

DART

Range

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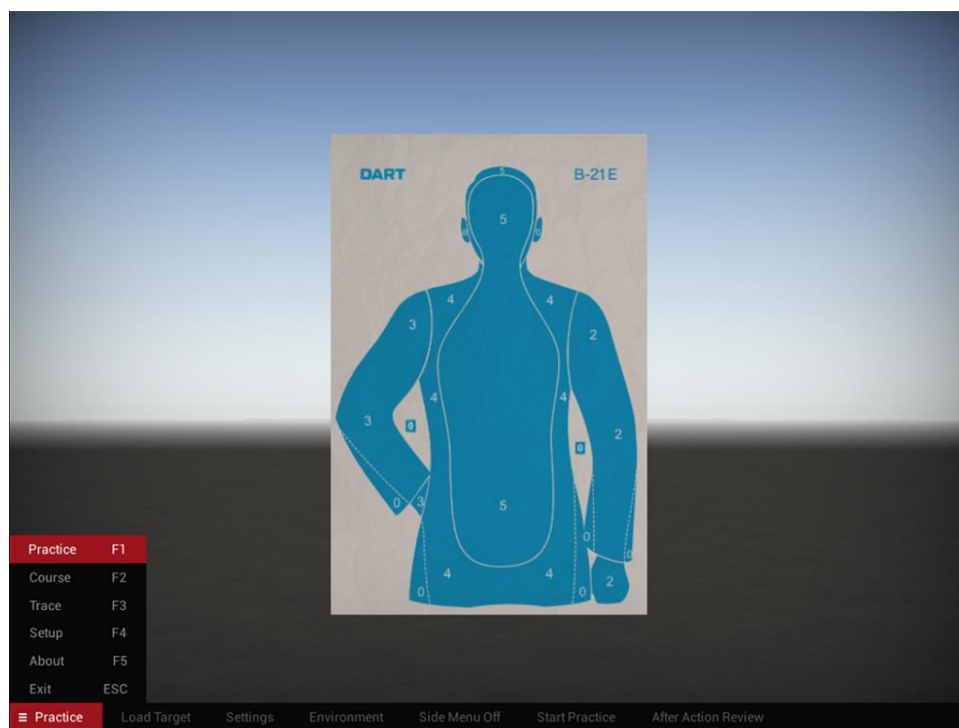
DART RANGE INTRODUCTION

DART uses realistic 3D graphics and video to simulate a firing range or scenario, referred to as courses, that law enforcement officers may experience in their jobs. These courses are developed in DART Creator and DART Studio and played back in DART Range. For those who are not going to create their own courses, DART Range is where you will spend most of your time.

Before running DART Range, the hardware must be set up and calibrated. Refer to the section on Calibration for more detailed information.

The Program Interface and Screen Layout

The DART Range screen (also referred to as the user interface or UI) uses a single menu bar at the bottom of the screen to select the various options of the program.



From the menu bar, you can select any of the four modules of DART Range: Practice, Course, Trace, and Setup. You can also see the About information and Exit the program.

Tip! Each option has a keyboard shortcut which is shown next to the command name. For example, you can press the F2 key to move instantly to Courses.

THE PRACTICE MENU

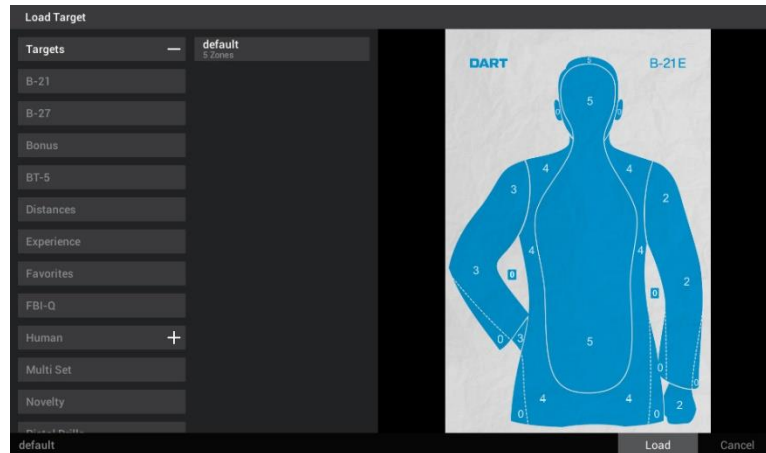
There will be times when you want to run quick practice sessions without going through an entire course. The Practice options allow you to quickly load a target and configure a practice session for one or two shooters to begin shooting with minimal effort.



Tip! Use the F1 key to instantly jump to the Practice menu from anywhere in the program.

Load Target

The Load Target options opens a dialog window to load a pre-saved DART target for use in a practice session.



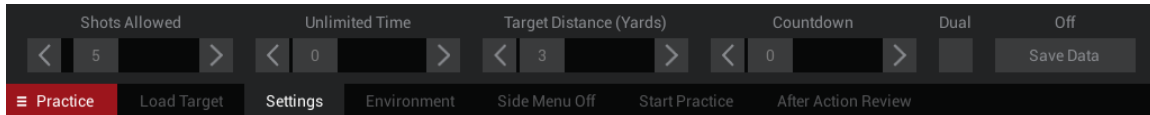
The load window in DART is a little different than those found in a typical Windows program. The left column shows a list of folders which contain one or more courses. Clicking a folder will show a list of available targets in the right column.

Single-clicking a file name will display a preview image of the target you have selected. Double-clicking a name will load the selected target or you may select a target name and click the Load button at the bottom right of the window. Clicking the Cancel button will close the window without loading a target.

Tip! DART comes with more than 100 prebuilt flat targets, and it is possible to create your own using DART Creator or DART Studio.

Settings

The Settings options allow you to set quick parameters for your practice session such as the maximum number of shots, time allowed, and the initial target distance.



Shots Allowed

Sets the maximum number of shots allowed up to 50. Moving the slider to zero will give you an unlimited number of shots.

Time Allowed

Sets the maximum amount of time allowed (in seconds) up to 120. Moving the slider to zero will give you an unlimited amount of time.

Tip! Your practice session will end once either of these limits is reached. Practice sessions with an unlimited amount of time *and* ammunition will never end. This type of practice is useful but will not provide an after action review screen as described below.

Target Distance

Sets the initial distance of the target between 3 and 25 yards. This can be changed during a practice section by using the distance settings in the Side Menu as described below.

Countdown

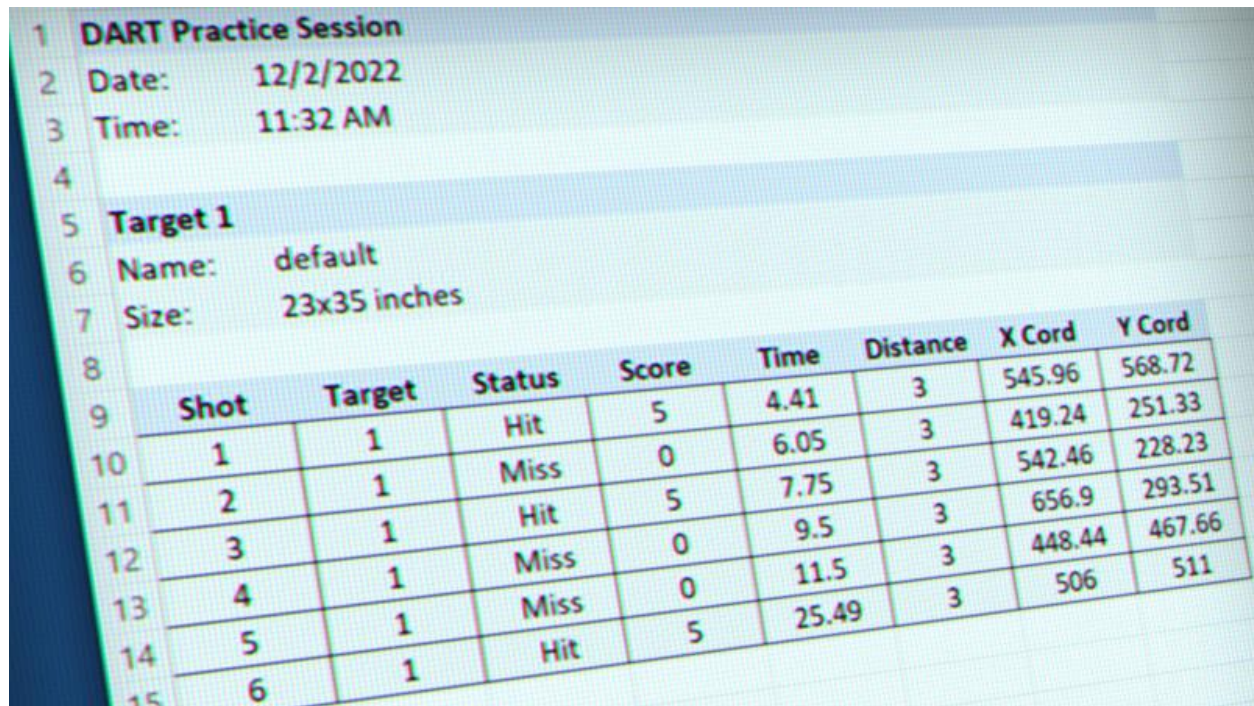
Sets a countdown before the start of a practice session between 1 and 9 seconds. Setting the countdown slider to zero will prevent a countdown from being shown.

