

Bertec Vision Trainer™

User Manual



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Bertec® Vision Trainer
A Division of Bertec® Corporation

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13.1	Licensee shall not initiate the use of the Product without fully complying with the Product activation procedures prescribed by Licensor.
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14.1	The validity, performance, construction, and interpretation of this Agreement shall be governed by the laws of the State of Ohio and the United States of America, excluding conflicts of laws, rules, and regulations.

Instructions for Use

This manual covers standard operating procedures for the following products:

- Bertec Vision Trainer System

WARNING: Federal law restricts this device to sale or on the order of a medical practitioner. When prescribed for therapeutic purpose, the prescriber should clearly define the parameters of use (i.e. total work, maximum heart rate, etc.) to reduce the risk of patient injury.



Read Carefully Before Proceeding

The Type 1004, Bertec® Vision Trainer (BVT) is intended as an objective platform used for training and rehabilitating subjects with vision, neurocognitive, and vestibular/balance disorders.

The Type 1004, BVT systems should only be operated by qualified personnel.

 **WARNING:** To avoid risk of electrical shock, BVT systems must only be connected to properly grounded power sources that are routed through the patient isolation transformer.

 The successful use of the Bertec® technology requires an appropriate level of professional expertise to develop proper treatment programs that are specific to the patient and their individual cases. The user should be confident they understand the operation of the system, can properly administer test protocols, and interpret results.

NOTE: Bertec® equipment must only be serviced by qualified personnel. Please do not attempt to service equipment yourself. Please contact Bertec® first for any service or support requests.

 **WARNING:** Do not modify Bertec® systems in any way. Modifications will void the warranty.

 For additional product service or support, please contact: Bertec® Corporation 2500 Citygate Drive, Columbus, OH 43219 phone: 614-450-0331 or support@bertec.com

General Maintenance

Bertec Vision Trainer systems require only basic maintenance, performed on an as-needed basis.

CLEANING INSTRUCTIONS (See Maintenance Manual)

BVT

- Wipe down the screen with damp cloth or Windex-like solution.
- Periodically clean air vents on the computer.
- Wipe down the balance plate with a damp cloth or standard cleaning solution.

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Company Overview



Bertec is an internationally recognized designer, manufacturer, and marketer of research-grade and clinical biomechanical equipment and software. Used by athletic trainers, physical therapists, and other professionals working to understand the movement of the human body, Bertec's tools help athletes and patients to meet their performance and rehabilitation goals.

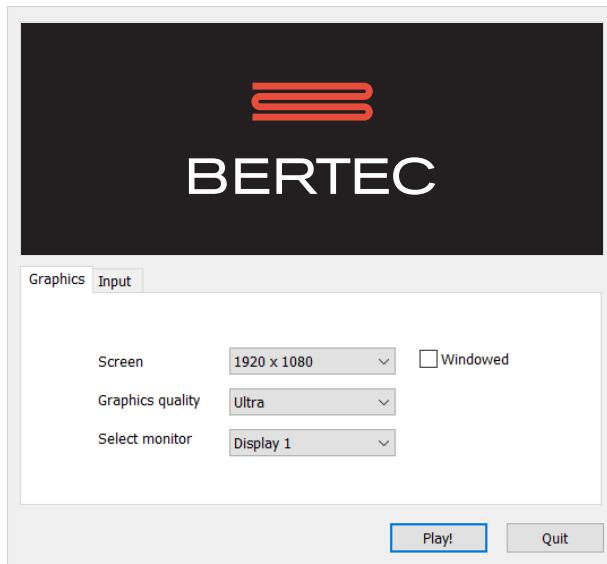
Institutions as varied as Nike, the US Olympic Swimming Team, Toyota Robotics, the NIH, Cleveland Clinic, Mayo Clinic, Harvard University, and hundreds of others around the world rely on Bertec, a 40-person technology firm based in Columbus, Ohio. Founded in 1987, Bertec continues to tackle some of the most ambitious engineering projects in multiple disciplines including biomechanics, mechatronics, immersive virtual reality, eye tracking, and computer vision to bring industry leading solutions to practitioners, researchers, and clinicians.

Dr. Necip Berme
Founder & President

BVT Product Manual

Getting Started

The Bertec Vision Trainer software is pre-loaded on the computer. To begin, click on the BVT app from the desktop icon or by searching “BVT” in the windows search bar. After opening the software, make sure the screen resolution is set to 1920 x 1080, the Graphic quality is set to High, and the monitor is selected.



Once the software has been loaded on the system, you will see the manage operators screen. The screen will have at least one admin profile with a preset password of **password**.

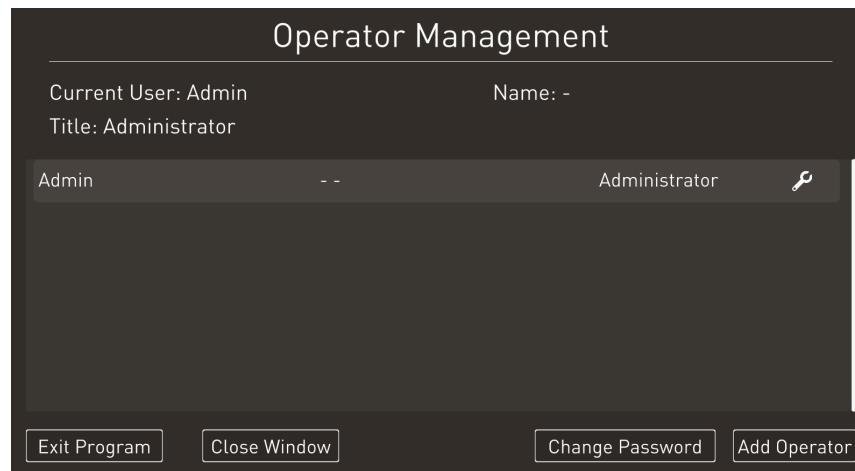


Fig. Operator Management screen

Successfully entering the password will direct the user to the main screen:

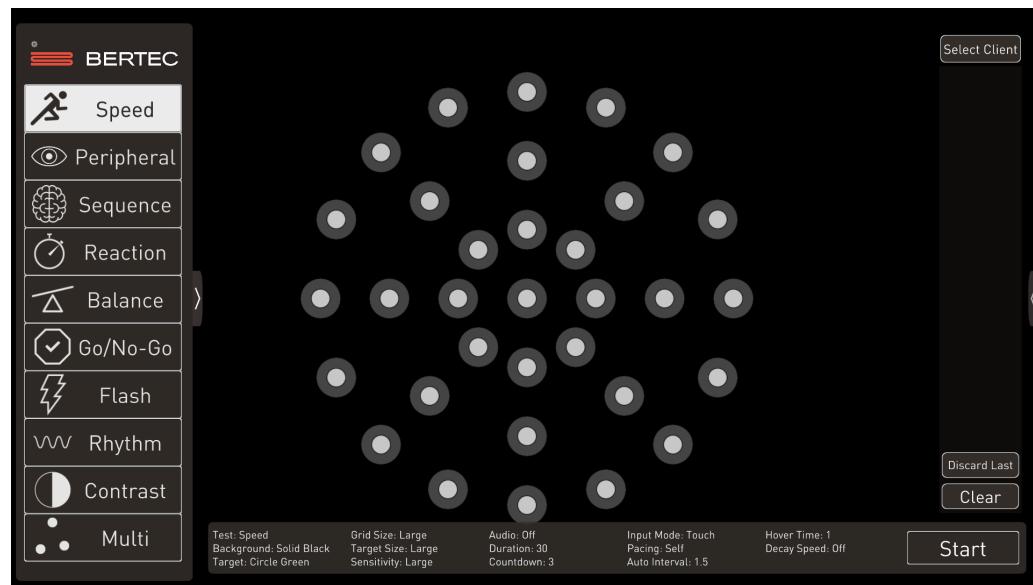


Fig. Main screen

Select Client

Next, click on the “Select Client” button to the top right corner of the screen. This is where you will enter new client information, select a new client to record data, or view past performance data.

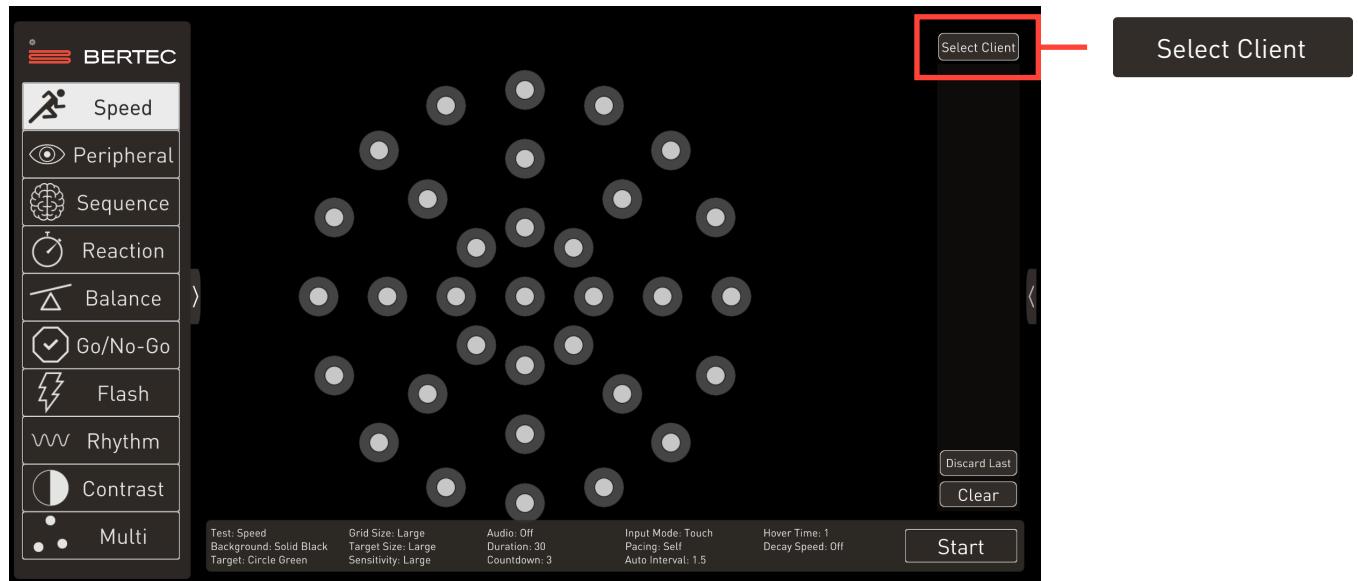


Fig. Main screen w/ select client highlighted

The client manager screen is where the client is selected. After a client is selected, all future data is saved to the client's profile, as long as they are logged in as the client. To add a new client, click on the “Add Client” button at the bottom of the screen.

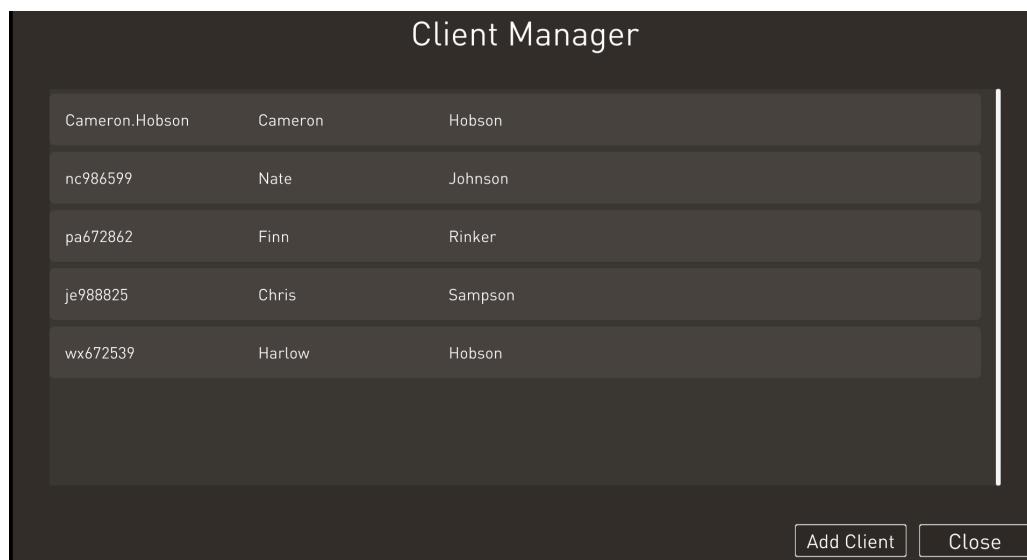


Fig. Client manager

Add Client

Adding a client is accomplished by opening the client manager and selecting the “Add Client” button. This will open the Add Client window.



