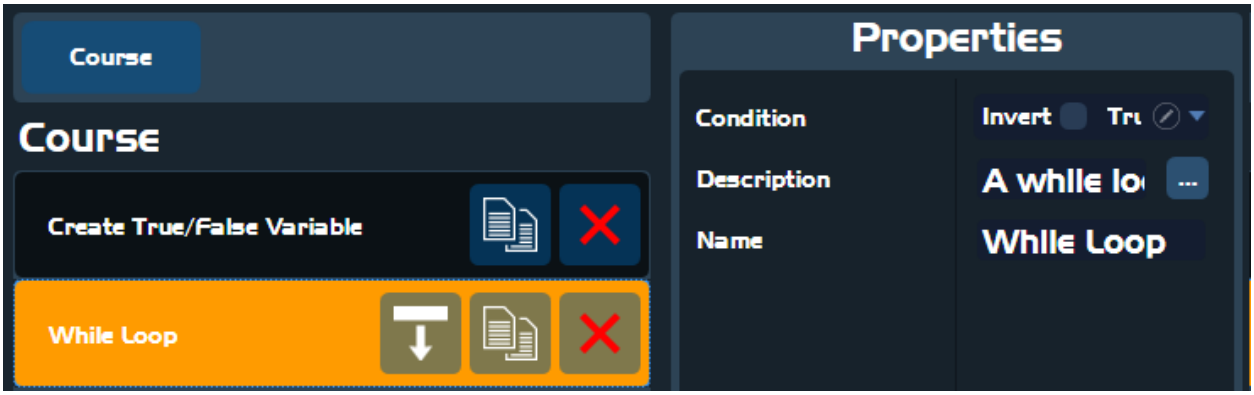


Figure 29

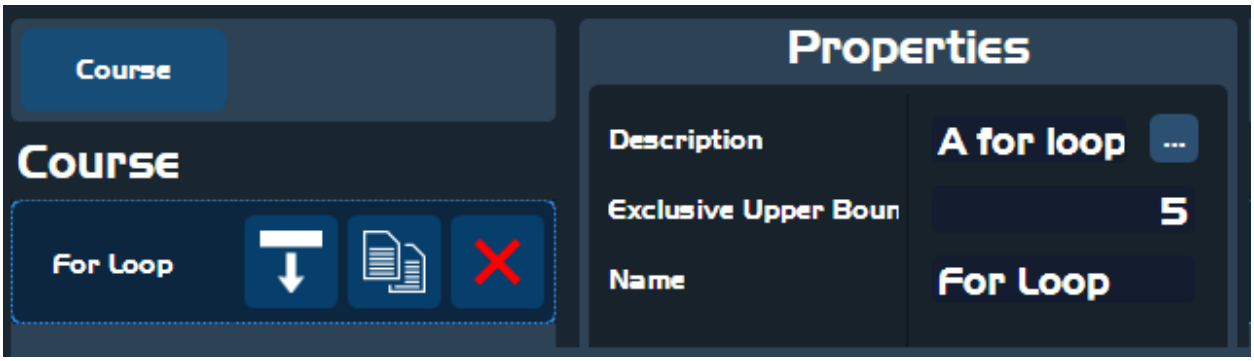


Figure 30

Grouped Shooting

When the course of fire requires a trainee to shoot shots within a specified group size, the "Require Grouped Shots" operation is used. This operation requires a link to a target, as well as a link to a true/false variable. This is because the operation will output whether or not the trainee successfully shot within the desired group size. *Figure 31* shows a common usage of this operation; an if/else branch is used to show a message for success/failure.

Figure 31

Advanced Shooting Requirements

When the course of fire has significantly more advanced shoot requirements, say: 2 shots to the body, 1 to the head - the "Require Complex Shooting" operation is used. Like the "Require Grouped Shots" operation, the "Require Complex Shooting" operation requires a link to a target, as well as a link to a true/false variable. What makes the "Require Complex Shooting" operation useful are it's' properties and requirements editor (see *Figure 32*).