Dual

When the Dual option is checked, the practice session will change to a two lane configuration. The target is always the same for both lanes, but their distances can be independently controlled with the side menus.

Save Data

You can toggle the Save Data button on and off. When on, DART Range will create a data file of your practice session which can be loaded into a spreadsheet program.



1	DART Practice Session							
2	Date:	12/2/2022						
3	Time:	11:32 AM						
4								
5	Target 1							
6	Name:	default						
7	Size:	23x35 inches						
8								
9	Shot	Target	Status	Score	Time	Distance	X Cord	Y Cord
10	1	1	Hit	5	4.41	3	545.96	568.72
11	2	1	Miss	0	6.05	3	419.24	251.33
12	3	1	Hit	5	7.75	3	542.46	228.23
13	4	1	Miss	0	9.5	3	656.9	293.51
14	5	1	Miss	0	11.5	3	448.44	467.66
15	6	1	Hit	5	25.49	3	506	511

Data can be saved for one or two lane practice sessions and includes the following information:

- **Shot** – the number of the shot taken.
- **Target** – the number of the target shot.
- **Status** – labels the shot as a hit or miss. Any shot resulting in a score of 0 or less is considered a miss.
- **Score** – the score resulting from the shot.
- **Time** – the elapsed time between the beginning of the practice until the shot was fired.
- **Distance** – the distance in yards of the target being shot.
- **X Cord** – the number of pixels from the left most side of the screen to the center of the shot taken.
- **Y Cord** – the number of pixels from the topmost side of the screen to the center of the shot taken.

The DART screen is 1,024x768 pixels in size, so a shot with coordinates of X=512 Y=384 would be exactly in the middle of the screen.

The data file can be found in the DART 4/DART Data/Practice Data folder. Each file is named using the date and time of the practice session.

Environment

The Environment options allows you to set the overall appearance of the practice scene by adjusting the lighting and the scene viewpoint.



Time of Day

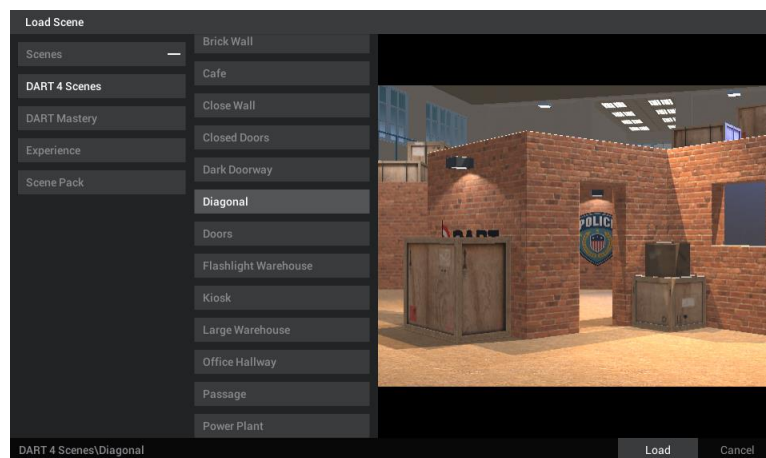
The Time of Day slider is used to simulate lighting that may occur at a particular time of day. The default setting is 0 – or noon. Moving the slider to the right moves into afternoon and evening, while moving the slider to the left move through morning hours. Time of Day affects shadow direction and intensity, ambient light color, and overall scene brightness. The Time of Day setting does not affect the appearance of video sequences.

Try It! Try moving the Time of Day slider back and forth and notice the effect it has on your scene.

Load Scene

Groups of props can be saved together and later reloaded as scenes. A scene contains all information about each prop in the group including placement, movement, and settings. This can make course creation easier because it allows you to use previously constructed scenes without recreating them from scratch.

The Load option opens a dialog which shows a list of available scenes. Loading a scene will completely replace all props in a stage, with the props in the newly loaded scene. Like other load windows in DART, the left column shows a list of folders which contain one or more scenes. Clicking a folder will show a list of available scenes in the right column.



Single-clicking a file name will display a preview image of the scene you have selected. Double-clicking a name will load the selected scene or you may select a name and click the Load button at the bottom right of the window. Clicking the Cancel button will close the window without loading a scene.

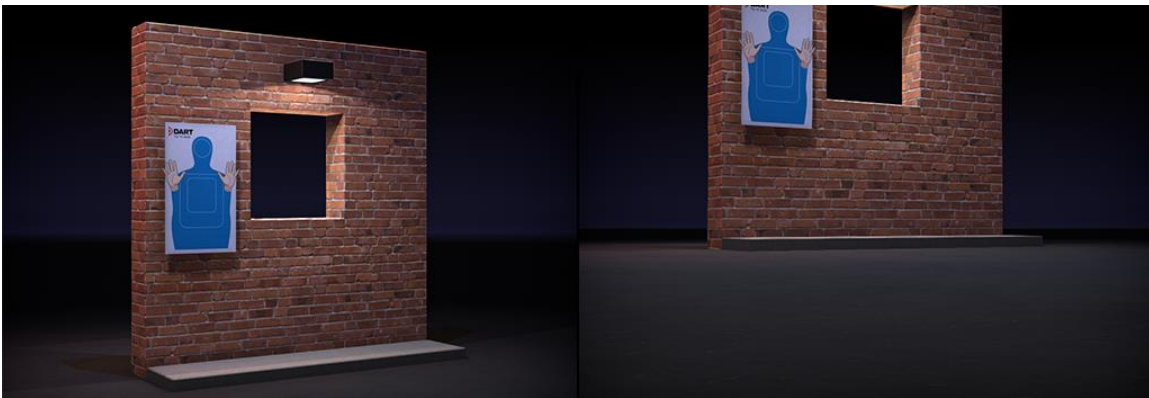
Tip! A quick way of removing all props in a stage is to load the Empty scene.

Load Environment

Environments are files that can adjust the viewpoint (or camera) position, ground cover, and lighting of a practice session. While you are not able to create your own environments, there are several pre-saved options available.

The default view in DART is approximately 6 feet above the ground, but what if you wanted to practice firing while lying on the ground? In this case you could use a different environment to change the view.

Try It! Click the Environment button and load the environment called default/Prone. Notice that your viewpoint now is very close to the ground.



Black

This option turns the environment off so that it appears black. The only things that will show will be the target(s) and props if any.

The Side Menu

The Side Menu option toggles the display of a target menu to be on the left side of the screen, the right side, or off. The side menu allows the shooter to control various aspects of the range.



+1 / -1 – moves the target forward or backwards one yard.

+5 / -5 – moves the target forward or backwards five yards.

Zoom – instantly brings the target forward. This makes it easy to check shot locations which may be difficult to see when the target is positioned far away.

Reset – clears all bullet holes from the target and resets the practice session.

The side menu is only intended for use during practice sessions. It is automatically hidden whenever a Course is run.

If dual lane mode is on, the left or right Side Menu will control both targets.

