GAIT TRAINER™ 3 (v3.X software)

INSTRUCTIONS FOR USE
Gait Trainer™ 3 (v3.X software)

This manual covers operation procedures for the following products:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>950-400</td>
<td>Gait Trainer 3, 115 VAC</td>
</tr>
<tr>
<td>950-401</td>
<td>Gait Trainer 3, 230 VAC</td>
</tr>
<tr>
<td>950-404</td>
<td>Gait Trainer 3, 100 VAC</td>
</tr>
<tr>
<td>950-402</td>
<td>Gait Trainer 3, 115 VAC, with Extended Handrails</td>
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<tr>
<td>950-403</td>
<td>Gait Trainer 3, 230 VAC, with Extended Handrails</td>
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<tr>
<td>950-405</td>
<td>Gait Trainer 3, 100 VAC, with Extended Handrails</td>
</tr>
<tr>
<td>950-406</td>
<td>Gait Trainer 3, 115 VAC, with Geriatric/Pediatric Handrails</td>
</tr>
<tr>
<td>950-407</td>
<td>Gait Trainer 3, 230 VAC, with Geriatric/Pediatric Handrails</td>
</tr>
<tr>
<td>950-408</td>
<td>Gait Trainer 3, 100 VAC, with Geriatric/Pediatric Handrails</td>
</tr>
<tr>
<td>950-413</td>
<td>Gait Trainer 3, 115 VAC, with Music Therapy Option</td>
</tr>
<tr>
<td>950-414</td>
<td>Music Therapy Kit</td>
</tr>
</tbody>
</table>

Contact information

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3
Definition of Symbols

The following symbols and their associated definitions are used and implied throughout this manual.

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<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
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<tbody>
<tr>
<td>🚨</td>
<td>Carefully read these instructions prior to use</td>
</tr>
<tr>
<td>⚠️</td>
<td>Caution</td>
</tr>
<tr>
<td>⚠️</td>
<td>General Warning</td>
</tr>
<tr>
<td>⚡️</td>
<td>General Mandatory Action</td>
</tr>
<tr>
<td>⚡️</td>
<td>Dangerous Voltage</td>
</tr>
<tr>
<td>🔌</td>
<td>“On” Power</td>
</tr>
<tr>
<td>🔌</td>
<td>“Off” Power</td>
</tr>
<tr>
<td>⚠️</td>
<td>Pinch Point</td>
</tr>
<tr>
<td>🌊</td>
<td>Earth (ground)</td>
</tr>
<tr>
<td>🌊</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>🔌</td>
<td>Fuse</td>
</tr>
<tr>
<td>🔌</td>
<td>USB Connector/Cable</td>
</tr>
<tr>
<td>🚫</td>
<td>Waste in Electrical Equipment</td>
</tr>
<tr>
<td>📦</td>
<td>Date of Manufacture</td>
</tr>
<tr>
<td>🏦</td>
<td>Manufactured By</td>
</tr>
<tr>
<td>🛠️</td>
<td>Type B Applied Part</td>
</tr>
</tbody>
</table>
Before Proceeding

NOTE: The warnings, cautions and instructions provided in this manual must be read, followed and kept available for consultation at all times. Observing the information, instructions, and procedures presented throughout this manual is essential for using this product both properly and safely.

SPECIFIC CAUTIONS

- Allow only qualified, trained personnel to operate or service this product.
- If the equipment is used in a manner other than specified in this operation manual, the protection provided by the equipment may be impaired and results could be compromised.
- Never leave patient unattended.

CAUTION: Unauthorized modifications to this product are not permitted and will void the manufacturer’s warranty. Unauthorized modification of the product may result in a hazard to the user and/or patient. Do not modify this equipment without authorization from the manufacturer.

Training

This operation manual includes assembly and operating instructions. Operating/assembly questions can be directed to the service department during business hours.

Important Safety Information

CAUTION: Federal Law restricts this device to sale by or on the order of a physician, or other licensed professional.

Follow the unpacking and assembly instructions document.

Before using this equipment, read the entire operation manual carefully. Failure to read the manual may result in user error or injury. Be sure to save all provided documents for future reference.

Make certain to understand all warning and caution labels as explained in the Before Proceeding section of this manual.

This product should be used only as specified in the operation manual.
For product specifications, refer to the Table of Contents.

This medical electrical equipment requires special precautions regarding EMC and must be assembled and placed into service according to EMC information provided in this manual. For electromagnetic compliance definition, refer to the Table of Contents.

Reference Cleaning and Maintenance instructions in Table of Contents.

CAUTION: Operation for 950-400: 115 VAC; 950-401: 230 VAC; 950-404: 100 VAC.

WARNING: Only use approved power supplies.

CAUTION: To avoid risk of electric shock, this equipment must only be connected to supply mains with protective earth.

CAUTION: The plug is considered the method of disconnecting the product from main power. Do not place the product in a position where the plug is not easily accessible.

CAUTION: This product is intended to remain in one location during operation. It is provided with wheels for relocation that should be used when moving.

User Profile

Patient:

This product accommodates patients fitting the following profile:

• Height: from Infants to 78 inches (6 ft, 6 in) (198cm).
• Weight: up to 500 lb (227.3 kg)
• Age: infants to adults

Biodex Warranty

1. Product Warranty

A. This equipment and its accessories are warranted by BIODEX MEDICAL SYSTEMS, INC. against defects in materials for a period of two years and workmanship for a period of one year from the date of shipment from BIODEX MEDICAL SYSTEMS, INC. During the warranty period, BIODEX MEDICAL SYSTEMS, INC. will in its sole discretion, repair, send replacement parts, or replace the equipment found to have such defects at no charge to the customer.
EXCEPT AS STATED ABOVE, THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR USE. BIODEX DOES NOT ASSUME LIABILITY FOR INCIDENTAL, CONSEQUENTIAL, OR INDIRECT DAMAGES INCLUDING LOSS OF USE, SALES, PROFITS, OR BUSINESS INTERRUPTION.

B. This warranty does not apply if the product, as determined by BIODEX MEDICAL SYSTEMS, INC., is defective due to abuse, misuse, modification, or service performed by other than a BIODEX MEDICAL SYSTEMS, INC. authorized repair representative. Misuse and abuse include, but are not limited to, subjecting limits, and allowing the equipment to become contaminated by fluid materials.

C. In order to obtain warranty repair service and to expedite repair process, please contact BIODEX MEDICAL SYSTEMS, INC. Support Services Dept. at 800-224-6339, and select product support as prompted.

**Warranty is non-transferable.**

**Non-Warranty Service**

A. Repairs and/or replacements not covered by this warranty may be performed by BIODEX MEDICAL SYSTEMS, INC. authorized service representatives.

**Service Procedure**

A. If you think you have a service problem, take the following action:

1. Check to see that the problem occurs more than once.
2. Refer to the instruction manual and operations procedure.

B. If you still think you have a service problem:

1. Call BIODEX MEDICAL SYSTEMS, INC., Service Department at (800) 224-6339 and select product service as prompted.
2. Keep yourself and the phone next to the equipment.
3. Service will ask for a brief description of the problem. We will ask specific questions about the malfunction that occurred. This diagnostic process may take a few minutes; therefore, call us when you can set aside an uninterrupted block of time.
4. After taking the information, we will advise on the action we will take.
5. Sometimes service personnel must consult with engineering and it may take time to get back to you. Be sure to let the service representative know your schedule so that we can call at a convenient time.
6. The return call may be from a person other than the one to whom you first reported the problem.
7. After analyzing the problem, we will decide if the unit can be repaired on site, or replacement parts will be sent.
8. If the unit must be returned, Biodex will provide a return materials authorization number (R.M.A. #.) Pack the unit in the carton that it was originally shipped in. It is the customer's responsibility for any damage that occurs during shipping.

9. Non-warranty/non-service contract charges for repair are as follows:

   a. Materials
       +
   
   b. Time
       +
   
   c. Travel Zone
1. Introduction

**Intended Use**

Designed specifically for rehabilitation and retraining of gait for patients with neurologic and orthopedic gait dysfunctions, the Biodex Gait Trainer provides both the audio and visual feedback needed to progress patients quickly and safely to normal ambulation.

The Gait Trainer is easy to use. The clinician need only select the patient's age and height for the treadmill to automatically calculate the exact speed needed to achieve desired step cycle. The rhythmic movement and the audio feedback provide patients with added stimulus for retraining of neural pathways to improve gait pattern.

The Gait Trainer promotes correct stride length for early phase patients. By starting out slowly (with the zero starting speed and small, one-step cycle speed increments), it is possible to manually position the patient's lower extremities in the desired patterns for gait thus reinforcing the proper techniques early in the rehabilitation process. As the patient progresses, correct stride length is coupled to the correct step cycle. When belt speed is increased, the patient must either take longer or more strides to stay on target. Normative data allows clinicians to compare patient progress to baseline norms.

**Indications for Use**

Of course, the Gait Trainer can also be used for many other rehabilitation treadmill applications. In the treadmill mode, its unparalleled speed control, durability, incline and decline in both forward and reverse directions, digital feedback, low profile, and choice of handrail configurations make it the ideal choice for virtually any patient young or old.

The Biodex Gait Trainer comes with a printer that is easy to install and resides on the printer stand.