Fig. Add new client window

Once the profile is filled, select the “Add” button to complete the profile. Warning: if a custom client ID is required, it must be completed at this time. If a change is required after completion of the profile, training data may be lost.

To begin training with an existing client, just click on their name and click the “select” button in the Client Details window.

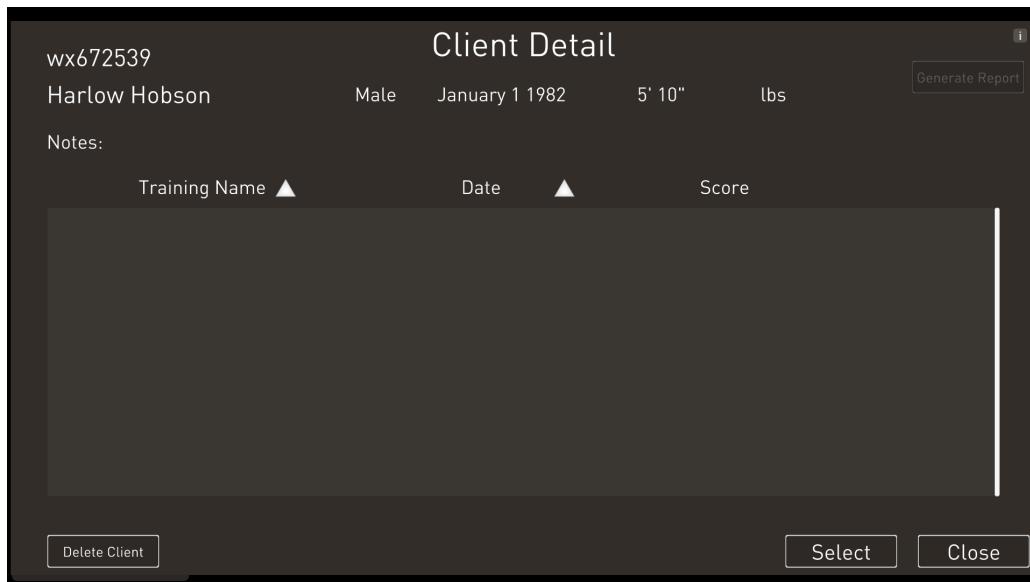


Fig. Client details screen with “select” client button. Subsequent session is recorded to client profile. This screen appears when selecting a new client.

For established clients in the database, the training history appears, as below:

The screenshot shows the 'Client Detail' screen for a client named 'Cameron.Hobson'. The client's name is also listed as 'Cameron Hobson', gender is 'Male', date of birth is 'January 1 1982', height is '6' 2"', and weight is '210 lbs'. A 'Generate Report' button is located in the top right corner. Below this, a section titled 'Notes:' is present. The main area displays a table of training modules with columns for 'Training Name', 'Date', and 'Score'. Each row includes icons representing the module type and a PDF icon for generating reports. The table has three rows of data.

Training Name	Date	Score
Contrast	5/12/2020	11.0%
Contrast	3/27/2020	1.8%
Flash	3/27/2020	27
Go No-Go	3/27/2020	17
Multi	5/12/2020	54.1

At the bottom left is a 'Delete Client' button, and at the bottom right are 'Select' and 'Close' buttons.

Fig. Client details screen

Selecting any of the training modules will open the report for the selected trial. To generate a printable PDF report, select the PDF symbol on the right.

Generate Report

To view daily or long-term performance trends, select the “Generate Report” button in the client details window.

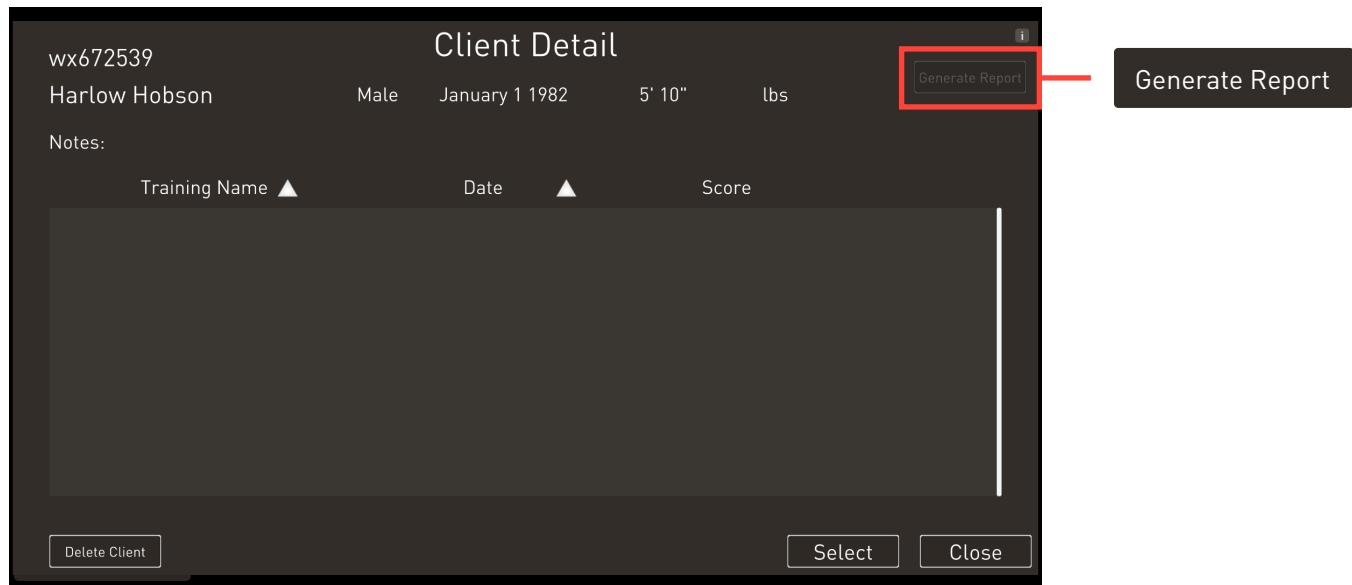


Fig. Client Detail, Generate Report highlighted

Clicking Generate Report will open the report generation window. From this window the user can select a single session or range of dates to view client performance trends. If Multi session is selected, a date range must also be input. A report is then generated using the average score for each training mode for each training date within the selected range.

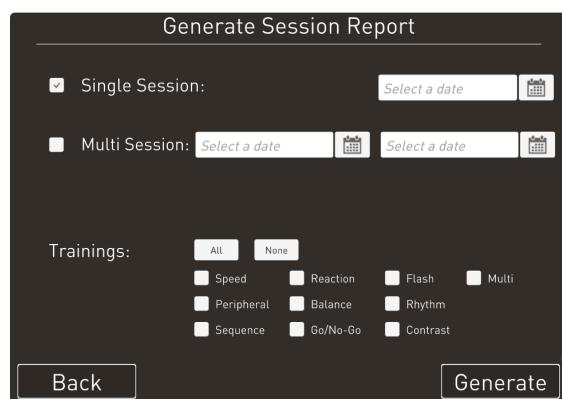


Fig. Report generation window

Select the training modes to generate a report and click generate to view the report.

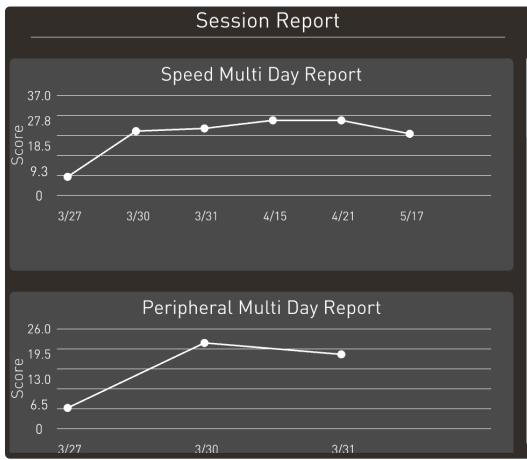


Fig. Multi session report

Printable Reports

To print a single trial report, find the desired trial in the Client Details window. To the right of the trial row is a PDF icon. Clicking this icon will open the PDF showing the score and settings details for the training mode.

The Client Detail window shows a list of trials for Cameron Hobson. The trials are: Contrast (5/12/2020, 11.0%), Contrast (3/27/2020, 1.8%), Flash (3/27/2020, 27), Go No-Go (3/27/2020, 17), and Multi (5/12/2020, 54.1%). Each trial row has a 'PDF' icon in the last column. A red box highlights the 'PDF' icon for the first trial, and a red arrow points from it to a larger 'PDF' icon on the right.

Training Name	Date	Score	Actions
Contrast	5/12/2020	11.0%	PDF
Contrast	3/27/2020	1.8%	PDF
Flash	3/27/2020	27	PDF
Go No-Go	3/27/2020	17	PDF
Multi	5/12/2020	54.1	PDF

Fig. Client details, printable PDF reports for a single trial

Clicking on the PDF icon will automatically generate the PDF report, which can be saved at the desired location or distributed within the owning organization's data sharing policy.

Training:

Once a Client profile is selected, you are ready to begin training. Select one of the training modes to the left of the main screen by clicking on the desired training mode icon (e.g.; Speed, Peripheral, Reaction...). Begin training with the default settings by clicking “Start” in the bottom right corner of the screen.

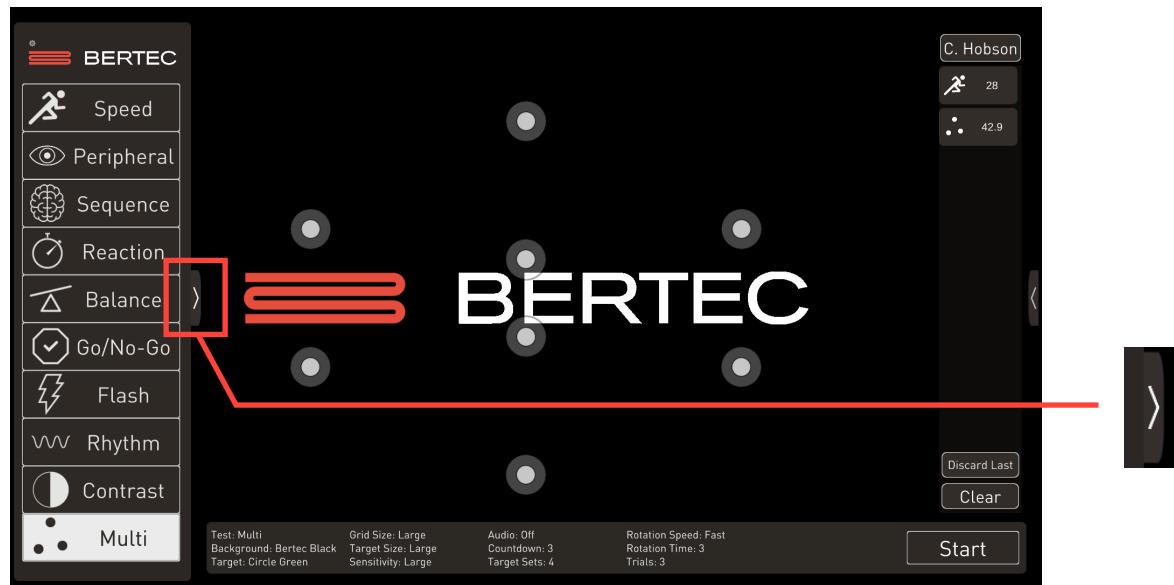
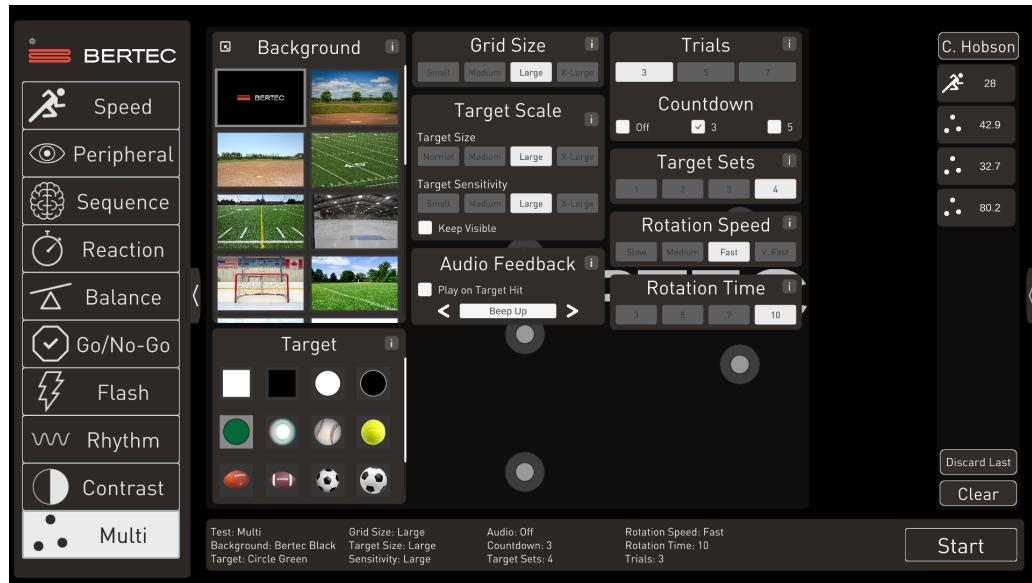