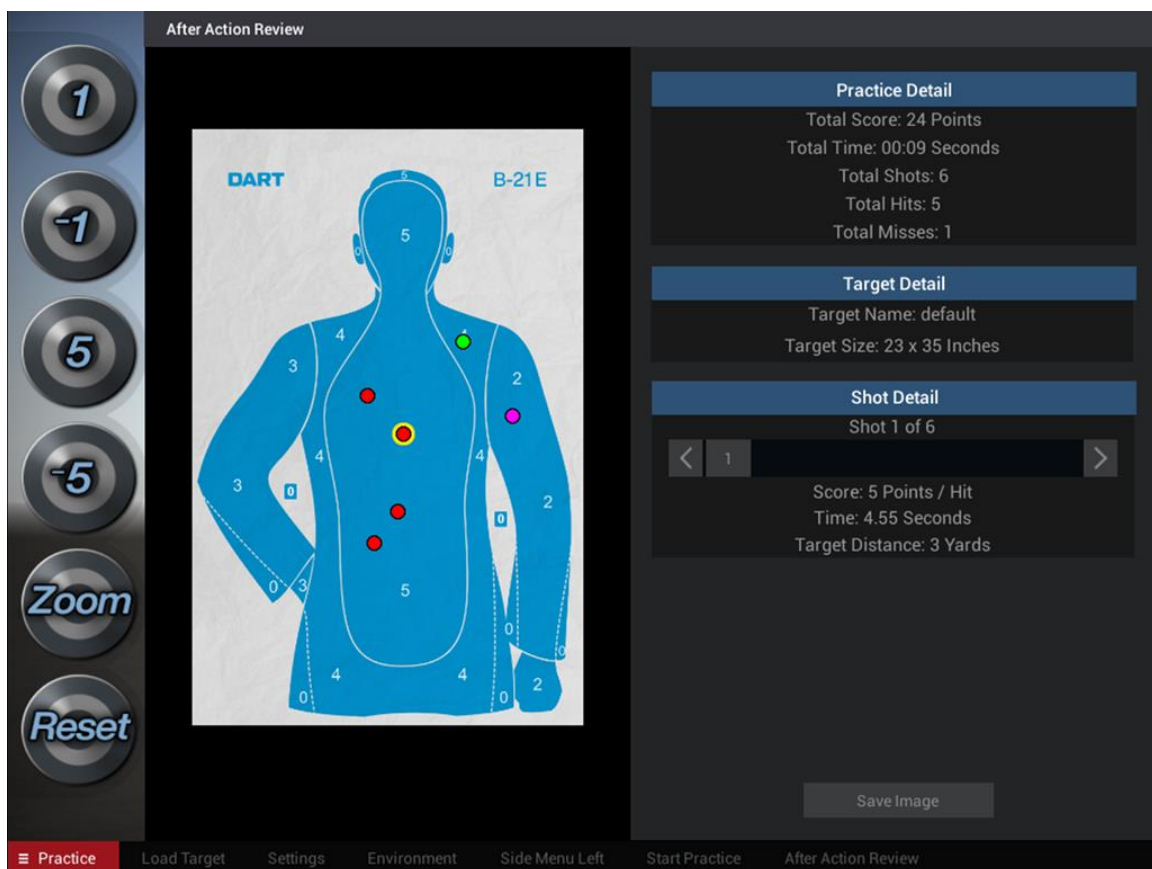
Tip! The Side Menu can also be set to Both if dual lane mode is enabled. In this case, the left menus control the left target and the right menus control the right target.

Start Practice

Runs a practice session as defined by the practice setting options.

After Action Review

Clicking the Action Review button will open the After Action Review of the last completed practice session. Once a practice session ends, an After Action Review will automatically appear.



The After Action Review allows you to step through each shot of the session and view shot placement, timing, and score. Shots are shown as colored circles which reflect the color of the target zone they hit.

Practice Detail - displays the total score and time of the practice session. It also shows the total number of shots, hits, and misses. A miss is defined as any shot that does not strike a target zone.

Target Detail - displays the name and size of the currently selected practice target.

Shot Detail - displays the number, timing, and target distance for the currently selected shot. Also displayed are the shot score and whether the shot was a hit or miss.

Tip! Bullet hole circles are only shown for shots that hit a target zone. It will not show shots that miss the target completely.

Save Image

Saves a JPG image of the target being reviewed along with its associated shot markers. The image will be saved in the DART Data/Results folder and will include the date and time the course was run in the image name.

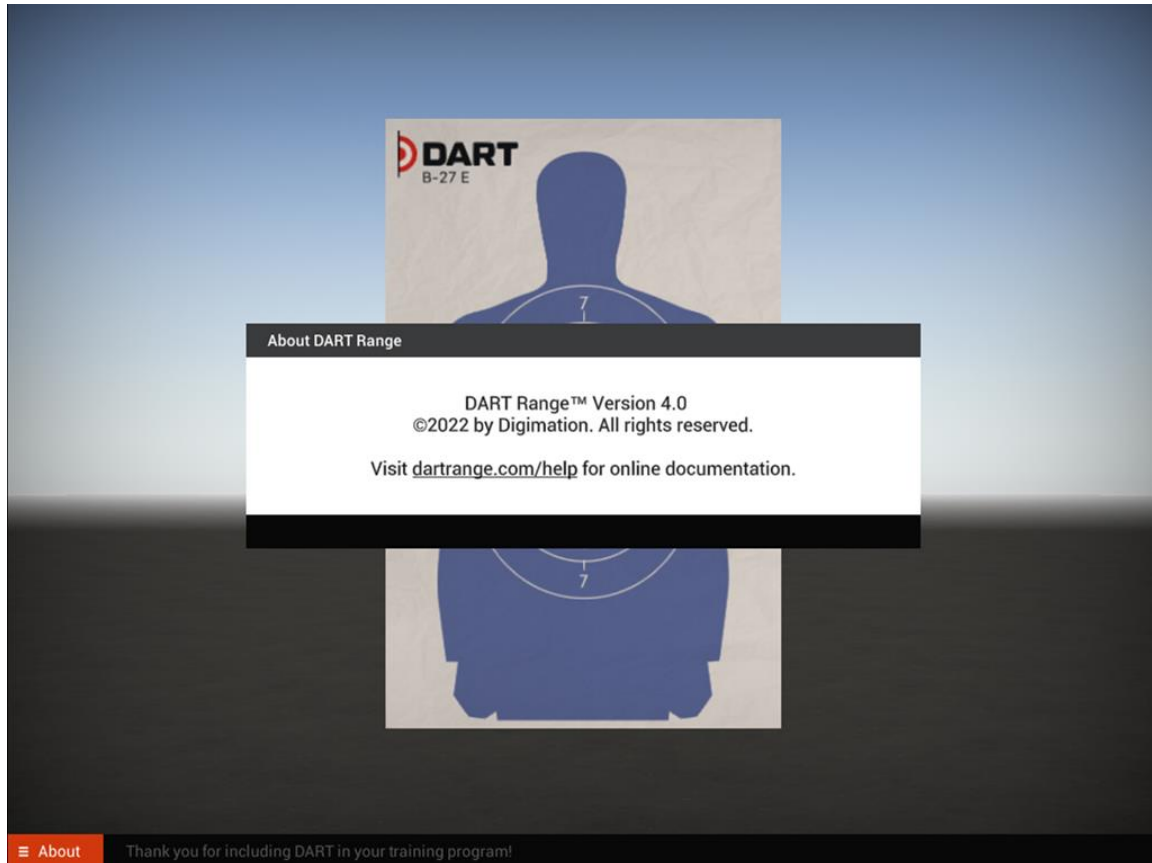
Target Zoom

In many cases, particularly where there is little movement in the aim point, it is helpful to zoom into the target for a closer look. This can be done by using the mouse scroll wheel to zoom into the target image.

To exit the After Action review screen, select another menu item from the main menu at the bottom left of the screen, or shoot the Reset side target (if showing). You can reopen the After Action Review window of the last completed course by selecting the Action Review button at any time.

About

Displays information about the program's version number and a link to this website containing program documentation.



To exit the About screen, select another menu item from the main menu at the bottom left of the screen.

THE COURSE MENU

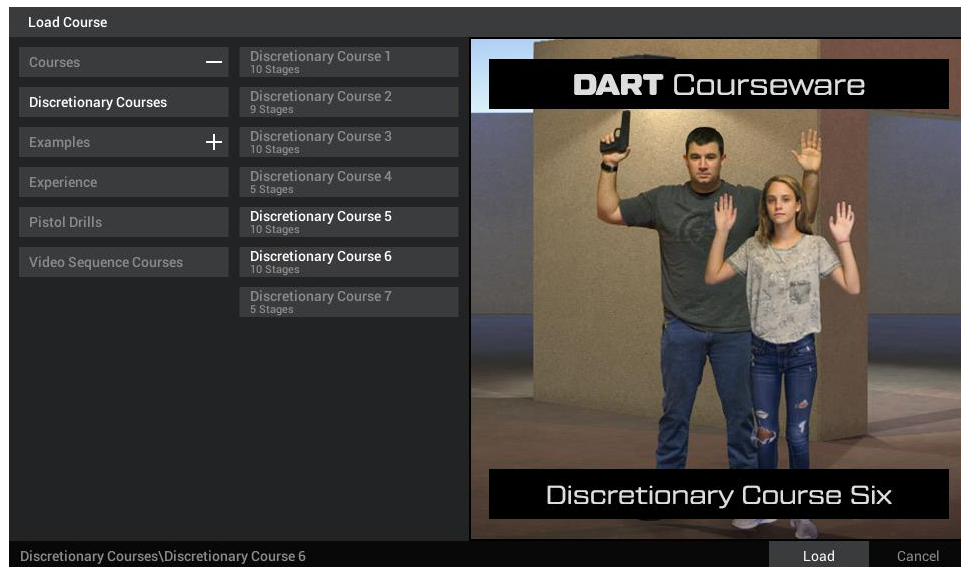
DART Range can run a wide variety of courses built with DART Creator or DART Studio. The Courses menu provides options for loading and running these courses.



Load Course

An infinite variety of courses can be created in DART Creator and DART Studio software. Those courses, with their varying targets, rules, and requirements, can be loaded into DART Range using the Load Course button.