**Assembly and Installation**

The display monitor receives power from the larger Gait Trainer device. Therefore, the Gait Trainer must be plugged into a wall outlet or surge suppressor and powered on by the ON/OFF switch at the front base of the unit.

The Gait Trainer deck is instrumented with a strain gage at each of the four corners. It is important that the Gait Trainer be level for optimal footfall detection. When not level, the user may see messages concerning Leveling or Offset Calibration. Depending on the situation, instructional screens will be displayed leading the user through any required process.

When first installed, or if the Gait Trainer is moved, the leveling foot may require an adjustment. This will require a ¾" wrench. Adjust the rear leveling foot by turning it with the wrench until the on-screen gage turns green. Please note that there is a jam nut that should be loosened first, and re-tightened after leveling the foot. Press <OK>. 

Figure 1.1. Leveling Foot Requires an Adjustment.

Figure 1.2. Loosen the Top Nut

Figure 1.3. Adjust the Bottom Nut
Power-down

In order to prevent the device's database from becoming corrupted, it is essential that the correct power-down sequence is performed. Always turn off the display, by touching the “X” in the upper right corner of the home screen, followed by “Shut Down”.

Once the display has finished its shut down sequence, power may be removed from the treadmill using the main ON/OFF switch located on the front of the base where the power line cord enters the treadmill.

⚠️ CAUTION: Do not unplug the device or turn off the ON/OFF front base switch before powering down the display!
Initial Setup and Activation

When the system is first powered on, the following screen is displayed if someone is standing on the treadmill deck:

![Footfall Initialization Screen](image)

**Note:** It is important to not be standing on the treadmill deck when OK is selected to perform the footfall initialization. The footfall initialization calibrates the treadmill sensors to patient footfalls. Standing on the treadmill deck while the initialization is in process, will result in inaccurate footfall readings.

Printer Installation

1. Refer to the supplied printer manual to unpack the printer and ensure that it has not been damaged by shipping.
2. Position the printer on the Biodex-provided printer stand.
3. Locate the printer power cable. Plug the small end into the power receptacle on the back of the printer.
4. Insert the AC plug end of the printer power cable first into the Biodex-provided power adapter, and then insert the adapter plug into the power cable receptacle on the back, lower base of the Gait Trainer 3. Do not connect any other equipment to this receptacle.

5. Locate the Biodex-provided 15ft USB cable that will be pre-installed in one of the USB ports on the Gait Trainer 3 display. Connect the other end of the cable to the port at the back of the printer.

6. Ensure both cables are positioned such that they will not interfere with the patient or get caught in the Gait Trainer 3 platform or handles.

7. Refer to the printer manual for directions on installing ink cartridges and paper.

8. With power ON to the Gait Trainer 3, press the <Power ON> switch on the printer. Refer to the printer manual for additional printer information.

**Figure 1.8.** Connect the power cable and USB cable to the rear of the printer.
Connecting Components

In addition to the printer that is shipped with the Gait Trainer, other printers may be used with the device. Most Windows 7 printers are compatible with the Gait Trainer display, but the drivers for many of those printers may need to be installed. For help with this, please call Biodex Customer Support at 631-924-9000, Option 3. Similarly, any Windows 7 keyboard or mouse will automatically connect using one of the USB connections.

It is possible to connect the device to a printer wirelessly. Please call Customer Support for instructions.

An external monitor can also be connected via the VGA port on the bottom of the display. Once the external monitor’s cable is connected, the <Mirror to External Monitor> button in System Utilities must be selected. (This button is accessed by the following navigation steps from the Home screen: Utilities > Configuration > System Configuration > Screen Configuration.)

Accessing Additional Ports and Connections

The Gait Trainer provides the user with the ability to access additional ports and connections from the back, bottom side of the monitor. These connections can be used to attach an additional printer, external monitor, or other component. In the example below, the monitor has been removed from the device column for demonstration purposes.

To access these ports and connections, the back of the monitor can be temporarily removed as detailed in Figure 1.9.

![Figure 1.9. Accessing Additional Ports and Connections](image)
2. Gait Trainer Mode

The Biodex Gait Trainer can be used for gait training applications or as a rehabilitation treadmill. The following section describes use in the Gait Trainer Mode. The rehabilitation treadmill operation is described later in this manual.

Gait Trainer Mode

The Gait Training Mode is useful for the rehabilitation and retraining of gait for patients with neurological and orthopedic gait dysfunctions. It provides both audio and visual feedback for the patient. The rhythmic movement of the treadbelt, along with the audio and visual biofeedback, provides the necessary stimulus for retraining neural pathways thus improving gait pattern.

NOTE: It is recommended that the Biodex NxStep Unweighing System be used in conjunction with the Gait Trainer to provide a safe environment for the patient and clinician, and also to allow for proper patient positioning for weight distribution and coordination of balance.

The Opening Menu displays three icons: Gait Trainer, Treadmill, and Utilities. Touch <Gait Trainer> to advance to the Patient Setup screen. This screen allows entry of patient information and parameters used for gait training.

![Image of Gait Trainer Opening Menu]

**Figure 2.1.** The Gait Trainer Opening Menu.

NOTE: Please be aware that entering patient information into the system for the first time will require some effort. This information is very important if reports are to be run for statistical purposes. After the initial set up, information for existing patients is very quickly retrieved making the session set up faster and easier.

The Gait Trainer Patient Setup Screen

At the Patient Setup screen, touch the appropriate icon to begin entering information. A pop-up keypad is used to enter some parameters such as Name and Age. Once the desired information is entered/selected, touch <Next> to advance to the Footfalls/Histogram screen. Other adjustments can be made using the icons along the bottom of the screen. The presence of some of these icons is set in the system Utilities section.
A brief explanation of each parameter and function on the Gait Training Patient Setup screen follows.  

**NOTE:** For all screens, <Next> advances to the next screen and <Back> returns the user to the previous screen. The <Home> icon at the top, left corner returns the user to the Gait Trainer Opening Menu screen.
Gait Training Patient Setup Screen Parameters

**NOTE:** The three parameters for Gender, Height, and Age are mandatory fields and must be completed before gait training can begin.

- **First and Last Name**: Optional, touch the pop-up <Keypads> to enter the first and last name. Touch <OK> to continue.

- **ID#**: Optional or required depending on Configuration settings. Touch the pop-up <Keypads> to enter an identification number. Touch <OK> to continue.

- **Gender**: Touch the appropriate icon to choose <Male> or <Female>.

- **Height**: This setting is used to determine step length. Touch the appropriate <Height> icon to select the desired range. This value can also be a manual number entry (see Figure 2.3). The manual height entry option can be set within the Configuration option in system Utilities.

- **Weight**: For new patients, a weight can be entered here in pounds. Entering weight data is optional.

**NOTE:** If a patient has been selected using the Select a Patient function, the application will display the existing height and weight as was previously recorded. If height or weight has changed, the numbers can be adjusted and new test results will feature the updated information. Once a test is performed, there is no way to edit the height or weight recorded for that test result. Patient height and weight can also be changed at any time from the Patient Management screen in system Utilities. The new numbers will be used for any subsequent tests.

- **Age / Date of Birth**: Range is from 10 to 120 years old. Touch the <Age> keypad and use the pop-up keypad to change the value. This value can also be derived from a Date of Birth entry (see Figure 2.3). The Age/DOB option can be set within the Configuration option in system Utilities. Touch <OK> to continue.

- **Gait Training Time**: Default value is 6:00 minutes. Use the <▲> and <▼> icons to change the value.

- **Additional Info** (Figure 2.4): Touch <Additional Info> to enter information regarding the patient’s health status and the facility where treatment is taking place. In addition to the predefined categories, the bottom four drop-down menus can be customized to define new categories and associated selection lists. Entering Additional Information data is optional.

- **Biofeedback Options** (Figure 2.6): Touch <Biofeedback> to adjust biofeedback options on the audio/visual Biofeedback Options screen.

- **Select Patient** (Figure 2.7): Touch <Select Patient> to designate an existing patient within the device’s records for a new training session.
Additional Gait Training Patient Setup Screen Parameters

**NOTE:** The following parameters are only visible when they are activated within the Gait Trainer Configuration settings (i.e., in system Utilities.)

- **G-Code Options** (Figure 2.10.): Touch <G-Code> to apply certain G-Code settings to this particular patient.
- **Diagnosis** (Figure 2.5): Touch <Diagnosis> to enter diagnostic information for the patient, including an ICD code.
- **CPT Code** (Figure 2.3): Touch the <CPT Code> drop-down menu to assign a particular CPT (Current Procedural Terminology) code to the patient.

The Additional Information Screen

![Additional Information Screen](image)

Figure 2.4   The Additional Information screen.

The Additional Information screen contains a series of drop-down menus and editable fields in which users can enter various types of information about the patient. In each menu, users can enter a new value or item into the drop-down list.
The Diagnostic Information Screen

On the Diagnostic Information screen, users can manually enter an ICD code in one field and more specific text in the other larger field. Note that this screen does not necessarily have to feature an ICD Code field; this can be activated or deactivated in system Utilities.

The Biofeedback Options Screen

The Biofeedback screen is accessed from the Gait Training User Information screen by touching the <Biofeedback> icon. At this screen, biofeedback parameters can be entered or set. A brief explanation of each parameter and function follows.