Fig. Main Screen

To adjust the settings for the training mode, open the training mode options panel by clicking on the “}” icon to the right of the training mode panel. Each training mode has both global options, like Background or Target, and training mode specific options, such as duration or grid size.

Training Modes

This section details the specific features of each training mode. The training modes are the foundational structure for training on BVT. Within the training mode framework, the user can customize the parameters of the training to match the level of stimulation desired for a client or group.



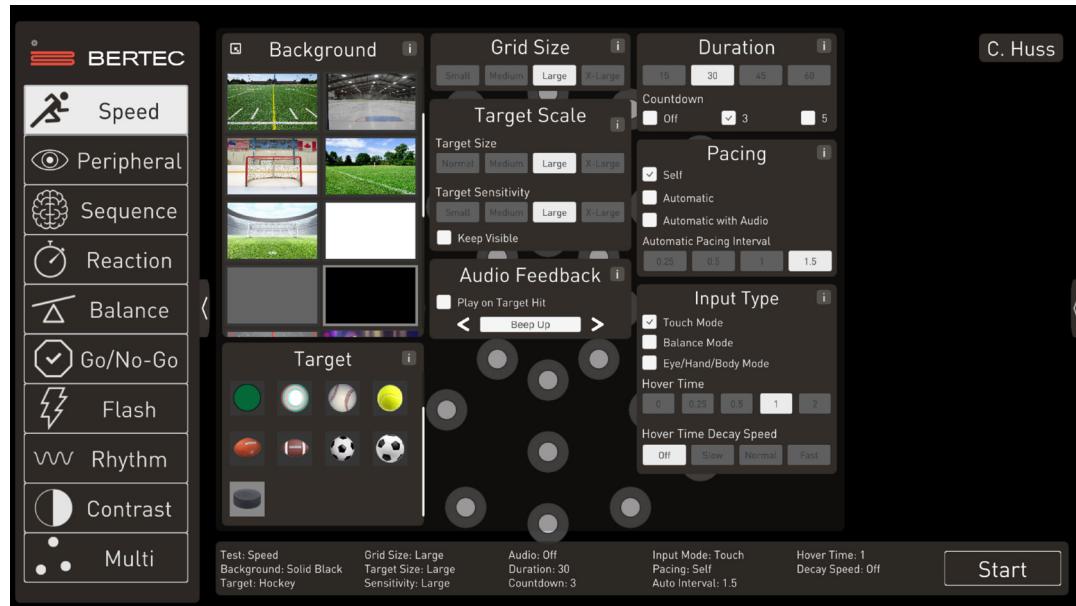
Training Modes

Speed

The SPEED training mode is the first training mode in the series. The background, targets and other settings are available from the left pull out menu which is activated by clicking or tapping on the small arrow, midway down the screen. One of the unique features of the BVT suite of training modes is the ability to select user specific backgrounds and targets. The software comes pre-loaded with the most popular backgrounds and target images.

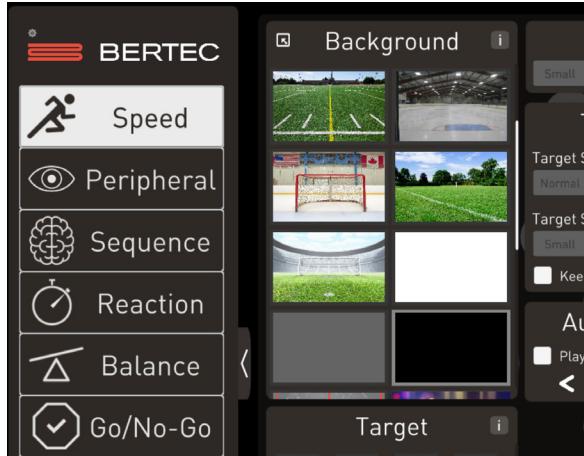
With the SPEED training mode, the targets will always appear in a fixed target array of 3 concentric circles radiating outward from the center of the screen. The size of the array is selectable, as are many other options.

Begin by tapping on the left pull out menu arrow and the following screen will appear:



Selecting backgrounds:

This system was the first to allow the user to select any background or any target for testing and training in visual reality. The system comes with preloaded backgrounds and videos, but almost any background desired may be added to the list by the user. To select the desired background from those already loaded, simply scroll down the list and click or tap on the desired one, a highlighted box will appear around your selection. In this example we will start with a simple black background.

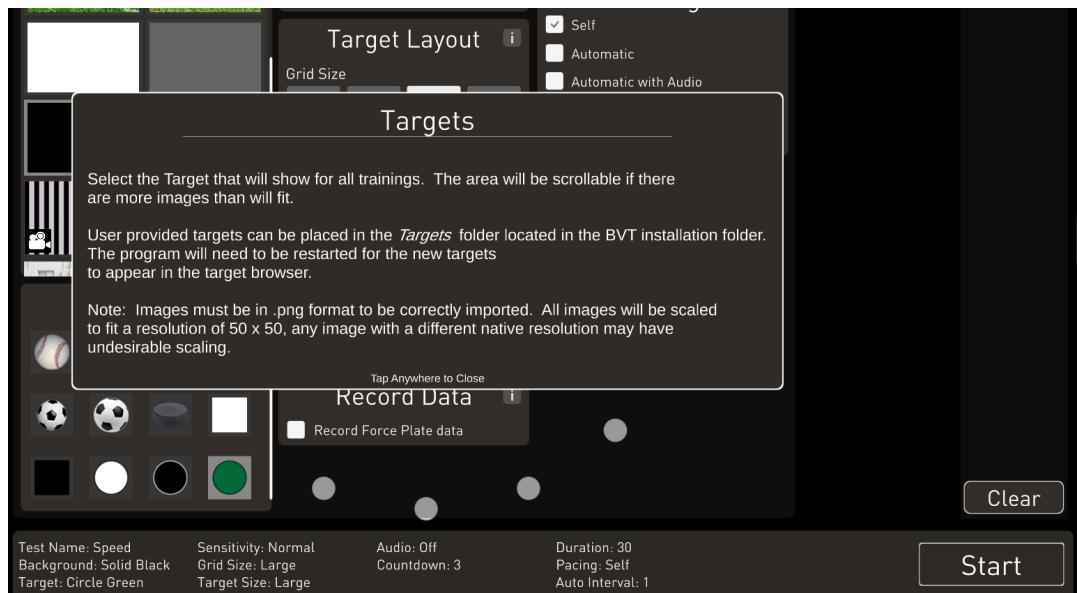


For instructions on adding your own backgrounds, click on the small information button next to the word "Background" and a pop-up information screen will appear. Follow the instruction within that information pop-up to add new backgrounds.



Selecting the target:

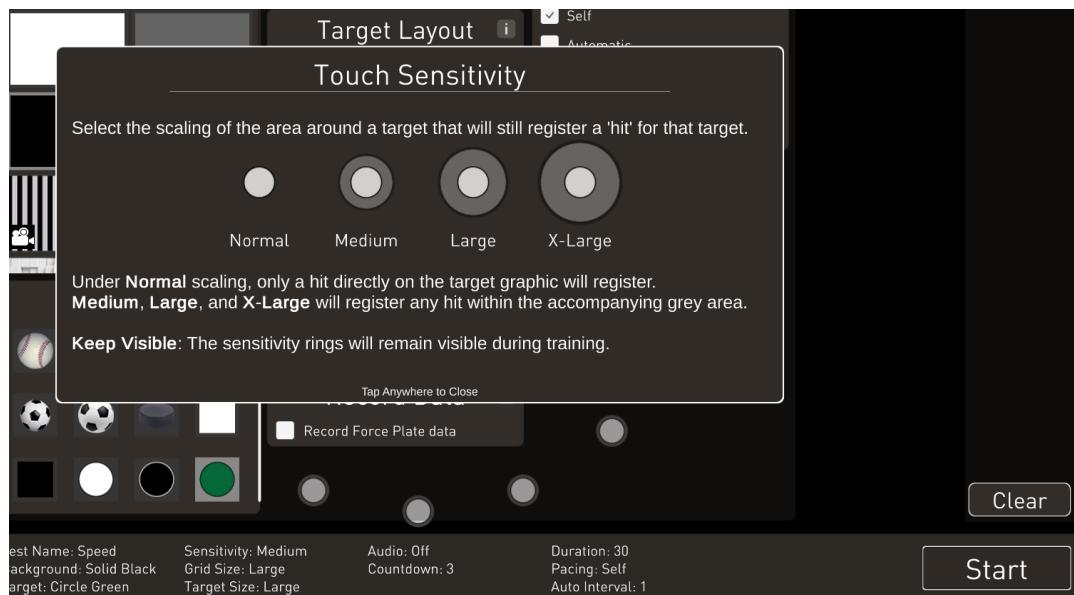
Target selection is an important consideration; almost any target may be selected based on desired difficulty, purpose of the testing or training, and the background selection. The more dis-similar the target is to the background or the higher the contrast, the easier it is to see. For example, it is easier to see a black target on a white background than a dark grey target on a light grey background. Visual reality is the end goal of most of our therapy and sports enhancement work. We want the client training as close to the reality of his or her environment as possible. In the rehabilitation setting, we often want to simulate daily living activity. That is why we go to great lengths to have a baseball player training on a baseball field background, with a baseball as a target, even to the point of day game vs. night or cloudy sky vs. blue.



To select the desired target, simply scroll down the target menu, double click on the desired target, and a highlighted box appears around it. In this case we will select the green button. For information on how to add targets, press the information icon and the information box will open.