DART courses can be saved in different folders inside the DART Data/Courses directory. When you select a folder by clicking on a folder name in the left-hand column, a list of courses contained in that folder will appear in the right-hand column. Once you select a course, a preview image of the course will be displayed. Click the Load button at the bottom of the dialog window to load the selected course.



Tip! A plus (+) icon next to a folder name indicates that the folder contains additional sub-folders. Click the plus icon to open the folder and view its sub-folders. Clicking the minus (-) icon will close the sub-folders.

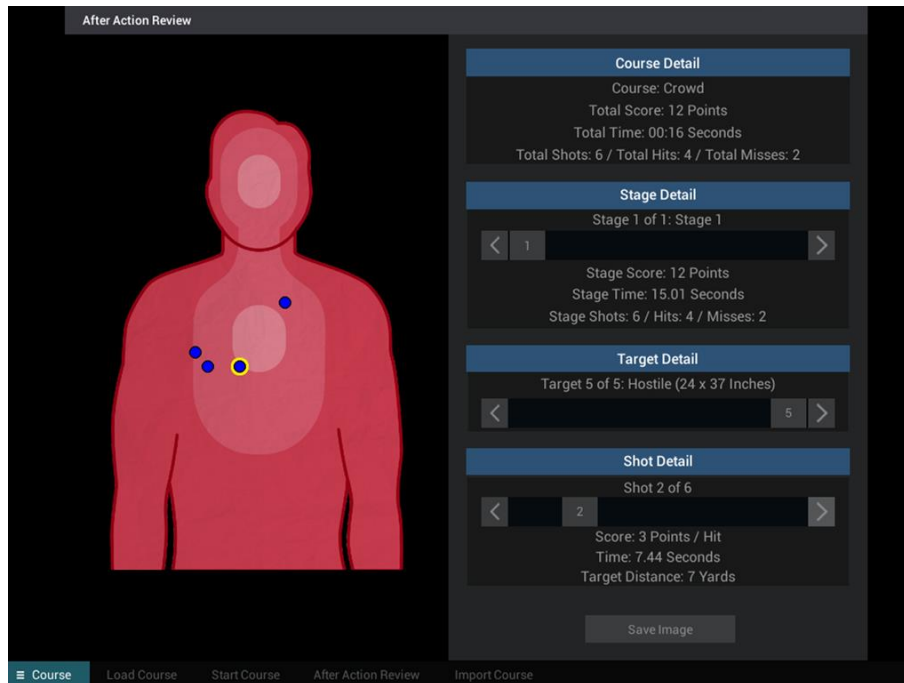
Start Course

This will run the currently loaded course. Starting a course will reset all values, scores, and timers. After completing a course, you will be shown an After Action Review.

Tip! The side menu and certain keyboard shortcuts are inactive while running a course.

After Action Review

The Action Review button will open the After Action Review of the last completed course. Once a course ends, an After Action Review will automatically appear. The After Action Review allows you to step through each stage, target, and shot of the course and view shot placement, timing, and score. Shots are shown as colored circles that reflect the color of the target zone they hit.



Course Detail

Displays the final course score and a Pass or Fail grade based on the course settings. It also indicates the total shots and amount of time taken.

Stage Detail

Shows the stage name and number containing the target currently under review, as well as the shot count and amount of time the shooter spent on the selected stage. The slider allows you to move through the various stages that were in the current course.

Target Detail

Displays the name, number, and size of the currently selected target. The slider allows you to move through the various targets that were in the current stage.

Shot Detail

Displays the number, timing, and target distance for the currently selected shot. It also indicates if a shot was a hit or miss.

Tip! Shot detail only shows shots that hit a target zone. It will not show shots that miss the target completely.

Save Image

Saves a JPG image of the target currently being reviewed along with its associated shot markers. The image will be saved in the DART Data/Results folder and will include the date and time the course was run in the image name.

Target Zoom

In many cases, particularly where there is little movement in the aim point, it is helpful to zoom into the target for a closer look. This can be done by using the mouse scroll wheel to zoom into the target image.

To exit the After Action Review window, select any other menu or command on the bottom command bar. You can reopen the After Action Review window of the last completed course by selecting the Action Review button at any time.

Tip! Courses with a fixed number of shots *or* limited amount of time will end once either of those limits are reached. Courses with an unlimited amount of time *and* ammunition will never end. These types of courses are useful for practice but will not provide a review screen as described here.

Import Course

DART courses are made up of many individual elements including targets, props, environments, instructions, rules, and so on. To make sharing courses easy, DART Studio and DART Creator have an Export feature. This is very different than saving a course, which only saves the base course file. By contrast, the Export options saves the course and every other asset required by that course as a single ZIP file. This makes it easy to share a course (and all related files) with another location or department with a DART system.

The Import option allows you to load a ZIP file saved from DART Studio or DART Creator.

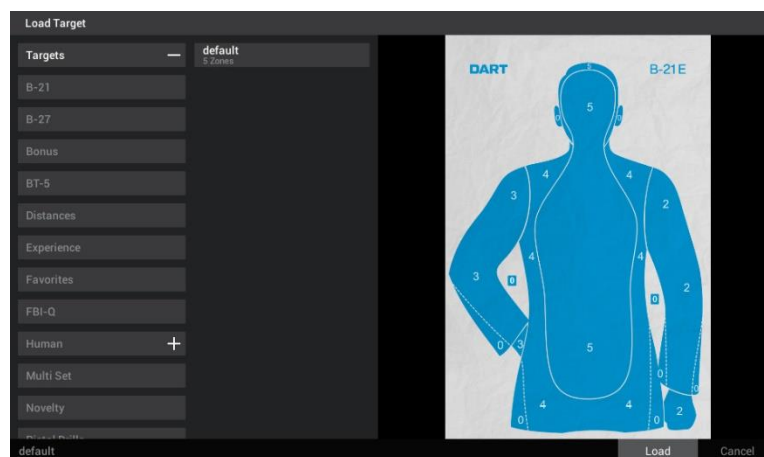
THE TRACE MENU

DART Trace adds real-time shot tracking to DART Range, which is particularly useful for accessing the capabilities of new students. DART Trace tracks the movement of a firearm during all phases of a shot: target acquisition, aim, trigger pull, and follow through. Once a shot is made, the shooter's aim point can be replayed in real time along with various data points, which can be used to analyze shooting performance.

DART Trace requires a dedicated laser training weapon that is available as an option to the DART system.

Load Target

The Load Target options opens a dialog window to load a pre-saved DART target for use in Trace training.



The load window in DART is a little different than those found in a typical Windows program. The left column shows a list of folders which contain one or more courses. Clicking a folder will show a list of available targets in the right column.

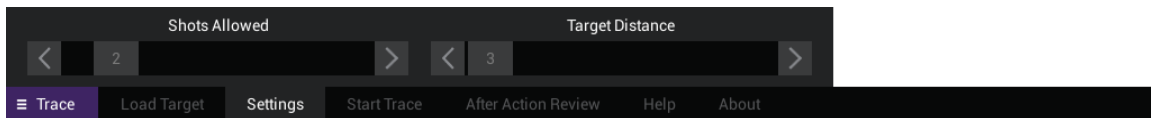
Single-clicking a file name will display a preview image of the target you have selected. Double-clicking a name will load the selected target or you may select a target name and click the Load button at the bottom right of the window. Clicking the Cancel button will close the window without loading a target.

Tip! DART comes with more than 100 prebuilt flat targets, and it is possible to create your own using DART Creator or DART Studio.

Settings

Trace training sessions are defined by the number of shots allowed and the distance of the target from the shooter. Trace sessions are not limited by time.

Trace training sessions are limited to ten shots or less and the target can be placed anywhere between 3 and 25 yards away.