Audio/visual biofeedback screen parameters and functions:
- **Set Step Length Tolerance Range**: Touch <Set Range> and use the pop-up keypad to increase or decrease the distance between the target lines the patient must achieve in the steps they take.

- **Set Visual Biofeedback ON/OFF Interval Time**: Touch <ON>, <OFF>, or <Interval> and enter the desired feedback time intervals via the pop-up keyboard.

- **Set Audio Biofeedback ON/OFF Interval Time**: Touch <ON>, <OFF>, or <Interval> and enter the desired feedback time via the pop-up keyboard. The audio tone is not a metronome tempo. The audio tone is timed to be in sync with the appearance of the target box. Tone is also based on the last footfall. A tone can be heard without a footfall. After a while, due to the rhythmic nature of walking, the tone falls into a seemingly real-time tempo.

Once the desired parameters have been set/entered on the A/V screen, touch <OK> to return to the Patient Setup screen.

**The Select Patient Screen**

![Figure 2.7. The Select/Edit Patient screen.](image)

In previous versions of the Gait Trainer software, a patient with existing data on the device could only be re-tested by either: a) typing in the patient’s name exactly as it is spelled on an existing record, or b) finding the patient within the set of records in the Patient Management section of system Utilities. Now, with the Select Patient option, users can quickly find an existing patient and started on a new gait training session.

There are two ways to identify specific existing patients from this screen. At the top there are search options for a patient’s last name or an identification number that has been assigned to the patient. Select one of these fields and enter either a patient last name or the ID number. Select <OK> to display a listing of search results. To return to the list of all patients, select the circular refresh arrow icon at the top right of the screen:
If the number of patient records on the device is relatively small, it may be easier to scroll through the records with the `<▲>` and `<▼>` arrows. (The arrows will not scroll through individual records, but rather pages of records — ten per page.) Patient records can be edited on this screen, or a new patient can be added. Many of the same information fields that are in the Patient Setup screen will need to be entered.
The G-Code Calculator Options Screen

The G-Code Calculator Options screen contains three drop-down menus that will apply various types of G-Code data to the patient’s tests. The G-Code result options and categories are discussed in depth in a later section of this document.

After making any selections to the menus on this screen, note that the G-Code icon on the Patient Setup screen will change from red to green.

Footfalls/Histogram Screen

Figure 2.11. If the Patient’s Steps are outside of the Target Step-Length Range, One or Two Vertical Orange Bars are Displayed.
In the Footfalls screen, the blue foot marks the user’s last foot placement while the space between the two green lines is a target for the next foot placement. The user can toggle by pressing the blue dots to display speed as cycles/sec, MPH, or meters/sec. The numbers in the left and right corners of the Footfalls display illustrate the real time average of the patient’s last five steps. (In Figure 2.12, it is 62 for both the left and the right legs.) There is also a reading for step length.

In the Histogram view, the Y axis represents Step Length and can be displayed in scales of 0-60 cm, 0-80 cm, 0-100 cm, or 0-120 cm. The X axis can be TIME, DISTANCE, or STEPS.

To change the axis label, touch the axis label (in Figure 2.13 the words *Number of Steps*) to toggle between selections.
Footfalls/Histogram Screen Parameters

Touch <Next> at the Patient Setup screen to advance to the Footfalls/Histogram screen. At this screen, users can view patient progress via either a footfall or histogram display. Touch the appropriate icon at the bottom of the left to toggle between display formats. With either display, the following parameters can be adjusted at any time as follows:

- **Walking Speed (mph):** Located at the top right of the screen. Use the associated <▲> and <▼> icons to set this goal to match the desired cycles per second.

  **Note:** The walking (gait) speed can be increased in two ways: Increase the step frequency (step cycle) or increase the step length.

Walking speed is displayed in MPH or KMH. The default value depends upon how the Gait Trainer is set up (English or Metric). Most people can relate better to MPH or KMH than cycles per second. To determine what the cycles/second are, toggle the speed on the left. When step length is increased or decreased, the green lines will move up or down. The patient’s goal is to place their foot between the lines. The numeric bars show the real time average of the last five step lengths for the respective side. Two vertical green bars are displayed if the patient is stepping within the lines (Figure 2.12), and change to orange when the footfall is too short (Figure 2.11).

  **Clinical tip:** Increase the step length to challenge the patient to take longer steps.

  **NOTE:** For visual and audio biofeedback, the treadbelt speed must be greater than 0.3 mph (0.48 kmh).

A step cycle is a successive heel strike for the same foot (i.e., right step, left step, right step). Set the treadbelt speed based on how many complete successive heel strikes occur within a second. 0.1 cycles per second is very slow; 3 cycles is fast. A normal walking step cycle approximates 1 cycle per second.

The cycle/sec speed and step length settings regulate the treadbelt speed. If the treadbelt speed is below 0.3 mph (.48 kmh), a message will display noting that the treadbelt is moving too slowly for biofeedback.

- **Time:** Located at the top left of the screen, counts down from the timing set at the Patient Setup screen.

- **Step Length:** A range equaling [Leg length (cm) x .69] to [Leg length (cm) x .86]. Step Target is placed within this range plus or minus the entered standard deviation. Located at the bottom right of the screen. Use the associated <▲> and <▼> icons on the right side of the screen to increase or decrease goal value.

  **Note:** A Step Target is a theoretical footfall area based on calculated step length. When the step target distance is increased, the treadbelt moves faster because steps need to become longer. If target distance is decreased, treadbelt speed decreases because steps need to become shorter.

- **Distance:** Located at the left of the screen, touch the blue dot <o> to toggle units of measure between miles, meters, and kilometers.

- **Speed (Treadbelt Speed):** Located at the left of the screen, touch the blue dot, to toggle units of measure between KMH, MPH, and meters/second.
- **Heart Rate:** Heart rate monitoring is accomplished by having the patient hold onto both heart rate handgrips on the front handrail. The heart rate value will be displayed at the top of the screen when the handgrips are held.

- **Histogram or Footfall:** Located at the bottom left of the screen, touch the desired icon to toggle between these two choices.

**Footfalls**

When the patient’s actual footfalls are detected, they are displayed with respect to the step length lines. When the patient falls within the set step length tolerance as set in biofeedback option, the footfalls are synchronized with the target and the message GOOD JOB will show in the display. Should they fall outside of the step length tolerance, the display will tell the patient what footfall is outside of the range by displaying a prompt to go longer or shorter on the respected foot or feet (Figure 2.11).

**NOTE:** Because footfalls are projected based on the patient's last step the screen is always one step behind. This should not be apparent once the patient falls into a rhythmic walking pattern. If a step does not go in front of the opposite step, the target box will not appear.

**Histogram**

The Histogram displays footfalls as a two-pixel wide dot. The X-axis shows distance traveled and the Y-axis shows the deviation, where 1 pixel is equal to 1cm of deviation. If the patient goes beyond the Standard Deviation (SD), the histogram will deviate from straight path.

**NOTE:** On the histogram graph, the upper and lower horizontal green lines are the target step length area, plus or minus the step length tolerance. The Step Length Tolerance Range can be adjusted in the Biofeedback Options screen (from the Patient Setup screen).
3. Normative Data

The normative data charts provided in this manual can be used to develop rehabilitation programs and discharge criteria for patients. The normative values are based on age and gender; therefore, comparisons can be easily made.


The cycle time in Whittle’s research is measured in seconds, whereas the Gait Trainer uses cycles/second. Therefore, data is presented as the inverse function of the cycle time:

\[
\text{Cycles per second} = \text{Cycles}^{-1}
\]

Whittle also presents normative data for stride length. The Gait Trainer uses step length. A stride equals two steps; therefore, these tables represent stride length divided by two.

### Table 3.1. Stride Length Tables

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Cadence (steps/min)</th>
<th>Cycle time (s)</th>
<th>Stride length (m)</th>
<th>Speed (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-14</td>
<td>103-150</td>
<td>0.80-1.17</td>
<td>0.99-1.55</td>
<td>0.90-1.62</td>
</tr>
<tr>
<td>15-17</td>
<td>100-144</td>
<td>0.83-1.20</td>
<td>1.03-1.57</td>
<td>0.92-1.64</td>
</tr>
<tr>
<td>18-49</td>
<td>98-138</td>
<td>0.87-1.22</td>
<td>1.06-1.58</td>
<td>0.94-1.66</td>
</tr>
<tr>
<td>50-64</td>
<td>97-137</td>
<td>0.88-1.24</td>
<td>1.04-1.56</td>
<td>0.91-1.63</td>
</tr>
<tr>
<td>65-80</td>
<td>96-136</td>
<td>0.88-1.25</td>
<td>0.94-1.46</td>
<td>0.80-1.52</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Cadence (steps/min)</th>
<th>Cycle time (s)</th>
<th>Stride length (m)</th>
<th>Speed (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-14</td>
<td>100-149</td>
<td>0.83-1.20</td>
<td>1.06-1.64</td>
<td>0.55-1.67</td>
</tr>
<tr>
<td>15-17</td>
<td>96-142</td>
<td>0.85-1.25</td>
<td>1.15-1.75</td>
<td>1.03-1.75</td>
</tr>
<tr>
<td>18-49</td>
<td>91-135</td>
<td>0.89-1.32</td>
<td>1.25-1.85</td>
<td>1.10-1.82</td>
</tr>
<tr>
<td>50-64</td>
<td>82-126</td>
<td>0.95-1.46</td>
<td>1.22-1.82</td>
<td>0.56-1.68</td>
</tr>
<tr>
<td>65-80</td>
<td>81-125</td>
<td>0.96-1.68</td>
<td>1.11-1.71</td>
<td>0.81-1.61</td>
</tr>
</tbody>
</table>
4. Test Results

Exercise results can be reviewed on the Test Results screen. This screen appears after touching <Results> on the Gait Training screen.