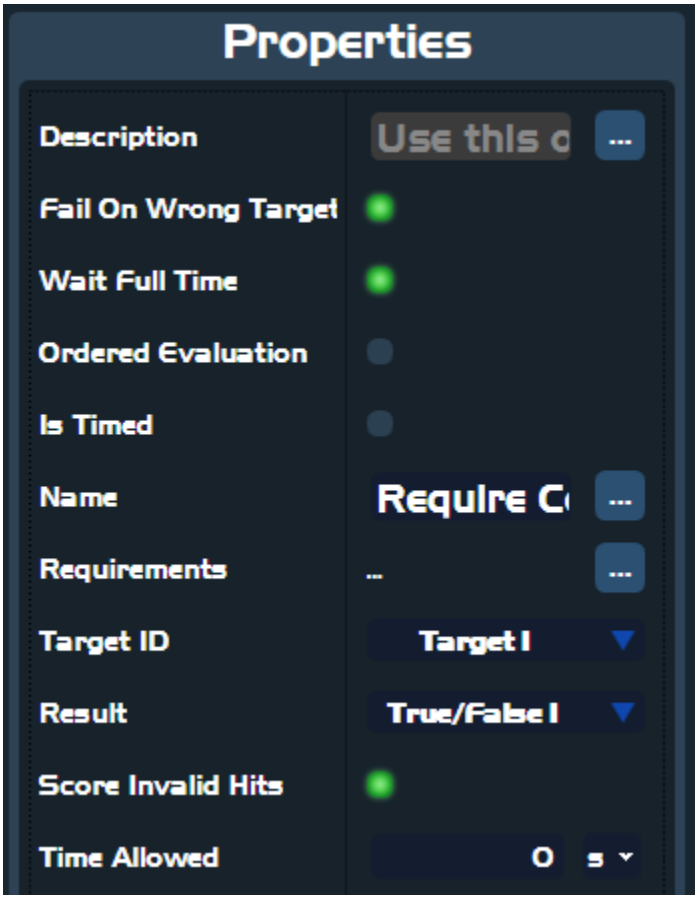


Figure 32

The properties affect the required shooting in the following way:

Property	Description
Fail On Wrong Target	When checked, this property creates a rule that if the shooter misses or hits a part
Wait Full Time	When checked full time allowed elapses before continuing the course of fire.
Ordered Evaluation	When checked, indicates that if the required shooting order is 2-body 1-head, a shooting of 1-head and 2-body is a failure.
Is Timed	When checked, indicates that the drill is timed, and failing to shoot the required parts within the time limit fails the drill.
Requirements	The collection of target-parts and number of times to hit them.
Score Invalid Hits	Indicates whether score is counted when the wrong part of the target is hit.
Time Allowed	The max time allowed to complete the shooting.

Target Import

The *V-Marksmanship Target Import* application allows users to create and modify custom *V-Marksmanship* targets.

User Interface

Figure 33 shows the user interface for the Course Authoring menu in *V-Marksmanship Authoring*. From this view users can:

1. Select existing targets and modify them.
2. Save targets
3. Create new targets.
4. Delete selected targets.
5. Edit properties/settings of a custom target.
6. Edit the primary, secondary or tertiary hit-zone layers of a target.
7. Select layer-parts and modify them.
8. Go into edit view of layer part.
9. Create new layer parts.
10. Delete selected layer part
11. Toggle visibility of layer part in hit-zone painting canvas.
12. Paint hit-zones inside the hit-zone painting canvas with zoom, pan, and paint/erase functionality.