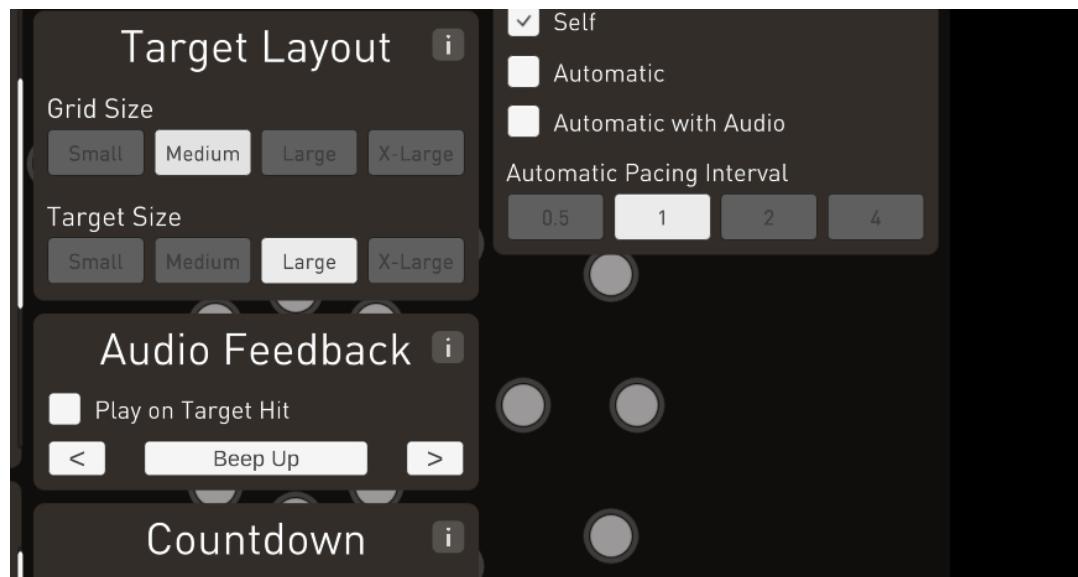
Selecting Touch Sensitivity:

Touch sensitivity refers to how accurate the subject must be in touching the target zone. When the sensitivity is set to "Normal", the patient must touch somewhere on the target, this is the most difficult of the settings. The "Medium" setting places a small ring around the target and the touch may be slightly off the target but within the ring and still be counted as a touch. The "Large" setting increases the diameter of the large and the touch now needs only to occur within the sensitivity rings to be counted as correct. The "X-large" sensitivity ring is the largest and therefore the easiest of the target sensitivity rings. This is used for instance when we are more concerned with speed than accuracy, when we want to reward the client for being close to the target. As skills improve and more accuracy is desired, the sensitivity may be reduced. The sensitivity rings may be kept visible to show patient or coach, but it is not recommended in most cases, as we want the client concentrating on, and always aiming for the center of the target.

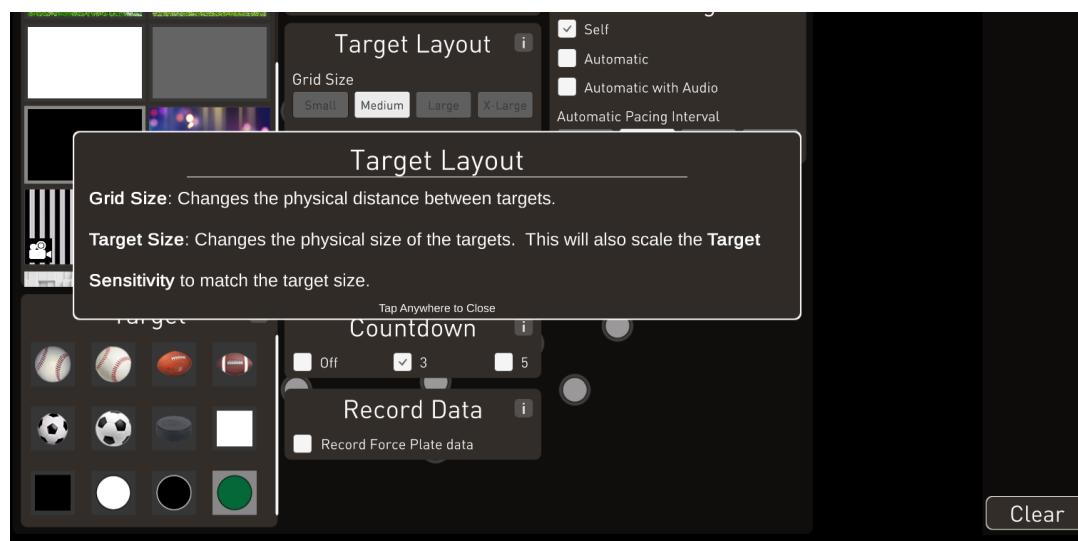


Target Layout Selection:

There are two variables in the target layout section, the “Grid Size” is unique to the “Speed” training mode as it refers to the diameters of the 3 concentric circles in the pattern. The larger the grid pattern the more the circles, and therefore the targets, are spread out. Larger patterns require the eyes and hands to cover a larger area of the screen.



The target size refers to the size of the target, and the ease or difficulty in both seeing it and touching it. If we have a client with limited vision or restricted eye/hand skills, it is best to make the target as large as possible. This makes it not only easier to see but easier to touch. Note the touch sensitivity ring also increases proportionally with the target size.



Audio Feedback selection:

This option allows the selection of an auditory re-enforcement of the visual system. It is often desired to get as many systems involved in therapy as possible. The sound gives an auditory cue when the target is touched. If the client simultaneously feels and hears the cues, they will integrate and retain the therapy more effectively. You may also select the type of sound you wish them to hear.



Countdown Selection:

This allows the subject to “get ready” for the test or training to start. The standard countdown is 3 seconds.



Record Data Selection:

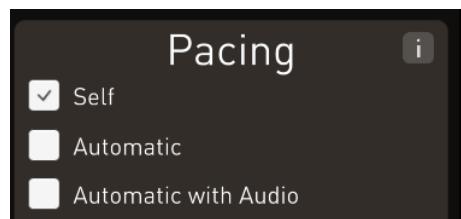
This option is designed for researchers who wish to record the raw force plate data for research purposes. The files are saved in the folder structure on the computer, in CSV format.

Duration:

This allows you to select the number of seconds you wish the test to run. The standard time is 30 seconds, but longer test may be used to measure fatigue factors.

Pacing:

There are two basic options to the pacing mode, “self” and “automatic”. In the “Self-Pacing” mode, the target moves to a new location as soon as it is touched, and it will not move until it is touched. In the “Automatic” mode the target is displayed for the selected period of time, usually 1 sec, and will move to a new location after that 1 sec of display time rather it has been touched or not.

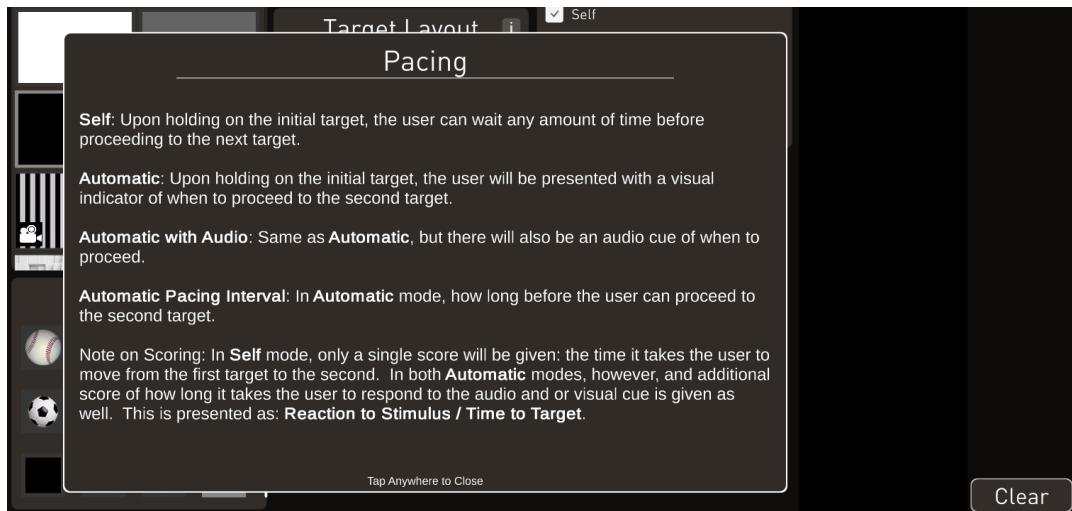


There is no limit to the number of touches that can be made for a given duration of time in the "Self-Pacing" mode, they could score 41 in 30 seconds for instance. In the automatic mode if the duration is 30 seconds and the display time is 1 second, a perfect score would be 30.

The most commonly used mode is the "Self-Pacing" mode. However, the "Automatic" mode is useful when the client has blind-spots or hemi-anopic visual field losses, as the target might sit there for a long time before it can be identified. It is also useful in sports enhancement training where a target such as a baseball gets lost against a white background and can't be seen.

If you have the optional force-plate, you have several additional options. You must select the input type, hover time, and the decay time. The system defaults to the touch mode for all tests, but you may choose the balance mode to use the force-plate to move the center of pressure cursor over the target, to count the same as a touch. With the eye/hand /body mode the subject must use the force plate to move the COP cursor over the target and simultaneously touch the target.

The hover time may be set to count if on the target for a brief period or up to 2 seconds. You will notice the cursor turns to a clocklike circle to indicate the accumulated time the cursor has been on the target. As the client moves or slips off the target the accumulation of time pauses, starting again when returning to the target. Decay time refers to how quickly the accumulated time is decreased as the cursor is off the target.



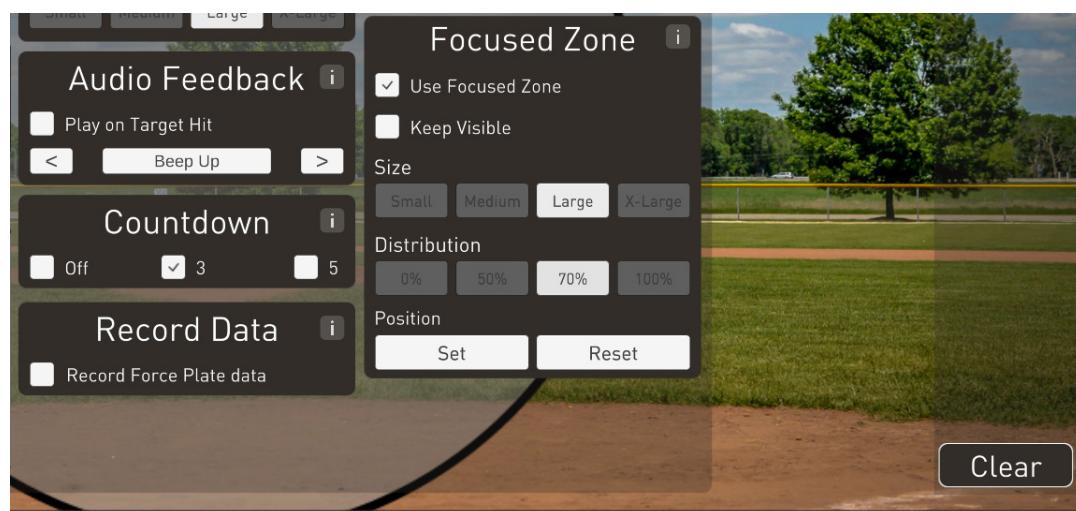
Peripheral

The Peripheral training mode may be considered the heart of the Bertec Vision Trainer system. It is the most flexible system for testing and training eye/hand co-ordination, speed of processing, and reaction time in a visual reality setting. Most of the settings previously discussed with the Speed mode, apply under the “Peripheral” mode. The background, targets, touch sensitivity, duration and pacing settings all remain the same.

The key difference is that the targets are randomly distributed instead of on concentric circles. By randomly placing the targets throughout the entire screen instead of confined to the concentric circles, we are more closely simulating reality. One of the key options in this mode is ability to focus or concentrate a percentage of the targets in a given area. This allows them to be selectively concentrated in areas or zones that are customized to the client. A good example of this in baseball would be weighting more targets to the left side for a third baseman, or in hockey concentrating more target down and left for a goalie that is having problems in that area. When working with a client that has lost function to the left side, we can put 70 % of the targets in that area to better treat his or her weaknesses.

Focused Zone:

To use this function, click the “use focus zone” button, then select the size of the zone you wish to use and the percentage of targets you wish distributed there. In the background you will also notice the size of the circle.