![Test Results Screen]

*Figure 4.1. The Test Results screen. Note the Test Results functions available at the bottom of the screen.*

**Test Results Parameters**

*Time:* This displays the total elapsed time from the start of the exercise session until either the end of the session or when the <STOP> icon is pushed.

*Steps:* Total Steps during the exercise session.

*Average Speed:* Average speed of the treadbelt during exercise session.

*Distance:* This is the total distance traveled by the treadbelt, which is in essence the distance traveled by the patient.

*Average Walking Speed:* Normative values have been established and are dependent on age and sex. The norms are expressed next to the real time value.

*Average Step Cycle:* This is calculated by taking an average for the step cycles during the exercise.

*Average Step Length:* This number is calculated by taking an average for all of the step lengths.

*Coefficient of Variation:* This is calculated as the amount of variation occurring between footfalls.

*Time on Each Foot:* This is the actual time spent on the mentioned limb. The time spent on each limb should be equally distributed between right and left. Should they be different, the patient is spending more time on one leg than the other.
Test Results Screen Functions

From the Test Results screen the user can perform the following functions:

**Back**: Return to the Footfalls/Histogram screen by touching <Back>. All current exercise data will be lost if <OK> to proceed is touched. To cancel and return to the Test Results screen, touch <Cancel>.

**Print Results**: Touch <Print Results> to print out a Gait Training Exercise Summary.

**Progress Report**: Touch <Progress Report> to compare results over time. For more details, refer to the section on progress report. This icon will only be visible if there is more than one exercise session (test) to compare.

**Print Histogram**: Touch <Histogram> to print a histogram for this exercise session.

**Save Results**: This option allows the user to save exercise results for later reporting or export as follows:

1. At the Test Results screen, touch the <Save Results> icon to save the results of the latest gait training session.

   **NOTE**: If no patient name has been entered, the system will prompt that the “The Patient Name is Undefined”. Enter the Patient Name to Save the Data. Touching <OK> will display the Add a New Patient screen where the patient’s name and other data is entered. Touch <OK> again to save the results.

   If the user tries to continue without entering a patient name, a prompt will appear stating that all exercise results data will be lost. Press <OK> to return to the Patient Setup screen, or <Cancel> to return to the Patient Name is Undefined screen.

2. If the patient name has already been entered, touch <OK> on the Test Results screen to save the results for later reporting or export.

![Gait Training Test Results and Gait Trainer Histogram](image)

Figure 4.2 and Figure 4.3. Gait Trainer printouts include a Gait Training Test Results and Gait Trainer Histogram.
Gait Trainer Progress Report

A progress report is perfect for showing need, progress, and outcome. Progress reports for specific parameters are available when a patient has multiple exercise reports.

Figure 4.4. Select any of the patient records by touching a row.

Figure 4.5. The Stored Test Results Screen
Figure 4.6. Select Progress Report, and Reports on the following screen.

Figure 4.7. Touch the progress parameters that you are interested in viewing and/or printing. Green boxes indicate selected parameters. Also, choose to have data points on the report and/or Normative data ranges.

Figure 4.8. Progress report showing total time in seconds for each exercise session.
Figure 4.9. Progress report showing increase or decrease in average walking speed over the six sessions.

Figure 4.10 Progress report showing increase or decrease in total distance covered and steps taken.

Figure 4.11 Progress report showing increase or decrease in average step length.
In this case, the progress report shows an increased step length variability over the sessions.

Progress report showing the percentage of time spent on each foot.
5. G-Codes

Introduction to G-Codes and Modifiers

G-codes are a method of recording and tracking a patient’s functional limitation at the outset of therapy, during the course of therapy, and at the time of discharge.

The codes are now required by Medicare for outpatient therapy services billed under Medicare Part B in order to collect data on beneficiaries’ functional outcomes from therapy services provided. Claims that do not include the required functional data will be returned for re-submission.

Functional tests will be used to report a functional limitation category (G-code) and a percentage of impairment (Severity Code Modifier).

Severity Code Modifiers are a series of impairment level ranges made up of approximately 20 percentage points each.

The G-codes will be used by those who provide outpatient therapy services. These include physical therapists, occupational therapists, speech-language pathologists, physicians, physician assistants, nurse practitioners, and clinical nurse specialists.

![Sample Claim Form with G-code and Impairment Modifier](image)

*Figure 5.1. Sample Claim Form with G-code and Impairment Modifier*
Associating G-Code Data

The G-code screen is accessed from the Patient Setup screen in the Gait Trainer interface. Touch the <G-code> icon to access this screen.

![Patient Setup screen in the Gait Trainer interface. Using the G-code icon, a user can access the drop-down menus needed for associating G-code data.](image1)

At this screen, the G-code data can be associated with the patient by making selections in the drop-down menus.

The top drop-down menu allows the user to select a G-code Result Option. This means that the Exercise Summary Report will feature the Impairment %, the Severity Modifier Code, or both. If the drop-down menu is set to Off, the Exercise Summary Report will show neither column and the G-code icon on the Patient Setup screen will have a red (as opposed to green) dot on it.

![G-code Calculator Options screen in the Gait Trainer interface. The first drop-down menu allows the user to customize the G-code data that will appear on the Gait Training Test Results.](image2)
Figure 5.4. A sample of the Test Results after 'Both Impairment % and Severity Modifier Code' has been selected.
The G-code category drop-down menu features a list of commonly used rehabilitation categories. The category most likely to be associated with the Gait Trainer is the Mobility: Walking and Moving Around selection.

Figure 5.5. The second drop-down menu on the G-code Calculator Options screen in the Gait Trainer interface allows the user to choose a G-code category.

Figure 5.6. A sample of the Test Results showing the G-code category that has been selected.
The Status drop-down menu relates to the patient’s treatment timeline. If this is the patient’s first treatment or one in a series of treatments, the status should be set equal to Current Status. If it is the last treatment, the Discharge Status should be selected.

![Figure 5.7](image1.png)

**Figure 5.7.** The third drop-down menu on the G-code Calculator Options screen in the Gait Trainer interface allows the user to select the status of the beneficiary.

![Gait Training Test Results](image2.png)

**Figure 5.8.** A sample of the Test Results showing the status that has been selected.

Press <Back> to return to the Patient Setup screen. Note that the dot on the G-code icon is green, as opposed to red.
Test Results Data

Exercise report data can be reviewed from the Test Results screen only after touching <End> to end the exercise session and touching <Results>.

The Test Results screen can also be accessed by selecting the individual record from the Reports section in system Utilities.

Near the top of the screen, the user can see that the G-code category has been specified as Mobility: Walking and Moving Around. The G8978 code is derived from making a “Current Status” selection. Both of these selections are made in the Gait Training Patient Setup screen.

The two columns at the right of the screen pertain to G-code data. The Impair Percentage numbers refer to what degree the patient could be considered impaired, with 100% meaning the patient is completely impaired and unable to do the associated task without help.
The Severity Code Modifiers are a series of impairment level ranges made up of about 20 percentage points each, where for example, "CI" would represent a status of 1-19% impairment.

<table>
<thead>
<tr>
<th>Modifier</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>CH</td>
</tr>
<tr>
<td>1-19%</td>
<td>CI</td>
</tr>
<tr>
<td>20-39%</td>
<td>CJ</td>
</tr>
<tr>
<td>40-59%</td>
<td>CK</td>
</tr>
<tr>
<td>60-79%</td>
<td>CL</td>
</tr>
<tr>
<td>80-99%</td>
<td>CM</td>
</tr>
<tr>
<td>100%</td>
<td>CN</td>
</tr>
</tbody>
</table>

*Figure 5.11. The scale of 7 modifiers is intended to denote the patient's degree of impairment/limitation/restriction.*

For further reference, review the chart below to see how the Gait Trainer software calculates Impairment Percentage. In measuring a patient's average walking speed, the software assigns an Impairment Percentage “score” based on the patient’s average walking speed during a particular session. If an average speed 0.1 MPH, but less than 1.1, cannot be obtained, the patient is considered to be 100% impaired. If the average walking speed is 1.1 MPH or greater, the patient is considered to be 0% impaired.

**Note:** In this example, a “normal” range of 1.1 to 1.82 MPH is calculated from the age, gender, and height data entered on the Patient Setup screen.
From the Stored Test Results screen, the therapist may also choose to alter the Impairment Percentage numbers manually. To do so, touch the number to be changed.

On the Reason for Amendment screen, select a reason for the change in the drop-down menu.
Figure 5.14. Reason for Amendment screens
Enter an updated number with the keypad.

Two things can be observed when the Stored Test Results screen is redisplayed: First, a red asterisk has appeared next to the updated number marking it as being amended. Also, since the impairment level change was a significant one — from 0 to 33 — the Severity Modifier Code has changed from CH to CJ.