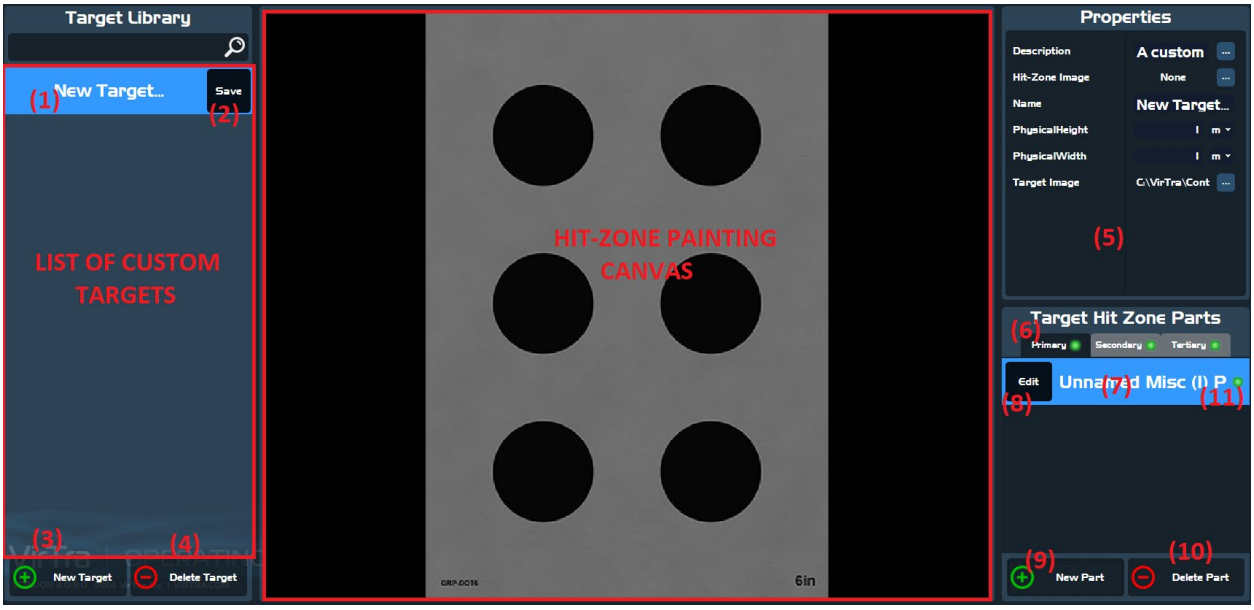


Figure 33

Target Configuration

In *Figure 33* (#5) the properties window reflects the configuration settings for the currently selected target. *Figure 34* provides a closer look at these properties:

1. Description: A description can be provided for targets, making them easier to understand their purpose in training.
2. Hot-Zone Image: Hit-Zone images are importable as well-formatted images made in programs like Adobe Photoshop.
3. Name: Targets should be named uniquely and so that they appropriately describe their application in training.
4. Physical Height & Physical Width: The physically simulated size of the target.
5. Target Image: Properly formatted images can be loaded from disk and used as targets. The hit-zone image needs to be the same size as the target image, which is only important if using a custom imported hit-zone.

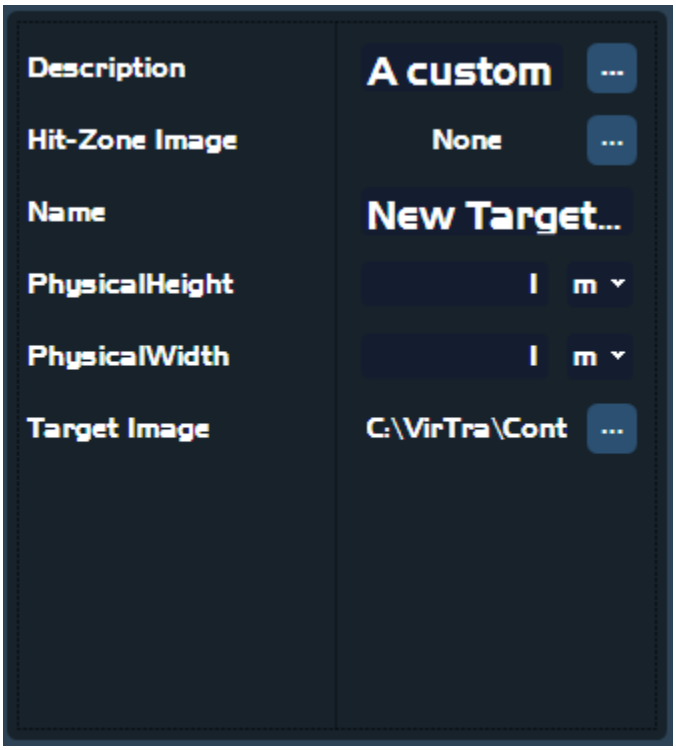


Figure 34

Hit-Zone Layering & Editing

To edit a hit-zone, select any one of the hit-zone layers: “Primary”, “Secondary” or “Tertiary”. Once selected, new layer-parts can be added by selecting “New Part”, and layer-parts can be deleted by selecting “Delete Part”. With a layer-part created and selected, select the “Edit” button on that layer-part. The “Edit Mode Tools” window will replace the “Target Hit Zone Parts” window. With this new interface users can (see *Figure 35, 36, & 37*):