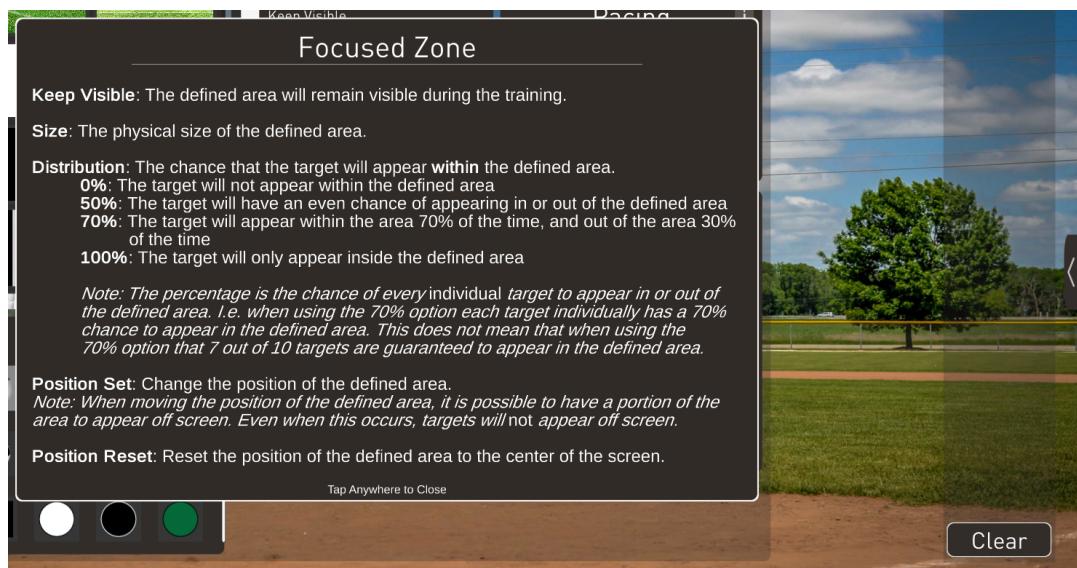


Next you will click on the “set” button, this allows you to position the focus zone circle anywhere on the screen you want. After clicking “set,” the screen will display the background and the next position on the screen that is touched will be the centerpoint of the focused zone.



The selected percentage of the targets will be displayed in that area. The circle may be kept visible, but usually is not.

One could also choose to have 0% of the target in the zone or exclude any targets from the zone. This is useful for instance if you place the zone in the center of the screen and want to concentrate all the target in the periphery for a point guard or a patient that need to expand his or her peripheral awareness.

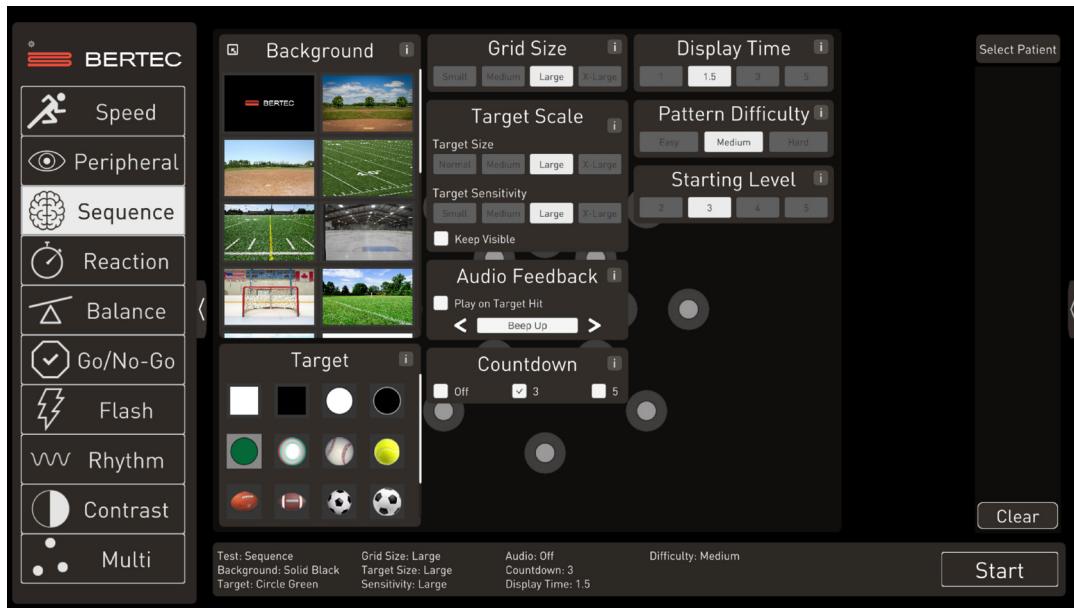


If you have the optional force-plate, you have several additional options. You must select the input type, hover time, and the decay time. The system defaults to the touch mode for all tests, but you may choose the balance mode to use the force-plate to move the center of pressure cursor over the target, either momentarily or hovering on it for a prescribe period of time, to count the same as a touch. With the combo mode the client must use the force-plate to move the COP cursor over the target and simultaneously touch the target.

The hover time may be set to count if on the target for a brief period or up to 2 seconds. You will notice the cursor turns to a clocklike circle to indicate the accumulated time the cursor has been on the target. As the client moves or slips off the target the accumulation of time pauses, starting again when returning to the target. Decay time refers to how quickly the accumulated time is decrease as the cursor is off the target.

Sequence

This function is a sophisticated version of a sequence driven visual memory task. It requires the client to remember the location and sequence of the targets presented and then give the correct response with eye/hand and visual memory. Any target and any background, including videos, may be used to add difficulty to the task. Once the testing parameters are chosen, a target appears briefly on the screen and after it disappears, the client must touch the location where it had been. If correct, the computer adds another target location and require touching of the original location, followed by the new location, in the proper order. It keeps progressively adding more target locations until missed. The proper sequence is then repeated to show the client & operator the intended pattern sequence.



Display time, Pattern Difficulty, and Starting Level can be chosen in the settings prior to initiation of the training. The default display time is 1 second, and starting level defaults to 2. The Pattern Difficulty refers to the number of targets displayed or location possibilities. Easy has 9 possible location, medium has 17 possibilities, and large has 33.

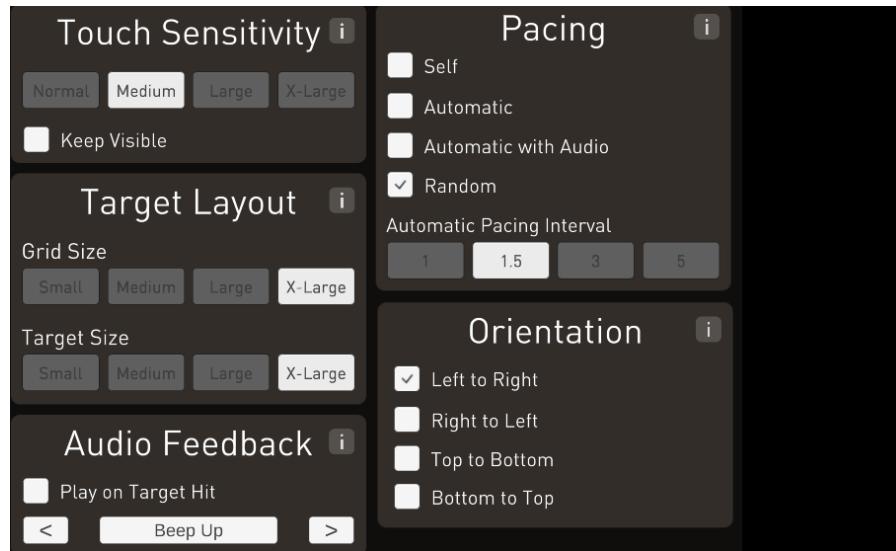
Reaction

This training mode tests and trains reaction time from two perspectives. Normally, one simply measures the time it takes to move from point A to point B, after the stimulus. This can be broken down into two parts, the visual processing speed, and the motor speed. This is accomplished by measuring the time it takes to start to move the hand, in other words, how long it take the brain to start moving the hand once a stimulus is presented. The second part is how long it takes the hand to travel from point A to point B. In driving, for instance, how long does it take once you see an object dart out between two cars, to start to move your foot to the brake pedal and how long did it take to move the foot from the floorboard to the pedal? In baseball, how long did it take to start the bat in motion and how long to move the bat to the strike zone once you decided to swing.

There are several variables that may be selected beyond background, touch sensitivity and target. One is grid size, the larger the grid size chosen the greater the distance between the targets. The other is target size, which also relates to sensitivity.

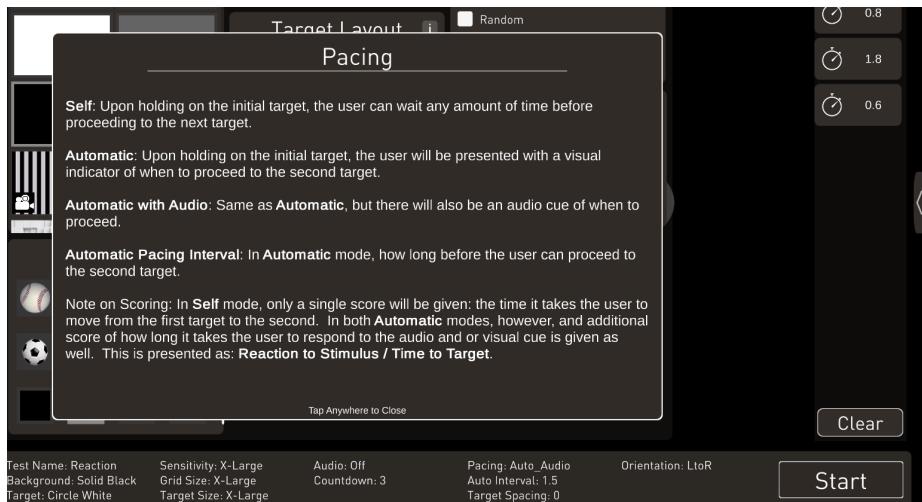
If you have the optional force-plate, you have several additional options. You must select the input type, hover time, and the decay time. The system defaults to the “touch” mode for all tests, but you may choose the balance mode to use the force-plate to move the center of pressure cursor over the target, either momentarily or hovering on it for a prescribe period of time.

The hover time is the amount of time the COP cursor is required to hover over the target to count as a successful “touch.” The subject moves the COP cursor over the starting or pulsing target, maintains a balance position over that target until the other target starts to pulse. The subject then shifts his or her balance, moving the COP cursor over the second target.



Normally we select random pacing, which means that the time from placing your finger on the home target, to when you are asked to move it to the objective target, varies randomly. This is done so the client cannot predict when to start moving the hand. An auditory cue may also be given by selecting that box.

Next choose the direction of the test left to right, right to left, top to bottom or bottom to top.



Reaction Mode Operation

The default setting is touch mode. In this mode, the client will place and hold their finger on the pulsating target and look to the. The client will hold their finger on the target and look at the target directly opposite the initial target. The second target will begin pulsating and the client must pull their finger off the initial target and touch the second target as quickly as possible.

The reported “reaction” time is the time it takes the client to lift their finger off the initial target. The “time to target” is the total time taken from the initiation of the second target to touching the second target.

Reaction mode can consist of multiple trials, determined by the preset number for “trials.”

Balance Mode

In “balance” input mode, the operation is slightly different. The client will hover their COP over the initial target for the preset period. Once the COP has hovered over the target for the entire duration, the second target will spawn. The client must then move the COP cursor to the second target and hover over it for the preset “hover time.”