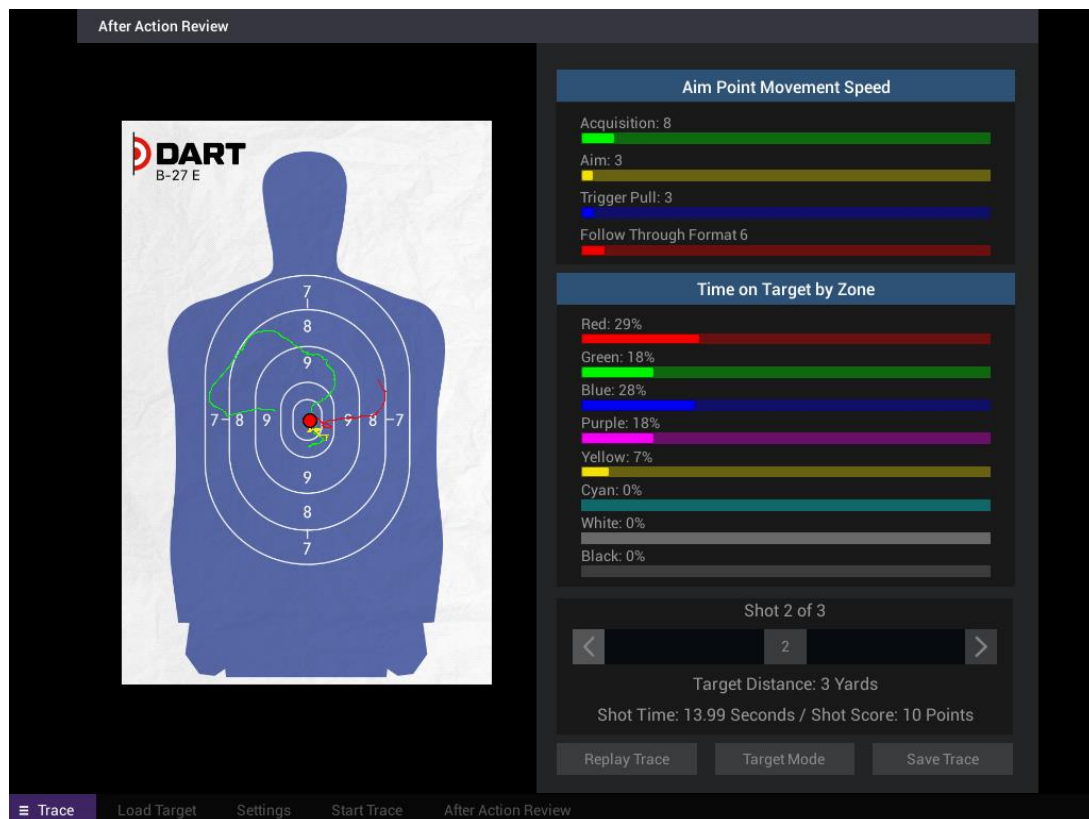
Start Trace

This will start a Trace training session using the currently selected target and settings.

After Action Review

The Action Review button will open the After Action Review of the last completed Trace session. Once a Trace session ends, an After Action Review will automatically appear.

The After Action Review allows you to step through each shot and view shot placement as well as the aim path prior to, and immediately after, a shot is made.



Shots are shown as colored circles that reflect the color of the target zone they hit. The tracing line is also shown in a range of colors, based on the timing of the shot.

The green line marks the path of the aim point prior to one second before the shot is taken. In DART Trace this is referred to as the acquisition phase.

The yellow line marks the aim point for one full second just before the shot is taken. This is referred to as the aim phase.

The blue line marks the aim point during the trigger squeeze, also referred to as the trigger pull stage.

The red line marks the aim point for one full second after the shot is taken. This is known as the follow through phase.

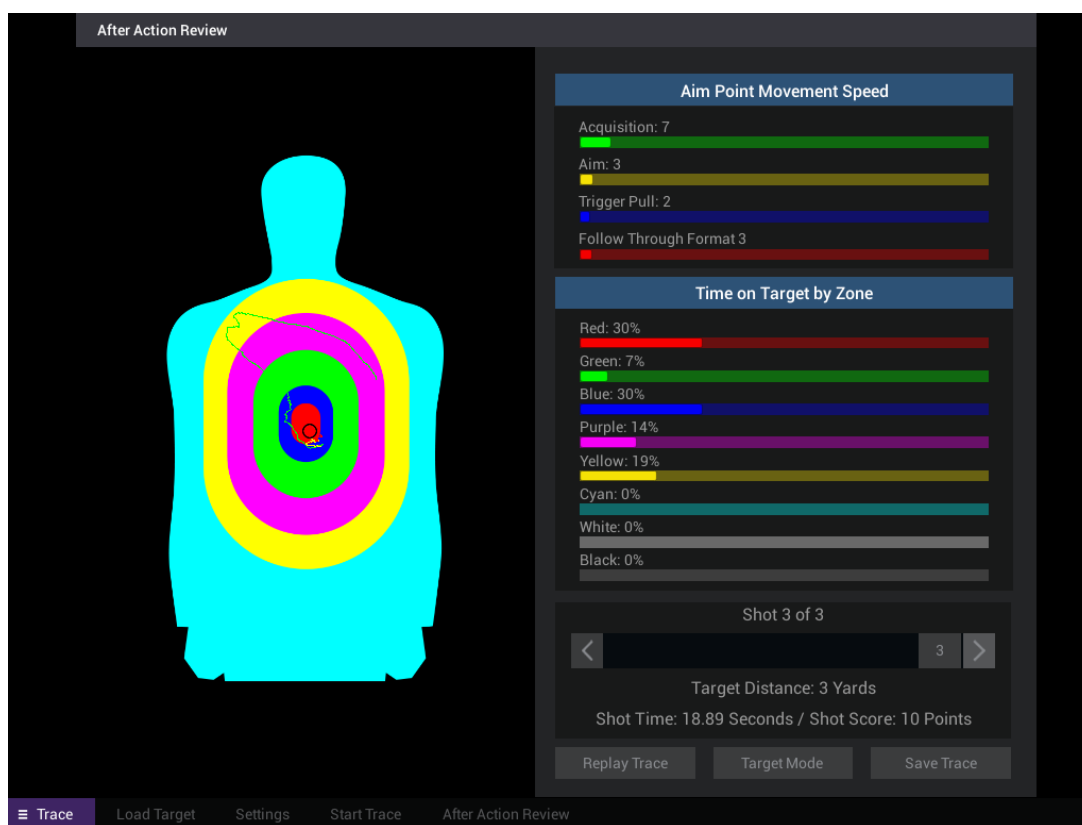
Muzzle Movement Speed

Under the Muzzle Movement Speed section of the After Action Review, DART Trace shows the relative speed of the aim point for each phase of firing with values ranging from 1 to 100. The higher the number, the faster the movement of the barrel. For example, a value of 2 would indicate a barrel that is very still, while a value of 70 would indicate a rapidly moving barrel.

Time on Target by Zone

DART uses two images to make a target. One image looks like a traditional target. A second “zone” image is used to let the computer know which areas of the target have special meaning. Targets can have up to eight zones, each defined by a different color.

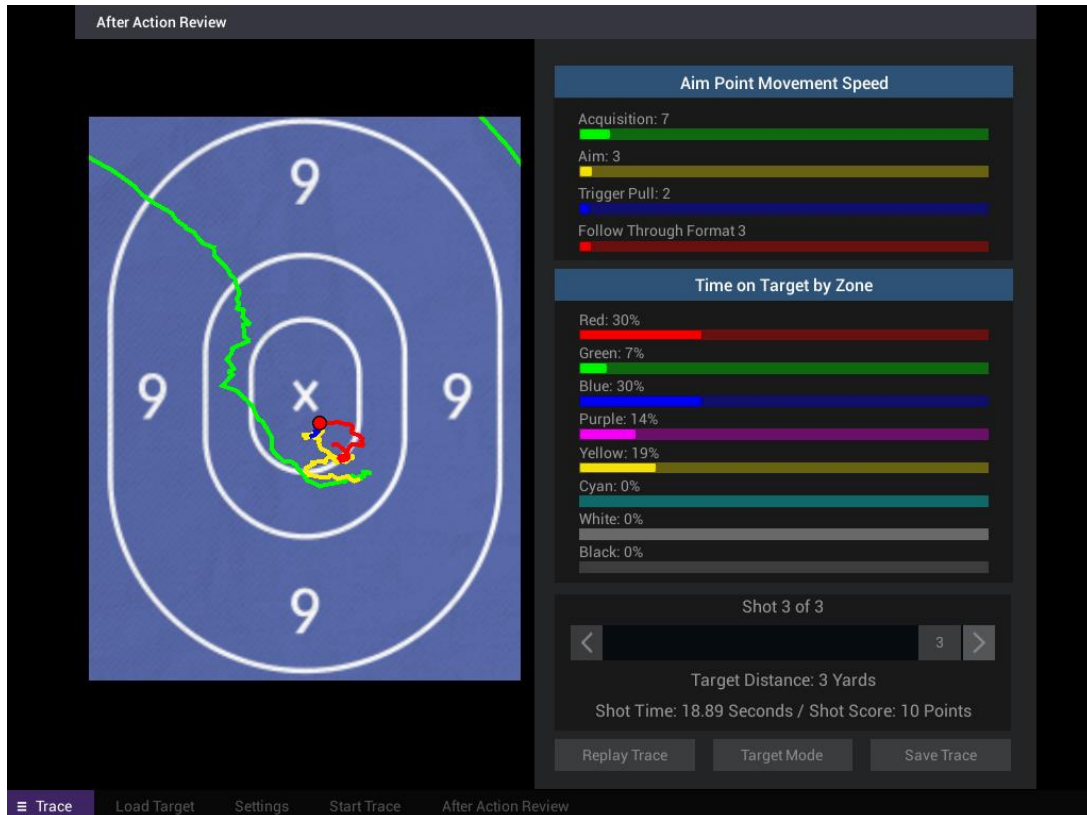
You can toggle the display between the main target image and it’s scoring zones by clicking the Target Mode button. An example of a target’s zones are shown below.