1. Paint with various brush sizes.
2. Erase with various brush sizes.
3. Pan-Zoom.

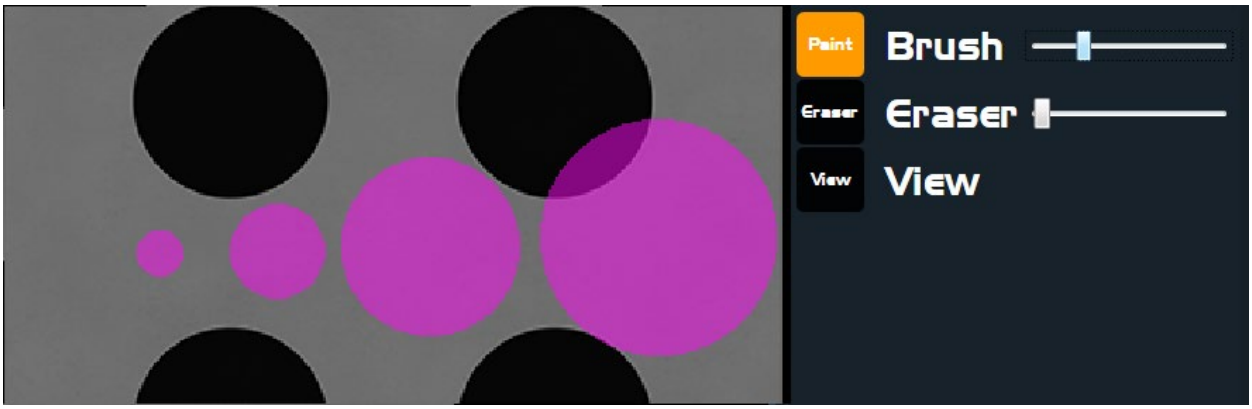


Figure 35

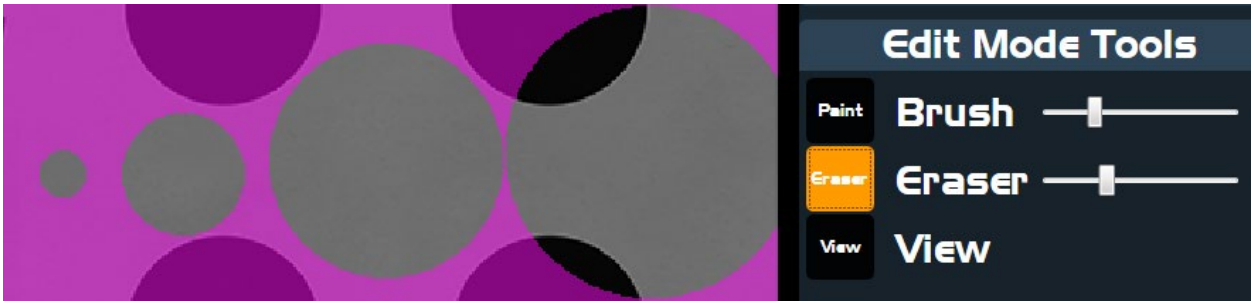


Figure 36

Figure 37

The parts of the target that are painted are visible in semi-transparent near-pink, near-green, and near-blue colors. These three colors help to identify the layer the user is editing (“Primary”, “Secondary” and “Tertiary” respectively). If a bullet hits a part of the target that is painted, logic will be applied according the course of fire programming, and the score will be referenced from the settings in the layer-part properties window see in *Figure 38*.

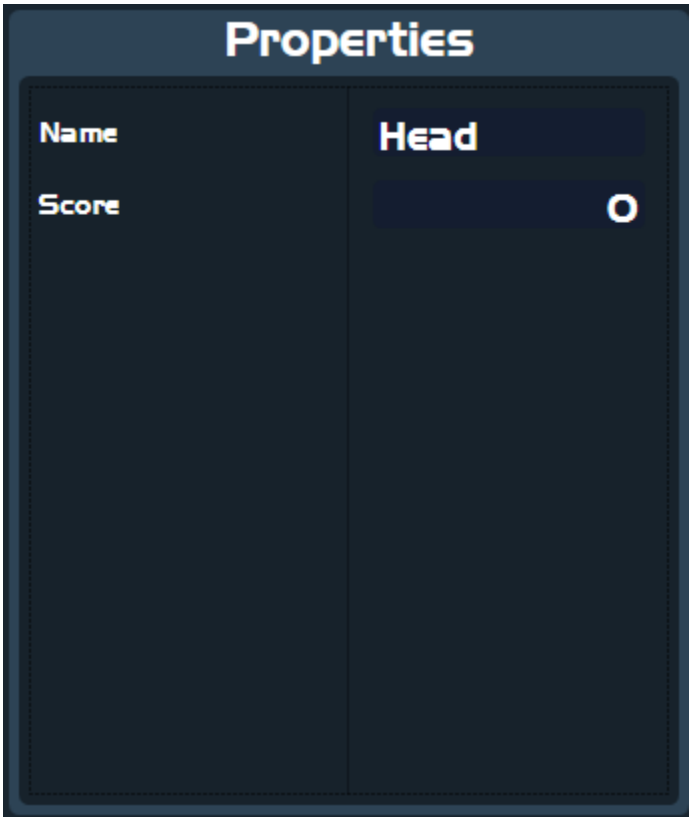


Figure 38

Note: The name property should be unique to any other layer-parts within the same layer. The name is also used as a reference inside the Course Authoring programming tool's "Require Complex Shooting" operation's "Requirements" property

13. Contact VirTra

For any questions or additional help with any part of this manual, please contact VirTra via the information below.

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