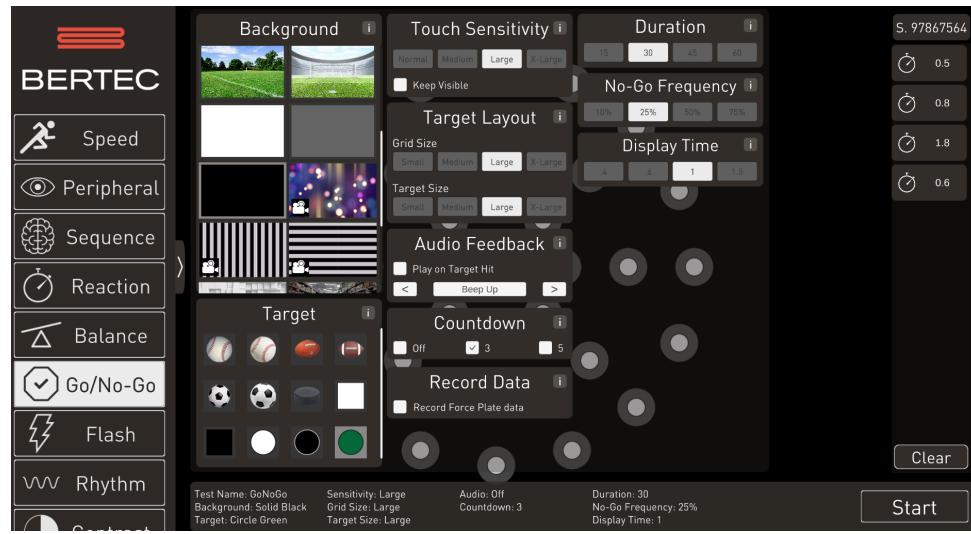
Hover time decay speed

If there is a “hover time decay speed” selected, this is how quickly the accrued time takes to disappear. Meaning if the client moves off the target, they will have to successfully hover the cursor over the target for a longer amount of time because they accrued time has decayed. If the “hover time decay speed” is set zero, then the client can accrue the preset duration in multiple successions, meaning they can hover off and on the target but never lose the accrued time.

Go/No Go

This is like the Speed training mode but with a cognitive component. Here the client is asked to make a cognitive decision prior to touching the target. If the target presented is green, representing ‘go,’ they touch the target. If the presented target is red, representing ‘no-go,’ they do not touch it. This may be particularly difficult for someone with reduced cognitive abilities.

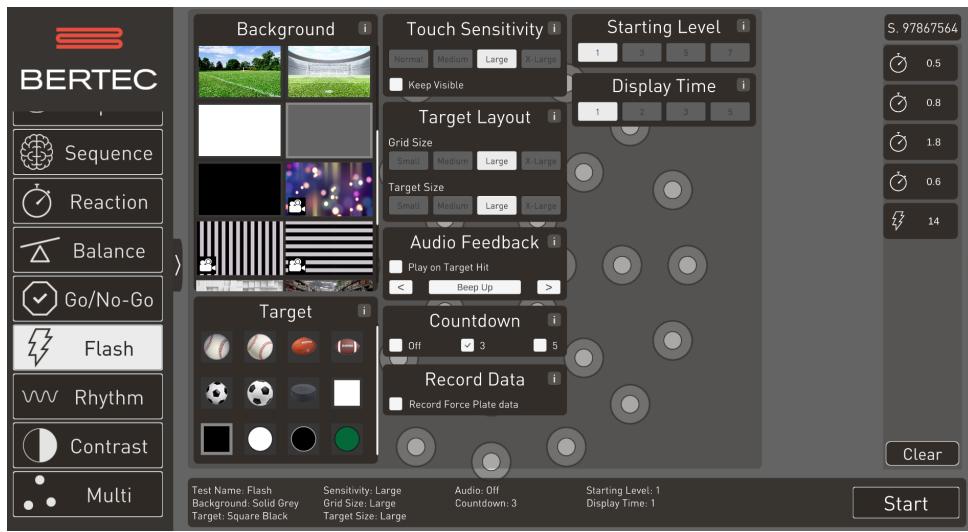
The test allows you to select the percentage of “no-go” target presented.



Flash

The Flash training mode is a short term memory test. One must select the duration and starting number of targets that will flash up on the “Speed” concentric circles in random positions. The targets displayed then disappear, and from memory you must tap the target locations where they appeared. It does not matter what sequence you get them in, only the position. Each time you are correct, another target is added, making the task progressively more difficult.

Variables are grid size, starting level and display time. This is an excellent test of short-term memory, but also mid-line shifts and perceptual disabilities.



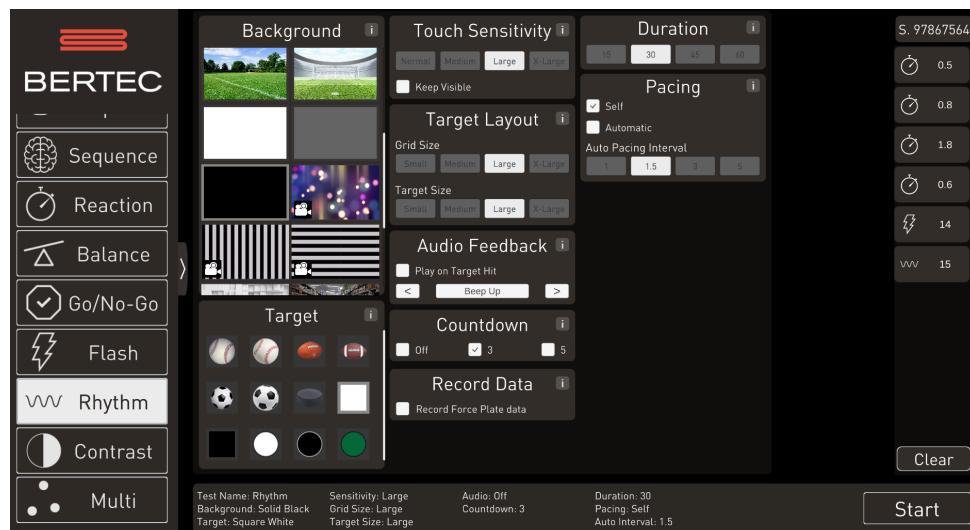
Rhythm

This function presents targets on the screen in random position on the left side of the screen, then in a random position on the right side of the screen. The subject is instructed as to which hand to use, based on the therapy desired.

If one hand or side is weaker, you may choose to have them use only that hand.

If you do not want them to cross the midline, you may have them reach to all targets on the right with the right hand and the targets on the left with the left hand.

If you wish them to cross the midline each time, have them do all of the targets on the left side of the screen with



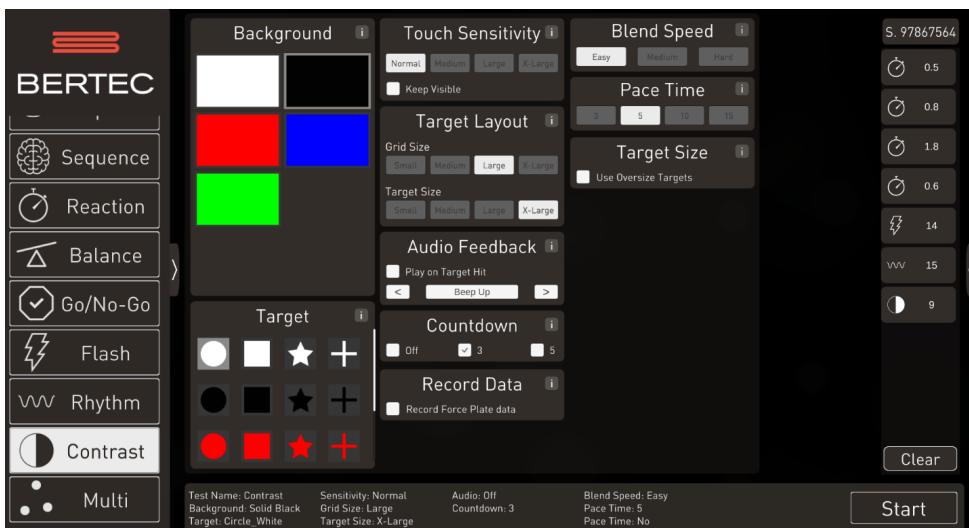
the right hand, and all targets on the right side with the left hand.

Contrast

Contrast sensitivity is measuring the subject's ability to see a target against the background. A baseball player must pick up a white baseball against a cloudy sky or roof of a dome stadium, a hockey player must see the black puck against a black or dark background, the ability to do this a key skill in many sports. Contrast sensitivity decreases with age, a young person has very clear media and lenses internal to the eye, as we age the lens clouds and eventually becomes a cataract, reducing contrast sensitivity as it changes. This reduction in contrast in everyday life causes trouble with reading and driving at night,

This testing and training are accomplished by gradually reducing the difference between the target and the background and a correct response or touch is noted. The target gradually blends into the background, until it cannot be distinguished. If you choose a white background and grey target, the grey target is randomly place on the screen and the subject is asked to touch or tap it. Once a correct touch is made, the target moves to a new position on the screen and the contrast is reduced by making the target a lesser percentage of grey and whiter. This is repeated until the target can no longer be detected. Various target colors, blend rates, and target sizes may be selected as well.

*Although this is a difficult test or training for elderly patients, it is a valuable training technique to promote awareness and demonstrate limitations as we age.

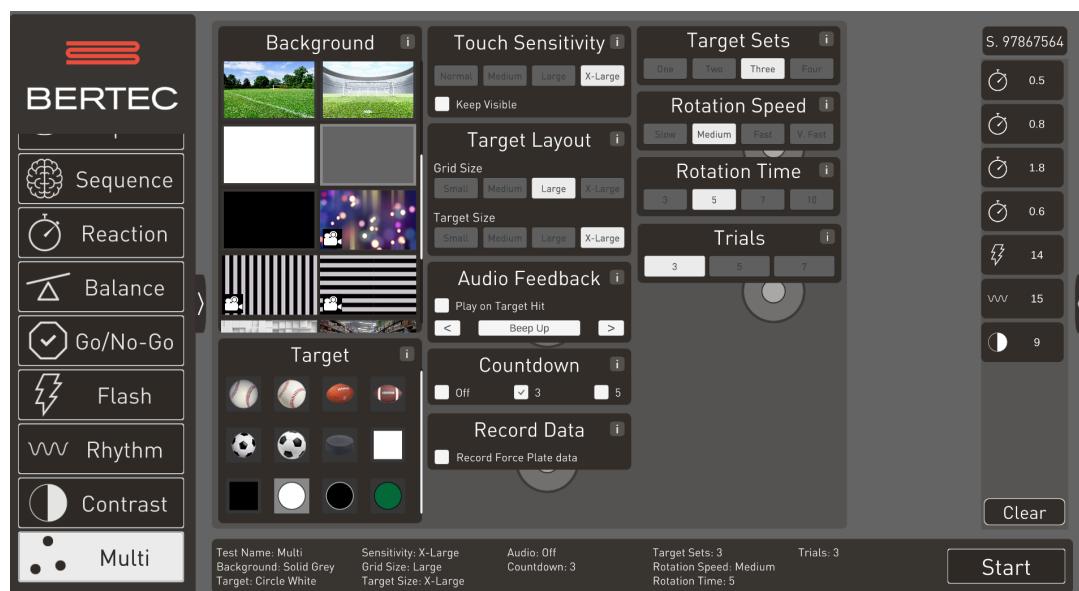


Multi

This may be the ultimate test of eye movement skills, perception and short-term memory. It requires saccadic eye movements to jump from one set of targets to the other and excellent tracking eye movements to follow the correct smaller target. Once the test is complete the subject must remember the location of the proper target and touch the screen to indicate which target is the one, they were pursuing. Very similar to the hiding a pea under a shell game.

The testing and training can be made relatively easy by choosing only one Target Set, or extremely difficult by choosing four target sets.

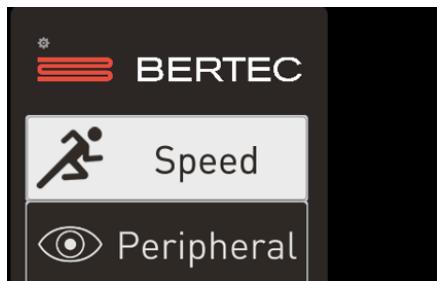
The rotation speed may be set from slow to very fast, and the length of test or Rotation time may be set from short to long.