The Time of Target gauges display the amount of time the aim point of a shooter spends in each scoring zone. In this example, the shooter spent 35% of his total shot time point at the red zone.

Target Zoom

In many cases, particularly where there is little movement in the aim point, it is helpful to zoom into the target for a closer look. This can be done by using the mouse scroll wheel to zoom into the target image.



When you are zoomed into a target, press and hold the left mouse button while moving the mouse to pan around the target area.

Replay Trace

Clicking the Replay button will play back the muzzle trace in real-time. This is particularly helpful for picking out movement associated with breathing, recoil anticipation, and other potential problem areas.

Target Mode

Changes the view of the target from normal view to zone view.

Save Trace

Animated traces can be saved to disk as video files by clicking the Save button.

Shot Selection

The Shot slider at the bottom of the After Action Review allows you to select any shot taken during a Trace session. Once a shot is selected, the color gauges will update as well as the target distance, shot time, and score for the selected shot.

Tip! Shot detail only shows shots that hit a target zone. It will not show shots that miss the target completely.

Exit

The Exit button will close the After Action window and return to the Trace menu.

Tip! You can reopen the After Action Review window of the last completed Trace session by selecting the Action Review button at any time.

The Trace Training Weapon

DART Trace uses a specially developed training weapon in which the laser remains constantly ON once the gun is activated and turns OFF briefly when the trigger is pulled.

Tip! Remember, to use Trace, DART Range must be properly calibrated properly. If you need help, see the section on setup and calibration in this document.

The Trace training weapon is available as either a pistol or rifle. It can only be used in the Trace portion of DART Range and will not work for regular courses.

Activate your Trace training weapon pulling and releasing the trigger. Even though you do not see the laser, it should be on. You can test this by pointing the gun at the screen. A red circle at the bottom right of the screen will turn on whenever the program detects a laser. If you do not see the red circle, or if the red circle is always on even if the pistol is not pointed at the screen, make sure that the program is calibrated correctly.

Tip! If the trigger is not pulled within 35 seconds, the laser will deactivate. This helps extend battery life.

Tip! Trace is not intended to analyze rapid shots. To get the most useful information, make sure that there are at least three seconds between shots.

THE SETUP MENU

Before DART Range can be used, it must be calibrated. This is done with the commands found in the Setup menu. In addition, the calibration process will use the size of the projected image and the average distance of the shooter from the screen to make sure that targets and scene objects are always shown at the correct size.

Calibration should be done anytime you start the system, or if the DART computer or projector are accidentally bumped or moved. Once you are comfortable with the process, you should be able to calibrate the system in about a minute.



Calibration

Calibration is a two-step process that aligns DART's camera and the projected image so that shots can be accurately tracked.

The first step is to position DART so that it captures the entire projected image. The second step defines the extents of the projected area and measures the maximum brightness of the projected image.

Step 1: Position the Projector

Position the projector so that it projects an image approximately 6 feet wide and 4 feet tall. For the projector that comes with most DART systems, this will be about 10-12 feet away from the wall or screen. Ideally, the projected image should be large enough to display targets that are actual size. If you are using a short-throw projector, the projector will be 3-4 feet from the wall or screen. Adjust the focus and zoom settings of the projector as needed.

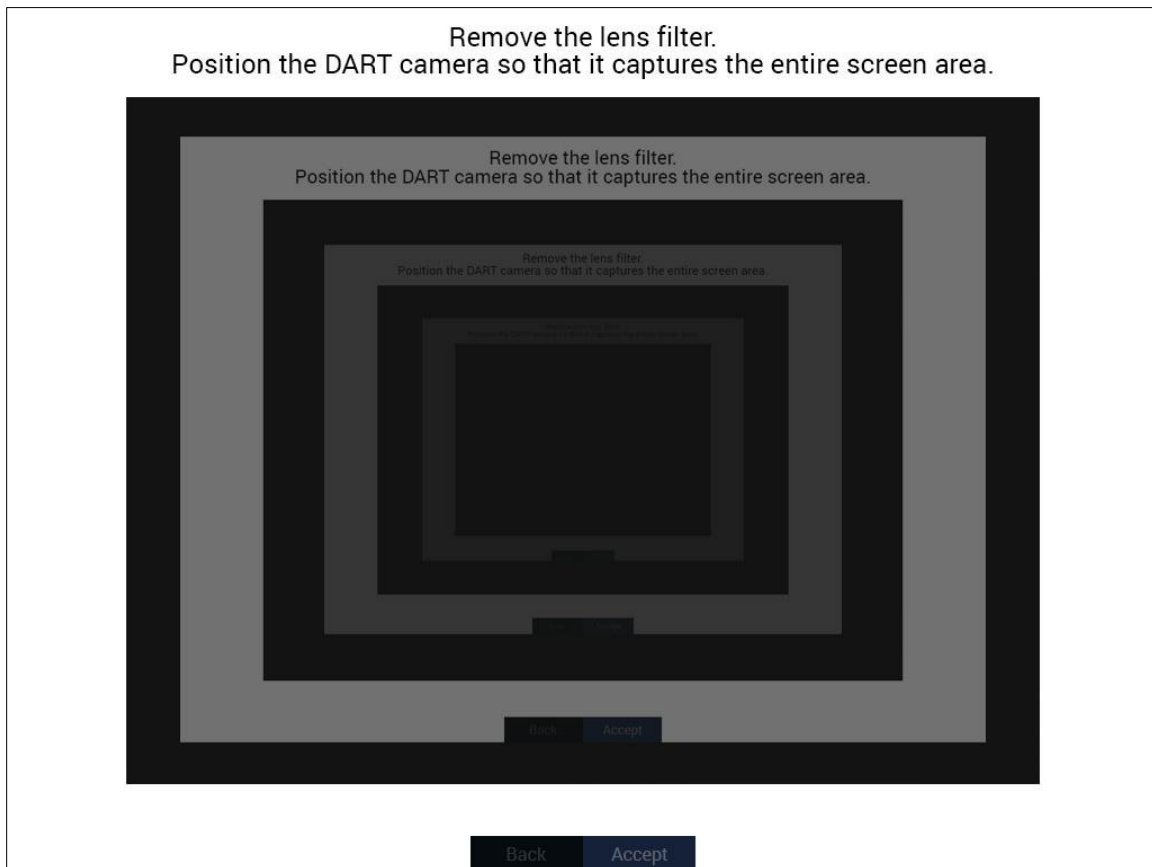
For now, position the DART system next to the projector. We'll adjust the exact position in the next step.

Tip! Before proceeding, make sure the room lights have been dimmed. DART does not require a dark room; however, for best results, it should be free of direct sunlight and bright room lights.

Step 2: Begin Calibration and Position DART

For this step of the calibration, make sure that there is no lens filter inserted in the DART system.

Click the Calibration button in the Setup menu. The projected image will turn white and display a “picture-in-a-picture” window in the center.



Position DART so that it completely captures the entire projected image. You can adjust the position of DART by loosening the tripod head and rotating the DART unit. Once the position is correct, tighten the tripod head. Once DART is positioned correctly, click the Next Step button to continue.

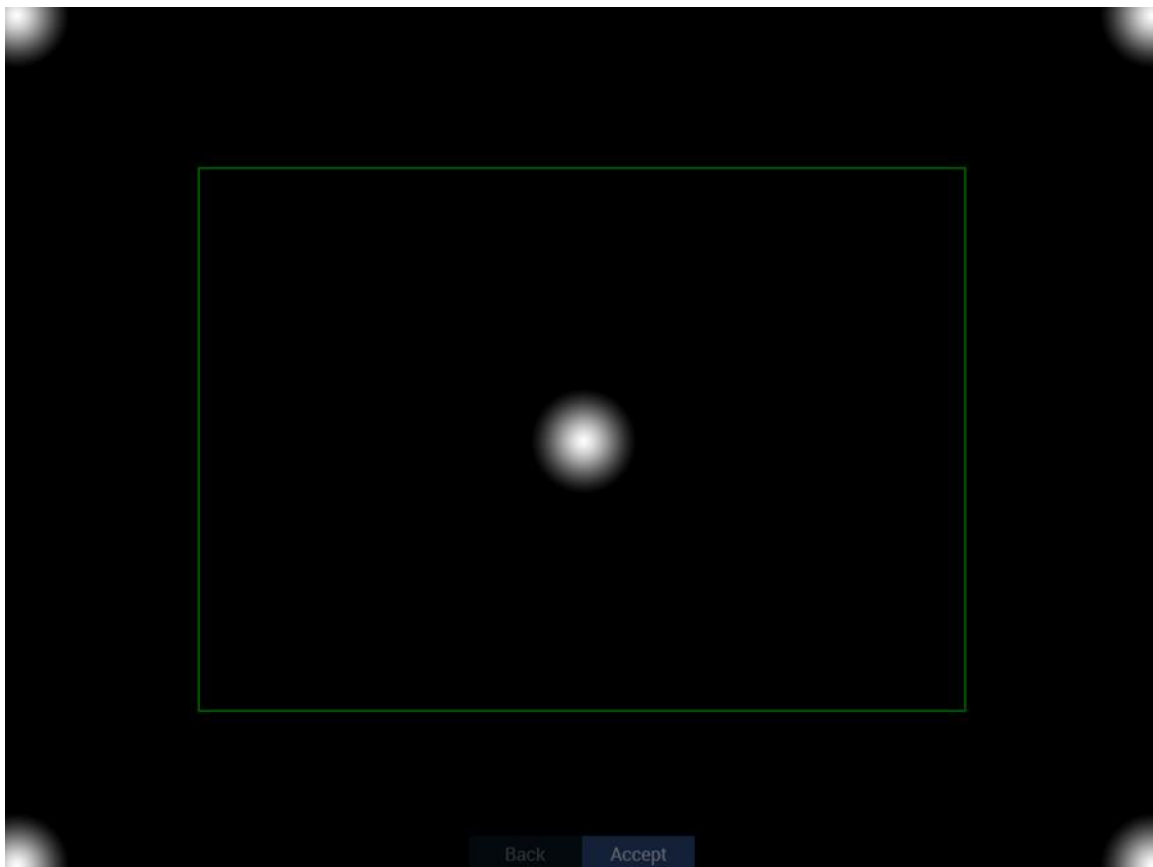
Important! Make sure there is an inch or two of black space around the white frame. This will ensure that the camera is capturing the entire image.