![Stored Test Results]

*Figure 3.15. The change in impairment percentage is now noted by an asterisk.*

**Sample G Code Categories**

For reference, some other G-code categories and associated codes are listed below. All of these selections are available on the Gait Trainer software.

**Mobility: Walking & Moving Around**

- G8978 Mobility current status
- G8979 Mobility goal status
- G8980 Mobility D/C status

**Changing & Maintaining Body Position**

- G8981 Body position current status
- G8982 Body position goal status
- G8983 Body position D/C status

**Carrying, Moving and Handling Objects**

- G8984 Carry current status
- G8985 Carry goal status
- G8986 Carry D/C status

**Self-Care**

- G8987 Self-care current status
- G8988 Self-care goal status
G8989 Self-care D/C status

**Other PT/OT Primary (not covered in above category)**

G8990 Other PT/OT current status
G8991 Other PT/OT goal status
G8992 Other PT/OT D/C status

**Other PT/OT Subsequent (not covered in above category)**

G8993 Sub PT/OT current status
G8994 Sub PT/OT goal status
G8995 Sub PT/OT D/C status
6. Treadmill Operation

Figure 6.1. The Quick Start feature allows the user to begin the exercise session with minimal input.

Quick Start Operation

Although the Gait Trainer offers advanced programming capability, it also features a "Quick Start" function that allows the user to immediately begin exercise on the system with 1/4-mile scaled track views.

Figure 6.2. Quick Start track view.
Quick Start operation is simple. With the system turned ON, position the user on the treadbelt and proceed as follows:

1. Touch <Treadmill> on the Opening Menu. The Treadmill Opening Menu is displayed. Touch <Quick Start>.

2. Press <Start> on the display to activate the treadbelt. The treadbelt will ramp up to .01 mph.

3. Touch the <▲> and <▼> arrows on the screen to adjust the Speed and the Elevation as desired.

4. Touch the display icons at the bottom left of the screen to toggle between the Quick Start Exercise Track display and a Numeric display.

5. Touch <Pause> to pause the exercise session at any time. Touch <Resume> to resume the exercise session.

6. Touch <End> to end the exercise session at any time.

Quick Start Track / Numeric Display Parameters

Users can choose from a Quick Start Exercise Track or Numeric display during Quick Start exercise sessions. The following parameters are displayed for both choices.

**NOTE: To toggle between displayed parameters (i.e., to change measurement units for calories, pace, or distance), touch the blue dot next to each parameter heading.**

**Time:** Cumulative time in minutes/seconds from the point at which the treadbelt begins to move in either direction.

**Distance:** The distance covered in miles or KM from the beginning to the end of the current exercise session.

**Calories:** Toggle between:

- Calories: Total calories burned by the user during the current exercise session. This value is displayed in real-time.
- Calories/Hr: Total calories burned in one hour if exercise continues at the current rate. This parameter is dependent upon a default weight of 150 pounds.
- METs: This value reflects the resting rate of oxygen consumption with one MET equal to the oxygen consumption of a seated individual at rest. Thus, a seated individual in a resting state is consuming one MET. A seated individual exercising at a rate of two METs is consuming twice the oxygen of a seated resting individual. A person exercising at 10 METs is consuming ten times the oxygen of a seated resting individual. To compute the METs of a person actively exercising on the Gait Trainer, the system uses standard calculations based on American College of Sports Medicine Guidelines for Testing and Exercise. The METs value is always displayed in real/time for current speed.
Lap Count/Pace: The amount of time it will take the user to move one mile or KM at the current treadmill speed. Toggle between miles or kilometers by clicking on the number below the Lap text.

Heart Rate: Displayed at the top of the screen, this is the real-time heart rate of the user during the exercise session measured using the contact handgrips.

Quick Setting Option for Speed Value: Clinicians and users have the option of bringing the treadmill to a designated speed without having to press the <▲> button multiple times. To use this option, select the keypad located to the left of the Speed setting in the upper right corner (see Figure 6.2). The keypad will appear on the screen for ten seconds. If a Speed Limit has been enabled, the speed limit — in MPH or KMH — will appear at the top of the screen. Users will not be able to select a number value that is higher than the speed limit. (For more information on the Speed Limit setting, refer to the System Configuration section of this document.) To set a speed, touch a number button. The window will close and the treadmill will start “ramping up” to that speed.

![Setup Options](image)

Figure 6.3. The Manual Start Setup Options screen allows entry of patient-specific information and parameters.

Manual Treadmill Operation

Manual treadmill operation is easy. Like the Quick Start function, Manual Start allows the user to begin exercising quickly. Rather than using default settings, however, this mode of operation prompts the clinician to enter the patient’s body weight, select the treadmill direction, and enter values for Time, Distance, and Calories. During the exercise, the user can choose between Exercise Track or Numeric displays.

Manual Operation Procedure

NOTE: For all screens, <Next> advances to the next screen, <Back> returns the user to the previous screen.
1. At the treadmill Opening Menu select <Manual Start>. The Setup Options screen is displayed.

2. At the Setup Options screen, touch the appropriate icons to enter information and select treadmill direction. In addition to the <▲> and <▼> arrows, a pop-up keypad can be used to enter values for Distance, Calories, and Body Weight. Once the desired information is entered/selected, touch <Next> to advance to the Exercise Track display.

3. Touch the Display icons at the lower left of the screen to toggle between the Exercise Track display and a Numeric display.

4. With the Exercise Track or Numeric Display on the screen, touch the yellow dot next to any heading or icon to change the value. To toggle between value settings (i.e., miles / KM), touch the displayed parameter.

5. When all parameters are entered/selected, press <Start> on the display to activate the treadmill and begin the exercise session. The treadmill will ramp up to .1 mph.

6. Use the <▲> and <▼> arrows on the Exercise Track or Numeric Display to adjust the speed setting to the desired value. Both speed and elevation can be adjusted at any time during the exercise session.

7. Touch <Pause> to pause the exercise session at any time. Press <Resume> to resume the exercise session.

8. Touch <End> to end the exercise session at any time.

Manual Mode Exercise Track and Numeric Display Parameters
The same parameters are displayed on both the Exercise Track and Numeric displays. A brief explanation of these parameters can be found in the previous (Quick Start) section.

Figure 6.4. The Exercise Track display.
Figure 6.5. The Numeric display.
7. Treadmill Profiles

The Biodex Gait Trainer treadmill mode features five pre-loaded exercise profiles and the ability to create and select up to 12 custom exercise profiles. These programs allow the clinician to select pre-determined exercise format routines. Exercise profiles are divided into as many as ten segments each. Users can select any of the pre-defined exercise profiles, review or edit any exercise profile, or delete an existing exercise profile.

The pre-defined exercise profiles include:

- Anaerobic
- Aerobic
- Pyramiding
- Surge
- Random

Selecting a Pre-Defined Exercise Profile

To select a pre-defined exercise profile:

1. At the treadmill Opening Menu, touch <Profile>. The Select Profile screen is displayed.
2. Touch to select the desired pre-defined exercise profile. The Profile Setup Options screen is displayed.
3. At the Profile Setup Options screen, enter the Time duration, user’s Body Weight, and the Maximum Elevation for the exercise profile. Touch <Next> to advance to the Profile Exercise screen.
4. At the Profile Exercise screen, push <Start> on the display to activate the treadbelt and begin the exercise session. The treadbelt will automatically ramp up to the speed required by the first segment of the desired protocol. The treadmill will also automatically rise or lower to the required elevation.
5. The treadmill will automatically beep to signal the end of each profile segment and proceed to match the required speed and elevation for the next segment. If necessary, the <▲> and <▼> arrows on the Exercise Track or Numeric Display can be used to adjust the speed and elevation setting at any time.
6. Touch <Pause> to pause the exercise session at any time. Press <Resume> to resume the exercise session.
7. Touch <End> to end the exercise session at any time.
Figure 7.1. The Select Profile screen allows the user to choose from five pre-defined profiles.

Figure 7.2. At the Profile Setup Options screen, users can enter values for time, body weight and maximum elevation.
Profile Mode Exercise Track and Numeric Display Parameters

The same parameters are displayed on both the Exercise Track and Numeric displays. A brief explanation of these parameters can be found in the Quick Start section.

![Profile Mode Exercise Track and Numeric Display Parameters](image)

Figure 7.3. Ready to begin an exercise session with Profile 3, Pyramiding, selected.

Designing a Custom Exercise Profile

To design a custom exercise profile:

1. At the treadmill Opening Menu, touch <Profile>. The Select Profile Menu is displayed.
2. Touch option six, <Custom>. The Custom Profiles screen is displayed.
3. Touch the <Empty> (1-12) icon of the profile to be designed. Touch <Edit Profile> at the bottom of the screen. The Editing Profile screen is displayed.
4. Each exercise profile can be divided into as many as ten separate stages. Enter the speed, elevation, and time duration for each stage. To add stages, touch the “add row below” icon to the right of the Time field. If it is necessary to clear a stage, touch the recycling can on that row. If it is necessary to clear all of the stages, touch <Delete All>. Touch <OK> to return to the Custom Profile menu.
5. At this point, the user can select any of the custom profiles designed. The Custom Profile Setup Options screen is displayed. Proceed as if using a pre-defined profile.
Figure 7.4. At the Editing Profile screen, clinicians enter values for speed, elevation and time for each of up to ten stages for any profile.
8. Gait Trainer Utilities

![Utilities Menu](image)

To access the Utilities menu, touch <Utilities> on the Main screen. The Utilities Menu allows access to the Configuration, Patient Management, Reports, System Maintenance, and Advanced System Maintenance (not displayed) screens. The Utilities menu also displays technical information about the Gait Trainer firmware version.