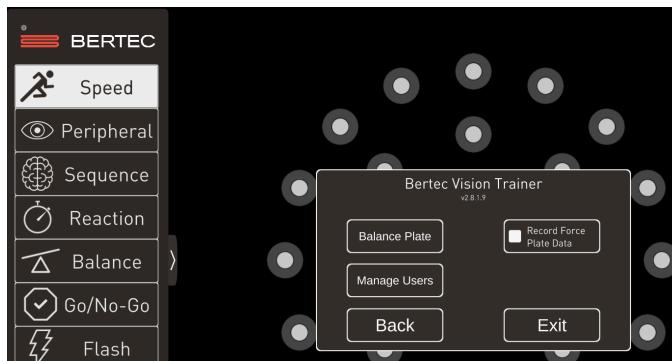
Many sports require an athlete to make jump eye movements (saccadic eye movements) from one part of the field or court to another. Then they must track or follow (pursuit eye movements) once there. For example, a quarterback drops back, looks from one receiver to another, then locks in on the receiver and defensive back and following them, predict from their movements where they will be when the ball gets there. In driving, a good defensive driver scans from one side to another, when seeing a potential hazard then tracks or follows, looking back and forth as needed.

Balance

If you will be using a balance plate, you need to activate it at the start up window. This is done by clicking on the Bertec Logo at the main screen.



After doing so, the follow screen will appear:



Click on the Balance Plate button and the Balance calibration window will appear, and the “State” should be “WAITING_FOR_GOOD_LOAD”

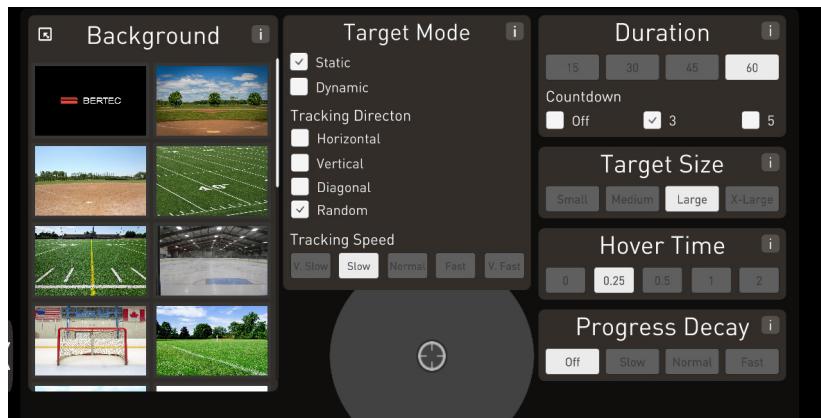


Then tap the Back button to return to main menu screen and select the Balance training mode.

Training Mode: Balance

The Balance training mode makes use of center of pressure (COP) data from the force plate to control the cursor in balance mode. The concept of hover time in balance mode is similar to touching the screen in touch mode. The hover time refers to the amount of time that the COP cursor must be kept over a target to be counted as a correct response. Hover time is selectable from a momentary hover, to a full 2 seconds.

There are currently two modes within the Balance training mode, static and dynamic. The Static mode randomly places a target on the screen, and you use your balance to move the COP cursor over the target for the hover time selected and then the target jumps to a new location. The size, sensitivity and duration of the target may be



adjusted as well.

With the Dynamic mode, the target moves across the screen and the task is to keep the COP cursor over the target as much as possible. The BVT software measures how much of the time, in percentage, that the subject was able to keep the cursor on the target. With the Dynamic mode, the direction, size, and sensitivity may also be set. Additionally, the speed at which the target is moving may also be varied.

Bertec Vision Trainer Safety

This guide contains information, cautions, and warnings which must be followed to ensure the safe performance of the static systems. Local government rules and regulations, if applicable, should be followed at all times.

Symbols Used

Symbol	Description
	Carefully read these instructions prior to use
	Caution
	Mandatory action
	High Voltage
	Power on
○	Power off
	Earth (Ground)
	Alternating current
	Fuse
	Type BF Applied Part
	Complies with Medical Devices Directive 93/42/EEC and RoHS Directive (2011/65/EC)

Symbol	Description
	<p>Electronic equipment covered by the Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).</p> <p>All electrical and electrical products, batteries, and accumulators must be taken to separate collection at the end of their working life. The requirement applies in the European Union.</p> <p>Do not dispose of these products as unsorted municipal waste.</p> <p>You can return your device to Bertec or to any Bertec supplier. You can also contact your local authorities for advice on disposal.</p>
	<p>Catalog Number (used in compliance with ISO 15223-1)</p>
	<p>Serial Number (used in accordance with ISO 15223-1)</p>
	<p>Authorized EC Representative in the European Community (used in accordance with ISO 15223-1)</p>
	<p>Consult Instructions For Use (used in accordance with IEC 60601-1)</p>
	<p>Indicates device manufacturer Includes name and address of the manufacturer (used in accordance with ISO 15223-1)</p>
	<p>Manufacturer build date (used in accordance with ISO 15223-1)</p>
	<p>Direct Current (used in accordance with IEC 60601-1)</p>
	<p>ON/OFF (Power/Stand-by) (used in accordance with IEC 60601-1)</p>
	<p>Equipment Safe Working Load XXX indicates specific weight (used in accordance with IEC 60601-1, Cl. 7.2.21)</p>

Symbol	Description
	<p>WARNING STORED ENERGY HAZARD! DO NOT OPEN TOWER OR REMOVE SAFETY GUARD!</p> <p>Stored Energy Hazard: The lift mechanism in the tower is under tension and will move up rapidly, on its own, as soon as attached equipment is removed. For this reason, DO NOT remove equipment or make adjustments to lift tension unless the front assembly has been moved to the highest position on the tower! Failure to follow this instruction may result in serious personal injury and/or equipment damage!</p>
	<p>WARNING</p> <p>DO NOT load the Cart/Stand past maximum weight capacity. DO NOT mount a display larger than the recommended size. Failure to comply with warning may result in Cart/Stand instability leading to equipment damage or personal injury.</p>
	<p>WARNING TIPPING HAZARD!</p> <p>DO NOT allow children on Cart/Stand. DO NOT rout electric chords or equipment cables within reach of children. LOCK CASTERS when Cart/Stand is stationary. Failure to comply with this warning may result in Cart/Stand instability leading to equipment damage or personal injury.</p>
	<p>CAUTION TIPPING HAZARD!</p> <p>DO NOT move Cart with Display in highest position. DO NOT push Cart from front or back of Tower. DO NOT move Cart over cords or uneven, dirty, soft or sloping surfaces. DO NOT move Cart by pushing on Display. Failure to comply with this caution may result in cart instability leading to equipment damage or personal injury.</p> <p>TO MOVE CART</p> <ol style="list-style-type: none"> 1. Push Display down to lowest position on Cart. 2. Disconnect power cord and attach to Tower. 3. Unlock casters; point casters in direction of travel. 4. Push Cart from side with hand on Tower.

Warning Notes

Bertec Vision Trainer is not designed to be used in conjunction with any devices not approved by Bertec. All parts of the Bertec Vision Trainer system packages represented here are suitable for use within the patient environment.

- Note 1** WARNING: Federal law restricts this device to sale or on the order of a medical practitioner. When prescribed for therapeutic purpose, a physician should clearly define the parameters of use (i.e. total work, maximum heart rate, etc.) to reduce the risk of patient injury.
- Note 2** Thoroughly read this user manual before using your Bertec® system. Failing to read the instructions prior to use may result in following improper test procedures, affecting test results.
- Note 3** The BVT system should only be used as specified in the user manual.
- Note 4** Only use approved power supplies.
- Note 5** WARNING: To avoid risk of electrical shock, BVT systems must only be connected to properly grounded power sources, such as the provided patient isolation transformer, as appropriate for your product. Only items that have been specified as part of the system, or compatible with the system, shall be connected.
- Note 6** Use biocompatible foot covers with the system. Foot covers are single use and should be discarded after each patient.
- Note 7** Ensure children are supervised around equipment and that unused receptacles are covered in pediatric environments.
- Note 8** None of the Bertec system parts are user serviceable. For the sake of safety, and in order not to void the warranty, the system should only be serviced by authorized service personnel. In case of defects, please make a detailed description of the defect(s) and contact your supplier. Do not use a defective device.
- Note 9** Keep Bertec Vision Trainer systems away from liquids. Do not allow moisture inside the device.
- Note 10** Do not use the device in the presence of flammable anaesthetics (gases).
- Note 11** No parts may be eaten, burnt, or in any way used for purposes other than posturography and balance testing.
- Note 12** Bertec Vision Trainer Static Systems can be disposed of as normal electronic waste, according to local regulations.
- Note 13** To comply with EN 60601-1-1, the computer, etc. must be connected to the isolation transformer.
- Note 14** Installation of any third party software (application, programs, or utilities) other than those specified by Bertec can compromise the safety of effectiveness of the system.

- Note 15** The device is disconnected from the mains by pulling the plug from the wall outlet.
- Note 16** The isolation transformer should be plugged into an outlet. Extension cords or power strips (MSP0) other than those provided with the system, should not be used in combination with the isolation transformer. Multiple-socket outlets that are provided as part of the system shall not be placed on the floor. The maximum load for the power strip provided with the system is 125V, 15A.
- Note 17** Only the monitor and computer power supplies should be connected to the isolation transformer. Do not connect any other devices to the isolation transformer. Connecting other devices to the isolation transformer can overdrive the isolation transformer resulting in a blown fuse or damaging the isolation transformer beyond repair.
- Note 18** Do not connect the BVT system directly to the wall outlets. By not using the isolation transformer supplied, you put the patient and operator at risk to be exposed to power surges or electrical shock.
- Note 19** The BVT system need to be installed and put into service according to the EMC information provided in this manual. Portable and mobile RF communications equipment can affect medical electrical equipment. The BVT system may be interfered with by other equipment with CISPR emission requirements.
- Note 20** The use of accessories and cables other than those specified in the Accessories List may result in increased emissions or decreased immunity of the system.
- Note 21** The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals. If it is used in a residential environment (for which CISPR II class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.
- Note 22** WARNING: No additional networking/data coupling is to be made outside of what has been designed for the Bertec Vision Trainer System. According to IEC 60601-1 standards, this system will only be connected wirelessly to the internet. If your facility is a hospital or university setting, please contact Bertec support to discuss your specific environment and conditions so that we may provide the best solution for syncing databases.
- Note 23** Balance plates are intended to only be connected to the specified computer, which has been tested as part of the ME Equipment.

Responsibility of the Manufacturer

The manufacturer is to be considered responsible for the effects on safety, reliability, and performance of the equipment only if:

- All assembly operations, extensions, re-adjustments, modifications, or repairs are carried out by the equipment manufacturer or personnel authorized by the manufacturer.
- The electrical installation to which the equipment is connected complies with EN/IEC requirements.
- The equipment is used in accordance with the instructions for use.

The manufacturer reserves the right to disclaim all responsibility for the operating safety, reliability, and performance of equipment serviced or repaired by other parties.

Operating Environment

These systems are suitable for use in the patient environment.

Temperature: +15° C to +35° C (+59° F to +95° F)

Rel. Humidity: 30 to 90%, non-condensing

Air Pressure: 600 hPa to 1060 hPa

Operations at temperatures below -20° C (-4° F) or above +60° C (+140° F) may cause damage

Isolation Transformer

Powertronix Isolation Station AC/DC Adapter

Input Voltage: 115(120)/ 230 (240) VAC - 50/60Hz

Input Current: 2.7A / 1.35A

Leakage Current: < 100-A

Output Voltage: 115 (120) / 230 (240) VAC

Output Current: 2.6A / 1.3A

Receptacle: IEC 320

Operating Mode

Warm-up time: < 5 minutes

Mode of Operation: Continuous

Storage and Handling

Temperature: -20° C (-4° F) or above +60° C (+140° F)

Rel. Humidity: <90%, non-condensing

Air Pressure: 500 hPa to 1060 hPa

Standards

Safety: IEC 60601-1, Class I, Type BF, IPX0

System: IEC 60601-1

EMC: IEC 60601-1-2

Input Voltage Configuration

Configured at factory

Input (50/60 Hz)	Output
100 – 120 VAC	120 VAC
220 – 240 VAC	120 VAC

 Warning: Check input voltage before starting system

Guidance and Manufacturer's Declaration Tables

Bertec Vision Trainer Systems are part of a medical electrical system and is this subject to special safety precautions. For this reason, the installation and operating instructions provided in this document should be followed closely.