Once DART is positioned correctly, click the Next Step button to continue.

Tip! Depending on the brightness of your projector, the buttons on the DART screen may be bright enough to confuse the calibration process. In this case, use the plus and minus keys of your keyboard to adjust the brightness of the screen buttons.

Step 3: Continue Calibration

The screen should display five white circles and a green rectangle in the middle of the screen. If the program has difficulty drawing the rectangle, it probably means that something is obstructing the view of the camera or projector, or that the system is detecting areas on the screen which are brighter than the calibration circles. This can happen if the camera sees areas of bright light like an open window or light bulb.

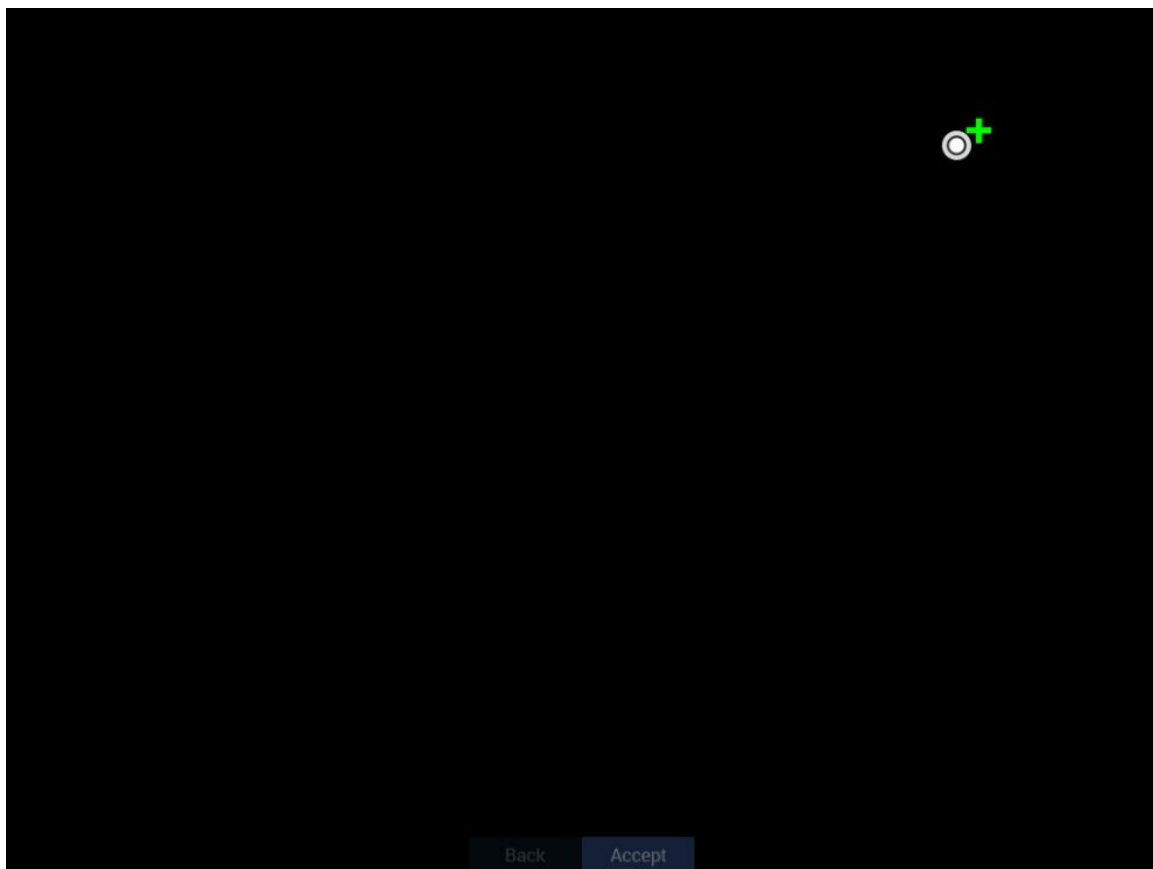


Once you see the rectangle, click the Accept button to move to the next step.

Important! If you do not see the rectangle, refer to the Troubleshooting section.

Step 4: Continue Calibration and Install the Camera Filter

The program will display a series of small white dots, one at a time. As soon as the program recognizes the dot, it will draw a small green calibration cross (this will happen almost instantaneously). Once you see the green cross, click the Accept Calibration button to advance to the next dot.



Repeat this process for all five white dots. Once all dots have been detected calibration is complete.

Install one of the lens filters that came with your DART system. If you are using a training weapon with a visible laser, use the red filter. If you are using an invisible laser, use the black (very dark red) filter. Drop the filter into the slot in the front of the DART system.



Once the proper filter is in place, the system is calibrated. Now you can use the Settings options to fine tune the system to your particular installation.

Settings

The Settings options ensure that the target size is correctly calculated and displayed based on the size of the projected image and the distance of the shooter from the wall/screen.



Screen Size

For DART to draw targets at the correct size it needs to know the size of the projected image. This is done through the Screen Size slider. Moving the slider back and forth will change the size of an orange measurement graphic projected in the center of the screen. Adjust the size of the box until it is one foot wide. DART will use this information to calculate the current screen size.

Tip! If you must use a Target Scale setting of less than 50, your projector may be too far away from the screen and creating an image that is too large. Generally, your projected image should be 4-6 feet tall.

Shooter Distance

The Shooter Distance slider tells DART how far away (on average) the shooter is from the screen. Many DART courses will encourage the shooter to move while firing, so the distance does not need to be exact. Generally, you will use the furthest distance. For example, if the shooter will be moving between 4 feet and 12 from the screen, move the slider to 12.

Shot Separation Time

DART uses an internal clock to differentiate between multiple shots. If a certain amount of time of “no laser light” passes, then the next instance of laser light is counted as another shot. This is why you can move a laser pointer (continuous light) around the screen and it will be treated as a single shot, but a rapid sequence of trigger pulls from a laser weapon is treated as multiple shots.

Normally, you will not need to adjust this setting, however there are some cases when you may need to. Consider these different circumstances:

- A rifle in automatic mode firing rapid laser bursts on and off.
- A Taser training device firing two lasers (top and bottom), just a few milliseconds apart.
- A training gun with recoil using a laser that is activated by vibration. In some cases, the motion of the gun going forward and backward creates two vibration (laser) events.

In the first two examples, we would want DART to register separate and distinct shots.

In the third example, we only want to recognize the first shot and suppress the second.

This can be achieved with the Shot Separation Time slider. The slider moved from 0 to 100 (milliseconds). If 50ms is selected, once a shot is registered, the system will not recognize any other shot for the next 50ms. So, a rifle on automatic would require a very low setting. On the other hand, if you are using a recoil gun and find that it is registering multiple shots with each trigger pull, you might adjust the slider higher so that only one shot is registered each time you pull the trigger.