**NOTE:** The Advanced System Maintenance is an icon that is normally hidden; instructions on accessing it will be discussed later in this section.

**Reports**

Touch <Reports>. On the Reports – Test Results screen, test results can be viewed or printed. Four Report Types are available: Test Results, Histogram, Progress Report – All, and Progress Report by Selection.

**NOTE:** Codes/Comments or G-Code data cannot be edited in Reports section screens.

![Test Results Screen](image)
Configuration

To advance to the Configuration screen from the Utilities Menu, touch <Configuration>. There will be a submenu featuring two icons; one for System Configuration and one for Gait Trainer Configuration. For either option, the user must enter 159 at the “Access ID Code” prompt and touch <OK>.

**System Configuration**

The System Configuration screen allows the user to choose between various display options and to set specific parameters for a variety of treadmill functions.

Following is a description of Configuration screen options. Once all parameters and values are set, touch <Back> to exit and return to the Utilities Menu. Touch <Back> a second time to return to the Main Menu.

![System Configuration Screen](image)
System Configuration Screen Parameters

**Test Completion Screen Timeout**: This setting determines how long the Test Results screen will be displayed before the screen saver activates following completion of the exercise session. The default is “OFF” but the range can be adjusted from 0:15 seconds to 60:00 minutes. Touch the <▲> and <▼> icons to increase or decrease the value.

**Screen Configuration**: The Screen Saver setting determines how long the display screen remains ON when the system is no longer in use. Once the selected time expires, the screen fades to black even if the Gait Trainer remains ON. To enable the Screen Saver function, touch the radio box next to <Enable Screen Saver> causing it to turn green. Use the <▲> and <▼> icons to increase or decrease the value displayed in 1 minute increments. The “time out” range is from 00:00 to 50:00. To enable a mirror image of the display on an external monitor, touch <Mirror to External Monitor> (An external monitor must already be connected to the VGA port on the bottom of the display.) Touch <OK> to confirm the changes and return to the Configuration screen. Touch <Cancel> to return to the Configuration screen without making any changes.

![Screen Configuration Screen](image)

**Set Date/Time**: Touch <Set Date/Time> to change the system time, date, or time zone. Touch the button to highlight the value to change and use the <▲> and <▼> icons to increase or decrease the value as desired. To change the Time Zone, touch the drop-down menu once and scroll through the list to make a selection. Touch <OK> to save the changes and return to the Configuration screen.
Figure 8.6. Set the System Date/Time Screen

*Tone Volume:* Touch any section of the horizontal bar to select a new tone volume setting. Selecting low numbers along the bar will result in lower volume while selecting high numbers makes the louder. Tone volume settings range from 0 to 10.

*Change Access ID Code:* Users can change the default Access Code (159) used to access secure settings in the device software. To change the access ID code, select a new Access ID Code by pressing this button and entering the value using the <▲> and <▼> arrows or the numeric buttons on the key pad. Press <OK> to save the New Access ID Code and return to the System Configuration screen.

Figure 8.7. Enter New Access ID Screen

*Units:* (see Figure 8.4.) Treadbelt speed can be measured in either US (MPH) or metric (KMH) units. Touch this menu to toggle between the two.

*Enable Secure Code Access:* Having this function enabled will require users to input an Access ID Code before changing certain settings on the device. The default Access ID Code is 159.
Enable Custom Profile Access Protection: Having this function enabled will require users to input an Access ID Code when they attempt to alter a customized profile that has been created in the Custom Profiles section of the Treadmill mode.

Enable Speed Limit: The software for the Gait Trainer 3 includes an additional safety setting to limit treadbelt movement to a predetermined speed during Treadmill Training activities. Clinicians can determine what speed limit would be most appropriate for the type of patients in their facilities. To enable the Speed Limit functionality, touch the box once to turn it green. To change the default Speed Limit from 5 MPH, touch the enabled “5 MPH” window once; a keypad is displayed for altering the speed limit. Speed limits can be set in either MPH or KMH by toggling the “Units” function in the bottom left portion of the screen. The device will be shipped with the Speed Limit functionality disabled.

Figure 8.8. Gait Trainer Configuration Screen.

Gait Trainer Configuration

The Gait Trainer Configuration screen allows the user to further configure the Gait Trainer user settings (e.g., Clinical Codes and Normative Data).

Descriptions of the Gait Trainer Configuration screen options are detailed below. Once all parameters and values are set, touch <Back> to exit and return to the Configuration submenu. Touch <Back> a second time to return to the main Utilities menu.

Gait Trainer Configuration Screen Parameters

Clinical Codes: The Clinical Codes screen allows the user to activate the CPT Codes, G-Codes, and Diagnostic/ICD Codes options on the Patient Set up screen. To enable one or more codes, touch the boxes to turn them green. A default CPT Code can be set by selecting one of the rows and touching <Add>. 
Normative Data Configuration: Normative data can be specified to each facility’s needs. Select a particular row of demographic information and touch the pencil icon beside the row to edit the norms for performance in the settings at the bottom of the screen. Selecting the <Restore Defaults> icon returns the normative data back to the factory setting.
Facility Information: Use this screen to enter the facility’s name, which can be featured on printed reports.

Enable Advanced Data Input Mode: Touch this checkbox to input a patient’s exact date of birth and height numbers in the Gait Training Patient Setup Screen (as opposed to simply designating an age number and height range).

Require Patient ID# for Patient Record: Touch this checkbox to require that users input a specific Patient ID# for each new patient that performs gait training sessions.

Enable “Additional Information” on Patient Setup: Touch this checkbox to enable the Additional Info icon at the bottom of the Gait Training Patient Setup screen.

Print Facility Information on Reports: Touching this checkbox allows the user to input information about the facility that will be displayed on printed reports.

Print Custom Logo on Reports: Touching this checkbox will display the logo on printed reports.

Step Symmetry Histogram X Axis: This setting allows the X axis for the Reports/Test Results histograms to be units of time, steps, or distance.

Patient Management

Figure 8.12. Utilities Menu
To advance to the Patient Management screen from the Utilities Menu, touch <Patient Management>. Enter 159 at the “Access ID Code” prompt and touch <OK>. The Patient Management screen is displayed.
To view an individual’s records or an individual’s test results, select the row listing the patient to be viewed from the main Patient Management screen (Figure 8.13), and select <Next>. From the Data Management – Test Results screen (Figure 8.14), select <Edit>. This displays the Stored Test Results screen (Figure 8.15).

Patient Management functions include the ability to add or edit an individual patient file, delete a file, delete single or multiple patient files, and import or export patient data. A description of each feature follows.

**Adding Patient Files**

To Add a Patient File:

1. From the Patient Management – Select a Patient screen, touch <Add Patient>.
2. On the resulting screen, there will be several fields to populate. Depending on how the system is configured, either the First and Last Name fields will be required or the Patient ID number field will be mandatory.
3. The user may also select to enter data on the Additional Information screen. On this screen, just to mention two options, the user can add details about the facility where the patient is being treated or create customized drop-down menus.
4. After inputting the new patient information, touch <OK>. The new file will be saved and the system will return to the Patient Management – Select a Patient screen.

To make the Patient ID# a required field when adding new patients:

1. From the Main system Utilities screen, touch <Configuration>.
2. On the next screen, touch <Gait Trainer Configuration>.
3. Check the box for "Require Patient ID# for Patient Record".
4. When the system returns to the Add Patient screen (from the Patient Management – Select a Patient screen) the First and Last Name fields are no longer required, but the Patient ID# field is required.

**Editing Patient Files**

To Edit a Patient File:

1. From the Patient Management – Select a Patient screen, touch a patient row, and touch <Edit>.
2. On the resulting screen, the fields that were present when the patient file was created are displayed. Depending on how the system is configured, either the First and Last Name fields will be required or the Patient ID number field will be mandatory. If the Patient file was created when one of these fields was not required, a value must be entered in the now-required field in order to save any other changes (Refer to the previous section for instructions on changing this setting).
3. The user may also edit the data in the Additional Information screen. On this screen, the user can add details regarding the facility where the patient is being treated or create customized drop-down menus to name two options.
4. After editing the patient information, touch <OK>. The file is saved with the changes and the system returns to the Patient Management – Select a Patient screen.

**Deleting Patient Files**

To Delete a Single Patient File:

1. Touch to highlight the patient file to delete.
2. Touch <Delete> to delete the selected patient file. The system will display a prompt to ensure the selected file is to be deleted.
3. Touch <OK> to delete all test results associated with the patient. The system returns to the Patient Management screen.

To Delete An Entire Range of Patient Files:

1. Touch the <Delete Range> icon. On the next screen, the user can select a range of patient records to delete: All records, records from a certain date to present time, records Prior To a certain date, or all records between certain dates (From/To). The system will display a prompt to ensure all the selected files are to be deleted. Touch <OK> to delete the selected files and return to the Patient Management screen.