Guidance and manufacturer's declaration – electromagnetic emissions for all equipment and systems		
Bertec Vision Trainer Systems are intended for use in the electromagnetic environment specified below. The user of Systems should ensure that it is used in such an environment.		
Emissions Test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	Bertec Vision Trainer Systems use RF energy only for internal functions. Therefore, RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	Bertec Vision Trainer Systems are suitable for use in industrial areas and hospitals.
Harmonic emissions IEC 61000-3-2	Class A	If it is used in a residential environment (for which CISPR II class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity for all equipment and systems			
Bertec Vision Trainer Systems are intended for use in the electromagnetic environment specified below. The user should ensure that it is used in such an environment.			
Emissions Test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	+/- 6 kV contact +/- 8 kV air	+/- 6 kV contact +/- 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	+/- 2 kV for power supply lines +/- 1 kV for input/output lines	+/- 2 kV for power supply lines +/- 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	+/- 1 kV line(s) to line(s) +/- 2 kV line(s) to earth	+/- 1 kV line(s) to line(s) +/- 2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % UT (>95 % dip in UT) for 0.5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles <5 % UT (>95 % dip in UT) for 5 s	<5 % UT (>95 % dip in UT) for 0.5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles <5 % UT (>95 % dip in UT) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the BVT Systems requires continued operation during very long power mains interruptions, it is recommended that the BVT systems be powered from an uninterruptible power supply or battery.
Power frequency [50/60 Hz] magnetic field IEC 61000-4-8	3 A/m	Swept Magnetic Fields per AAMI	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Guidance and manufacturer's declaration - electromagnetic immunity - for equipment and systems that are NOT life-supporting			
Bertec Vision Trainer Systems are intended for use in the electromagnetic environment specified below. The user should ensure that it is used in such an environment.			
Immunity Test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80 MHz 3 V/m 80 MHz to 2,5 GHz	3 Vrms	<p>Portable and mobile RF communications equipment should be used no closer to any part of BVT Systems, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance: $d = 1.17 \sqrt{P}$ $d = .5 \sqrt{P} \text{ [80 MHz to 800 MHz]}$ $d = 1 \sqrt{P} \text{ [80 MHz to 2.5 GHz]}$</p> <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a should be less than the compliance level in each frequency range. b Interference may occur in the vicinity of equipment marked with this symbol: </p>
<p>Note 1: At 80 MHz and 800 MHz the separation distance for the higher frequency range applies.</p> <p>Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m. The compliance levels in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas. For this reason, an additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in these frequency ranges.</p>			

Recommended separation distances between portable and mobile RF communications equipment and Bertec Vision Trainer Static Systems

Bertec Vision Trainer Systems are intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and Systems as recommended below, according to the maximum output power of the communications equipment.

	Separation distance according to frequency of transmitter (m)		
Rated maximum output power of transmitter (W)	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
Rated maximum output power of transmitter (W)	150 kHz to 80 MHz $d = 1.17 \sqrt{P}$ (V1=3)	80 MHz to 800 MHz $d = 1.17 \sqrt{P}$ (E1=7)	800 MHz to 2.5 GHz $d = 1 \sqrt{P}$ (E1=7)
0.01	0.117	0.050	0.10
0.1	0.369	0.158	.316
1	1.167	0.50	1.00
10	3.689	1.58	3.16
100	11.667	5.00	10.00

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1: At 80 MHz and 800 MHz the separation distance for the higher frequency range applies.

Note 2: The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

Note 3: An additional factor of 10/3 has been incorporated into the formula used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas.

Note 4: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Accessories and Cables

Part Number	Part Name
87P-0011	Bertec Vision Trainer Software
37P-0113-00	55" Touchscreen Monitor — Anti-Glare
37P-0086-00	Mobile Media Cart
37P-0066-00	BVT Computer
37P-0055-00	Wireless Touch Keyboard
31P-0140	Powertronix Transformer, Isolation, 115 to 230 VAC, 50/60 Hz, 600 VA
30P-0285	Isolation Transformer Power Cable
30P-0048-1	Power Adapter Cord — 2ft — C14 to NEMA 5-15R
04P-0174	Computer Mounting Adapter Kit
30S-0805	1m HDMI Cable — Black
04S-0985	M4 Hex Nut
04S-1436	Black-Oxide Alloy Steel Socket Head Screw M4 x 0.7 mm Thread, 8 mm Long

Installation Guide

- Step 1** Unwrap and remove equipment from pallets by cutting the plastic-wrap and white strapping material.

Note: Grey monitor stand tray should be handled with care



Figure 1 – Touchscreen Monitor and Accessories

- Step 2** Remove monitor from packaging.

Note: The Monitor weighs 100 lbs. and requires 2–3 people for safe removal

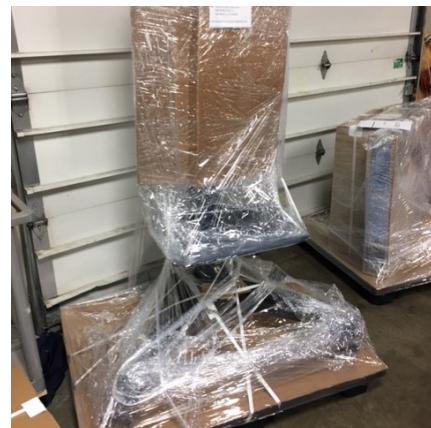


Figure 2 - Monitor Stand



Figure 3 - Engaging brakes on monitor stand

- Step 5** Turn the rotational lock knob on the monitor bracket shown in Figure 4 counterclockwise to loosen and allow the bracket to rotate freely.



- Step 6** Rotate the monitor counterclockwise 90 degrees until in position shown in Figure 5.

Note: The monitor will not be attached to the bracket at this point

- Step 7** Loosen the (2) set screws, circled in red in Figure 6, securing the mounting bracket to the stand using a Phillips head screwdriver .



Figure 5 - Monitor bracket in the correct orientation

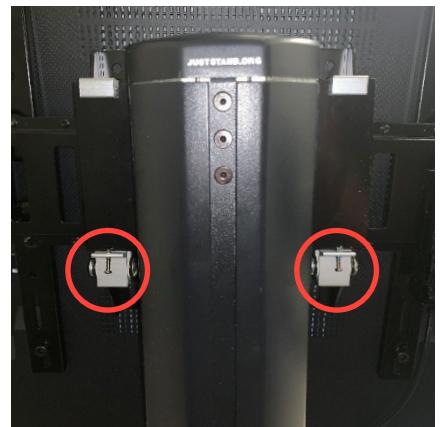


Figure 6 - Location of bracket set screws

- Step 8** Move the bottom of the bracket away from the monitor stand then upward, following the arrows shown in Figure 7, to free the aluminum hooks, circled in red, from the monitor stand.

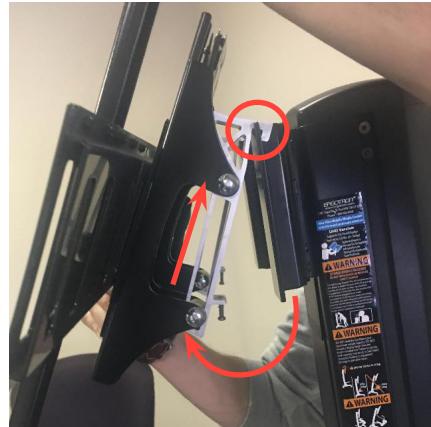


Figure 7 - Removing bracket from monitor stand

- Step 9** Attach the bracket to the monitor.
- Gently lean the front of the monitor against a wall
 - Place foam from the accessories box in between the monitor and wall
 - Do not lay monitor facing down on the ground
 - Secure bracket to monitor with the 4 bolts with washers using a Philips head screwdriver in the locations circled in red in Figure 8

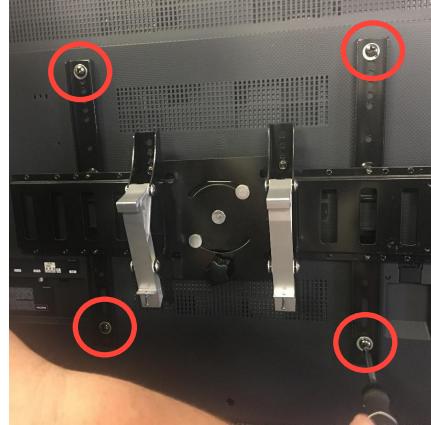


Figure 8 - Bracket mounted on monitor

- Step 10** Attach the monitor with the bracket to the monitor stand
- Remount bracket to monitor stand by positioning the bottom of bracket outwards to latch the aluminum hooks to the stand as shown in Figure 7



Figure 9 - Bracket tightened securely to monitor stand

Step 12 Adjust tension bolt on monitor stand – this step will take 2 people.

- a. The monitor bracket will move up and down along a rail system on the stand. Then tension bolt is loosened to adjust the height of the monitor then tightened down to stay in the height desired.
- b. The tension bolts will arrive loose enough that the monitor will slide down the stand under its own weight
- c. One person will be needed to adjust the height of monitor by pressing upward on the bottom side of the monitor.
- d. If the monitor does not move easily, loosen the tension bolt.
- e. When the monitor is the desired height, the other person will then tighten the tension bolt, circled in red in Figure 10, using an adjustable wrench.



Figure 10 - Monitor stand tension bolt

Step 13 Attach computer and power source to the mounting bracket.

- a. The computer has two pins attached, circled in red in Figure 11, that fit into the slots on the computer mount, circled in blue in Figure 11, located on the back of the monitor bracket.
- b. Press downward to secure into the slot.

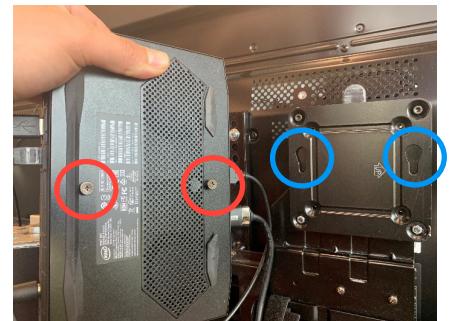


Figure 11 - Computer and computer mount

Step 14 Secure the computer power supply using the Velcro straps as shown in Figure 12.

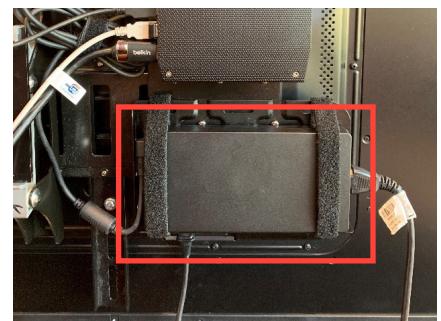


Figure 12 - Mounted computer and power supply

Step 15 Connect cables from computer to monitor as shown in color-coded Figure 13.

- HDMI port on computer to HDMI port on monitor
- USB-Mini B on touchscreen module to USB port on computer
- Power-port on computer to power-supply
- Power supply to power strip (power strip plugs into standard wall outlet)
- Keyboard & mouse dongle plugs into a USB port on the computer
- Optional white balance plate cable: USB-B port on computer to USB-A port on balance plate

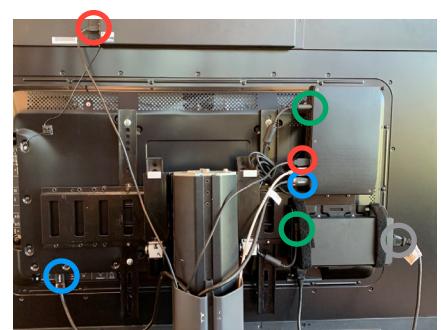


Figure 13 - Plug in the Cords

Appendix A: Abbreviations and Glossary

Appendix B: Clinical Evaluation Resources

Appendix C: License and Support Features

Appendix D: Contact Bertec®

If this manual does not satisfactorily answer a question, or if additional information or purchases are desired, contact Bertec® via email or phone. Our office hours are Monday-Friday 8am to 5pm Eastern Standard Time.

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