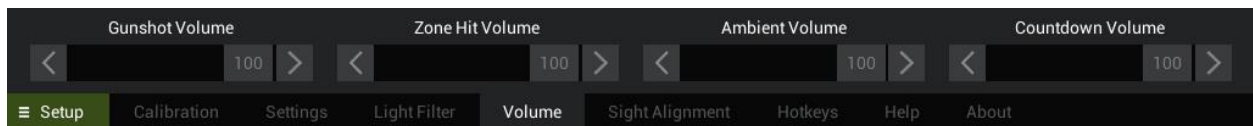
Luminance Clamp

The Luminance Clamp slider sets a threshold for laser detection. For example, if it is set to 170, anything on the screen with a brightness higher than 170 will be treated as a shot. The Luminance Clamp has a “ghost” handle which cannot be adjusted. It displays the value of the brightest area of your screen.

Once the filter has been installed, and depending on room light, the ghost handle should have a value of less than 50 (under 10 is ideal). Since laser light typically registers between 225 and 250, setting the slider value to 200 (the default value) should be low enough to capture the laser and high enough to ignore projector and ambient room light.

Volume

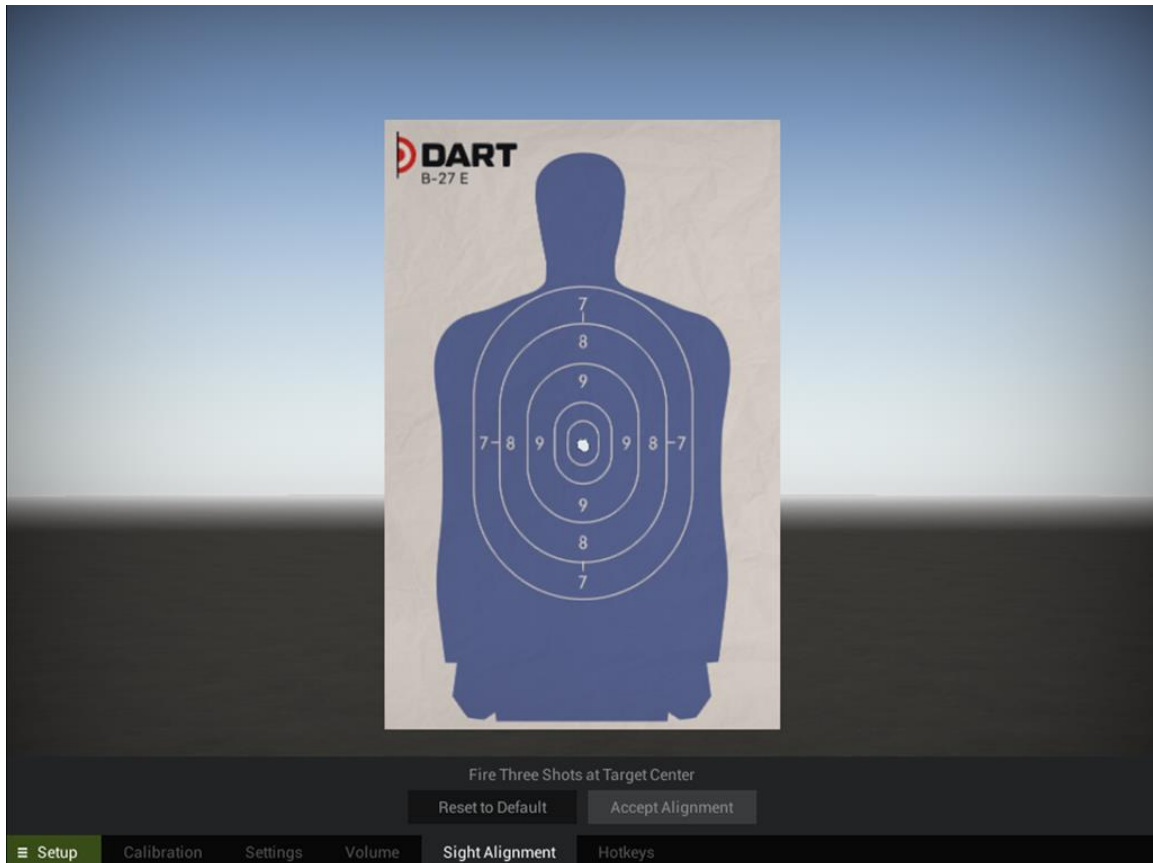
DART Range allows you to independently adjust the volume of gunshots, zone hit sound effects, ambient sounds (which includes video instructions), and countdown sound effects.



Tip! Remember that volume level is also controlled by the Windows operating system as well as the volume setting on the speaker itself.

Sight Alignment

Most laser training weapons have mechanical means of adjusting and aligning the sights. However, DART provides a way to make small adjustments in software rather than going to the trouble of adjusting a weapon by hand. This is done using the Sight Alignment option.



To use the Sight Alignment tool, make sure to use a target in which the center of the target is clearly defined. The B-27E target with an X in the middle is ideal.

Select Sight Alignment option and fire three shots at the center of the target. If you feel your aim is off on a shot, you may keep firing until you are satisfied with the last three shots.

Click the Accept Alignment button to accept the alignment information of the last three shots you fired.

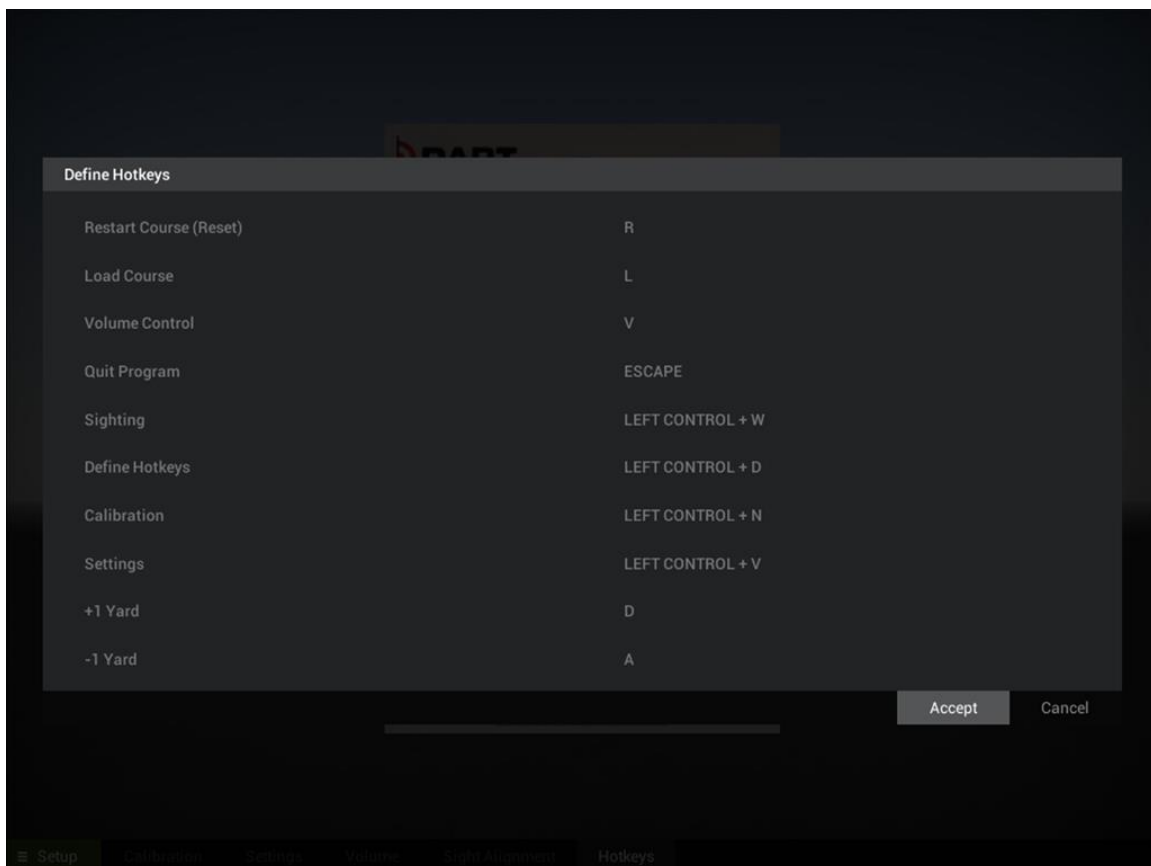
Now all shots fired from the current weapon should be aligned.

Tip! Remember that the new alignment will be applied to ALL weapons. If you are using more than one training weapon, you should adjust errant weapons mechanically. Also, keep in mind that the accuracy of the alignment is entirely dependent on the accuracy of your last three shots. If they are off, the final alignment will be off as well.

Hotkeys

Most program options may be quickly accessed through keyboard shortcuts. For example, you can restart a course no matter where you are by pressing the R key. These keyboard shortcuts can be viewed and changed using the Define Hotkeys option. To define a hotkey, follow these steps:

- Select the Define Hotkeys button.
- In the dialog window, use the mouse scroll wheel to move through the list of commands.
- Double-click the mouse button on the preferred command. The command will highlight.
- Press a key or key combination. DART recognizes Left Shift, Right Shift, Alt, and Ctrl keys separately.
- Select the Accept button to keep and save your settings.



End of Documentation