**Importing Patient Data**

The Import Patient Data function allows patient data from a stored test to be imported in a binary (.biodata) file format.

![Figure 8.16. Select a File Name from the Patient Data File Import Screen](image-url)
To Import a Patient Data Set:

1. From the Patient Management – Select a Patient screen, touch <Import>.
2. The system displays the contents of a biodata folder from an attached flash drive. Select a data set to import by touching a particular row.
3. Touch <Import Selected Data>.
4. A confirmation screen is displayed prompting the user whether or not to proceed. Touch <OK> to update the system’s data set with the patients and their associated test results in the imported data.

**Exporting Multiple Patient Data Sets**

The Export Multiple function allows patient data from stored tests to be exported in either a binary (.biodata) file format or a CSV format.
1. From the Patient Management – Select a Patient screen, touch <Export Multiple>.

2. On the next screen, the user has the option to select what range of patient records to export: All records, records from a certain date to present time, records prior to a certain date, or all records between certain dates (From/To).

3. Touch either the <Export Binary> button or the <Export CSV> icon. A confirmation screen is displayed prompting the user whether or not to proceed.

4. Touch the <Export Binary> or the <Export CSV> button again to complete the export process. The selected files are exported to the attached flash drive in the designated format.

5. Touch <Back> to return to the Patient Management – Select a Patient screen.

**Working With Individual Patient Records**

To export an individual patient data file:

1. From the Patient Management – Select a Patient screen.

2. Select a patient row, and touch <Next>.

3. On the following Data Management – Test Results screen, touch <Export CSV>. The CSV file will be saved to an automatically generated folder titled “BioCSV” (refer to Appendix A for details regarding how to perform a CSV file export).

*Note: The user has the option to export patient data either to a Binary file or a CSV file, which can be stored locally on a hard drive.*
Printing Stored Results

To Print a Stored Test Result or Histogram:

- Touch <Next> at the Patient Management - Select a Patient screen.
- At the Data Management – Test Results screen, touch <Edit>.
- Touch <Print Results> to print out the patient file, or touch <Print Histogram> to print out a patient histogram.
- At the Print screen, the user has the option to send the record to a connected printer or to export the document to a PDF on a USB flash drive without printing it.

*Note: When <Export PDF> is selected, the PDF will be exported to an automatically generated folder titled "BioReports" on an inserted USB flash drive.*

- After printing, the system returns to the Stored Test Result screen.

![Print Results screen](image1.png)

*Figure 8.20. Print Results screen.*

![Hard drive saving location](image2.png)

*Figure 8.21. The hard drive saving location for the <Export PDF> function.*
Figure 8.21 illustrates that the BioReports folder is just one of several subfolders that are automatically generated in the main GaitTrainer4 directory, which is automatically generated by the system. Here is a list of the subfolders, along with the types of files they contain:

- **BioBackup**: The backup of system settings with database.
- **BioCsv**: Both individual CSV file and multi data CSV file.
- **BioData**: The patient test results as Binary file.
- **BioExport**: The event log file.
- **BioReports**: The reports in PDF format.

### System Maintenance

![Utilities main screen.](image)

Figure 8.22. Utilities main screen.

The System Maintenance main menu contains icons for the three configurations related to database maintenance:

1. Backup to USB.
2. Restore from USB.
3. Database Cleanup.
Backup to USB

The Backup to USB function creates a backup database of current patient records on a removable USB flash drive. After a flash drive is inserted into one of the device’s USB ports, selecting the <Backup to USB> icon will generate the following screen:

![Backup to USB Screen](image)

Figure 8.23. System Maintenance Main Screen.

Restore from USB

The Restore from USB function allows users to restore a previously backed up database to be the Gait Trainer’s current data set. The restoration will be from a removable flash drive that was used in the Backup to USB function.

Selecting the <Restore from USB> icon displays the following screen:

![Restore from USB Screen](image)
The Select Backup to Restore screen displays a list of backed up databases that have been created. The most recently backed up database will be the top row of the list. Select the database to restore as the Gait Trainer’s current data set, and select the <OK> icon. The Database Restore Complete screen is displayed as illustrated below:

Depending on the size of the database, it can take some time to reach the Database Restore Complete screen. The Gait Trainer application will restart once <OK> is touched.

The Backup operation makes a backup of the entire system — not just the database. All system selections and settings will be backed up and the Restore operation will restore all of these settings in addition to the patient data. This includes the backup and restoration of the facility name. Also, for added safety/security, all backup data is encrypted.
Database Cleanup

Database Cleanup is an administrative maintenance function that reduces the system's overall file size.

Selecting the <Database Cleanup> button displays a confirmation screen prompting the user whether or not to proceed with the cleanup or cancel the action.

Advanced System Maintenance

The Advanced System Maintenance screen is hidden from normal view. This screen, when active, allows the user to make adjustments such as selecting a language preference, performing speed and elevation calibration, and performing strain gauge calibration.

To access the System Maintenance screen:

1. Touch <Utilities>.
   
   **NOTE:** The next step requires pressing the hidden keypads in the right and left corners of the displays touch screen.

2. To access the <System Maintenance> prompt on the display:
   
   a. Touch the right side of the Utilities screen (refer to the red circle in Figure 8.27).
   
   b. Touch the left side (as indicated by the red circle in Figure 8.27).
   
   c. Touch the right side a second time.

   ![Figure 8.27. Unmarked touch areas for Access to the Advanced System Maintenance Screen.](image)

3. Touch <Advanced System Maintenance>. The Advanced System Maintenance screen is displayed.
Advanced System Maintenance Screen Settings

*Treadmill Diagnostics:* The Treadmill Diagnostics screen allows the user to conduct some diagnostic tests with regards to treadmill performance. The strain gauges can be reset to the factory calibration and the strain gauge board can be re-initialized.

- Touch <  > for the elevation until the elevation motor stops. The reported elevation counts must be between 12 and 15. If they not, loosen the nut on the elevation pot and adjust the pot for a count between 12 and 15.

- Touch <  > until the treadmill is fully elevated. The counts must be between 121 and 125.

*Treadmill Calibration:* Use this gauge when manually adjusting leveling.
**Hours:** The Hours of Use screen provides a breakdown of device usage along with the option to reset the hour count.

**View Event Log:** The Event Log screen contains information on device events with options to filter by date ranges. The screen can be used to delete the log content or export it to a USB flash drive.
Reset Application Settings: Use this function to return all application settings to factory defaults. Patient data will not be deleted a reset is performed.

Language: Use this function to set a language preference for the system.

Product Type: The product type can be designated as either Gait Trainer or RTM 600. Keep the Product Type selection set to “Gait Trainer.”

Aux Com Port: The auxiliary port, which allows the device to transmit or receive data, can be set as COM1 or COM3.

Custom Logo: Use this function to upload an image from a USB flash drive to be used as branding on the device.
Software Updates

From time to time, it may be necessary to update the device’s software. The steps for updating the software are as follows:

1. Download the updated software from www.biodex.com to a portable thumb drive. Be sure to save the file in the root directory of the drive.

2. While the device monitor is displaying the main screen (with the <Gait Trainer> and <Treadmill> icons), plug the thumb drive into one of the USB ports. The Software Update screen (Figure 8.34) is displayed.

3. Follow the directions on the screen to complete the update.

Figure 8.34. Software Update Screen.
9. Music Therapy

The Biodex Gait Trainer 3 with version 3.X software can be configured with an optional Music Therapy component (see Appendix B for a treatise on the use of music therapy in relation to the Biodex Gait Trainer). The Music Therapy option includes a specially designed bracket to hold the provided sound bar and a USB drive that activates the music player software and the music therapy music files. If the Gait Trainer 3 was ordered from the factory with the Music Therapy option, the sound bar will already be installed on the display.

**NOTE: The sound bar on the actual gait trainer may be a different model than those displayed in the manual.**

If the Music Therapy option was purchased at a later date (model number 950-414), the sound bar can easily be installed. Simply unscrew the lower two screws on the display mount, slide the sound bar bracket in between the display and the display mount, and re-apply and tighten the screws.

![Figure 9.1](image)

*Figure 9.1. The sound bar mounting bracket is slid in behind the Gait Trainer display bracket and fastened with the two screws from the Gait Trainer display bracket.*

The sound bar has two cables: one for power and one for sound (see Figure 9.3). Both plug into the display directly above it. The sound bar also has standard jacks for headphones and a microphone (see Figure 9.22).
Figure 9.2. The sound bar’s headphone and microphone jacks (circled).

Figure 9.3. The sound bar’s power and sound cables (arrows).

The Music Therapy component will not be activated until the flash drive is inserted into one of the USB ports on either the side or the bottom of the display. (The location of USB ports may vary depending on the display model.) The software will activate automatically once the flash drive is inserted. If the Gait Trainer was ordered with the Music Therapy option, the flash drive is included in the packaging along with the manual, safety lanyard, etc.
When the Music Therapy software is activated, the music therapy button will be visible on the left hand side of the Gait Trainer mode screen.

During an initial assessment, a Music Therapist assesses the patient's gait with either an over-ground session (10 meter walk test) or if they have the Biodex Gait Trainer, with a standard Gait Trainer mode session—no music.

The Music Therapist, using the toggle button on the left side of the screen, converts the patient's walking pace from the walk test speed measurement (usually MPH) to steps per minute. This is how the therapist/clinician will "fit the music" to a prescribed song tempo (beats per minute or BPM) from the music library to optimize the patient's gait pattern.
The therapist touches the <Music> button located below the <Footfalls> and <Histograms> buttons. On the following screen, the Music Library is accessed by touching <Select Song>.

![Image](image1.png)

*Figure 9.6. Setting the Toggle to Steps per Minute*

In this example, the 72 BPM version of the song “Street Walking” is selected.

![Image](image2.png)

*Figure 9.7. Setting the Beats per Minute (BPM)*

To match the BPM of the song with the steps per minute reading on the left, touch the “up” <Metronome> button until the BPM reads “78”.
The therapist presses the <Play> button to start the music for the patient to begin gait training.

Below are two sample biofeedback screens from a gait training session with music therapy:

![Figure 9.8. Pressing the Play Button.](image)

![Figure 9.9. When Music Therapy is installed, the tempo can be adjusted to optimize the gait pattern.](image)
Figure 9.10. Histograms are displayed for Music Therapy including the music tempo

Each song in the Music Library has an identifiable BPM. During therapy, the tempo is typically increased in increments of 10% but clinicians may adjust belt speed and music at any time to better fit the patient’s need and therapy targets (i.e., getting the patient out of a shuffling gait into a long stride). Compositions such as “Animals Everywhere” (70/80/90bpm) offer a bass line at half tempo for the clinician to cue slowed, long strides without having to adjust the tempo. As a result, the therapist must only make slight belt speed (walking cadence) adjustments until the patient relaxes into a more open gait pattern according to Patterned Sensory Enhancement (PSE) strategies.

Note: Patterned Sensory Enhancement (PSE) is a technique that uses the rhythmic, melodic, harmonic and dynamic-acoustical elements of music to provide temporal, spatial, and force cues for movements that reflect functional exercises and activities of daily living. PSE is broader in application than Rhythmic Auditory Stimulation (RAS), because it is (a) applied to movements that are not rhythmical by nature (e.g., most arm and hand movements, functional movement sequences such as dressing or sit-to-stand transfers) and (b) it provides more than just temporal cues. PSE uses musical patterns to assemble single, discrete motions (e.g., arm and hand movements during reaching and grasping), into functional movement patterns and sequences. PSE cues movements temporally, spatially, and dynamically during training exercises.

The patient walks (i.e., gait trains) using the music therapy informed compositions to achieve “entrainment”; the repetition of the gait training aids in the reconditioning of neural pathways (“neuroplasticity”). The Histogram screen is the preferred biofeedback as it illustrates when entrainment occurs; in other words, when the footfalls (steps) register within the step targets for a steady period of time.

When the gait training session with music therapy is complete, a report documents the song title, starting bpm, and the percent change of the song tempo in addition to showing all the

1 Refer to the fourth entry in the References section.
important gait parameter measures of: gait speed, step length, step length variability, and such.

The patient is often sent home with prescribed music therapy songs to play on an mp3 compatible device. In this way, the music therapy treatment can be continued outside of the session. On returning to the clinic, the patient can work with the therapist to modify/monitor the music therapy exercises.

On the Music Therapy screen when <Select Song> is touched, the contents (audio files) of the currently inserted flash drive are displayed. If the Biodex flash drive is inserted, a library of songs composed specifically for music therapy will be displayed. A different flash drive can be inserted (although not at the same time) and the software will display any audio files that are in the flash drive’s root directory. If music therapists intend to play songs that they have composed in addition to the Biodex provided files, the therapists are advised to save their compositions to the Biodex flash drive via their own computers. Their compositions will be displayed along with the others songs included in the Biodex library.
If the user uploads songs to a flash drive and inserts the drive into one of the USB ports on the display, the system will identify them and make them available for music therapy. However, the baseline tempo will be unknown and will need to be entered for tempo control to work correctly.

For each song with no tempo identified, enter the tempo (in this case 80 BPM [Beats Per Minute]) and touch <OK>.

![Figure 9.12. Entering a song’s tempo (BPM).](image)

The Controls work as follows:

* **Play**: Starts the song and, if already playing, will pause the music.

  * **Previous Song**: Navigates to the previous song on the flash drive or if the current song has played for five seconds, it will restart the current song at its default tempo.

  * **Next Song**: Navigates to the next song on the flash drive.

  * **Tempo Adjustment**: On the top of the screen, the two buttons with metronomes are used to adjust the tempo from any Gait Training view not just the music player interface. The buttons are, from left to right, tempo down and tempo up.

  **Note**: The next and previous buttons will only load songs with defined tempos. Songs that have not had their tempo set will be ignored when using those two buttons.

The system will remember the tempo that was entered for any previously selected song and will not ask for it to be entered again when retrieved from the library.
A more comprehensive clinical guideline for music therapy protocols will be available to help guide a music therapy program. Visit www.biodex.com or email clined@biodex.com for more information.

The music therapy component of the Gait Trainer 3 should only be utilized by a credentialed music therapist.

**Music Compositions**

The following songs will be included with the Music Therapy option:

*Metronome:* This series of compositions will include the following selections:

- Metronome Only – E Click (20BPM).mp3
- Metronome Only – E Click (40BPM).mp3
- Metronome Only – E Click (60BPM).mp3
- Metronome Only – E Click (80BPM).mp3
- Metronome Only – E Click (100BPM).mp3
- Metronome Only – E Click (120BPM).mp3
- Metronome Only – Woodblock (20BPM).mp3
- Metronome Only – Woodblock (40BPM).mp3
- Metronome Only – Woodblock (60BPM).mp3
- Metronome Only – Woodblock (80BPM).mp3
- Metronome Only – Woodblock (100BPM).mp3
- Metronome Only – Woodblock (120BPM).mp3

*Genre Compositions with Metronome:* The following compositions are included:

- 50’s 1 – (120BPM)
- 50’s 2 – (80BPM)
- 70’s – (116BPM)

*Music Therapy Informed:* The following compositions are included:

- Animals Everywhere (45BOM)
- Animals Everywhere (57BOM)
- Animals Everywhere (72BOM)
- Animals Everywhere (89BOM)
- Animals Everywhere (108BOM)
- Street Walking (72BPM)
- Street Walking (90BPM)
- Silvery Moon Medley (90BPM)
- Silvery Moon Medley (100BPM)
- Silvery Moon Medley (110BPM)
- Silvery Moon Medley (121BPM)

**Copyright Notice of Music Compositions**

Music Therapy Compositions provided with Biodex Medical Systems, Inc. products are protected under U.S. Copyright laws. Use of these compositions is restricted to clinical application only. Use in any public domain is strictly prohibited.

“Silvery Moon Medley” is a music therapy arrangement.

Copyright © 2016 The Center for Music Therapy, Inc.
Note: “Silvery Moon Medley” is a Music Therapy arrangement from three compositions:
1. “By The Light of the Silvery Moon” © 1909; original music by Gus Edwards.
3. "On Moonlight Bay" © 1912; lyrics by Edward Madden, music by Percy Wenrich.

“Street Walking” is an original Music Therapy composition.
Copyright © 2015 The Center for Music Therapy, Inc.
Phonorecord © 2015 The Center for Music Therapy, Inc.

“Animals Everywhere” is an original Music Therapy composition.
Copyright © 2015 The Center for Music Therapy, Inc.
Phonorecord © 2015 The Center for Music Therapy, Inc.
10. Maintenance

The Biodex Gait Trainer 3 should provide trouble-free operation as long as the following maintenance procedures are performed. To verify hours of operation, touch <Utilities> and touch the right-left-right sequence on the main system Utilities screen to activate the <Advanced System Maintenance> button (refer to Figure 10.2). From there, touch the <Hours of Use> button, where hours of use will be indicated, both in total and in MPH categories (see Figure 10.3). Be sure to adhere to the hours of usage guidelines in Table 10.1.

**NOTE:** Without proper maintenance, excessive wear to drive components will occur. To assure trouble-free operation, scheduled maintenance must be performed. Failure to adhere to the scheduled maintenance instructions below will void the warranty.

![Warning Symbol]

**WARNING:** Only qualified persons should perform maintenance and repair on this device. This is a motorized device with many moving assemblies. Precaution is necessary.
Figure 10.1.  Main Screen

Figure 10.2.  Main Menu, followed by right-left-right touches to activate Advanced System Maintenance button.
Figure 10.3. Hours of Use screen.

Table 10.1. Hours of Usage Guidelines

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Hours of Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubricate Deck</td>
<td>75</td>
</tr>
<tr>
<td>Reverse Deck</td>
<td>1,000</td>
</tr>
<tr>
<td>Belt Replacement</td>
<td>1,000</td>
</tr>
<tr>
<td>Clean Motor and Amp</td>
<td>750</td>
</tr>
<tr>
<td>Front Roller Cleaning</td>
<td>375</td>
</tr>
</tbody>
</table>

**Daily Maintenance**

As required, clean all exterior surfaces, excluding the display with a light application of disinfectant and wipe dry with paper towels.

*NOTE:* **DO NOT** use solutions containing ammonia.

Hardware computer components should be wiped clean as needed using a soft rag dampened with alcohol.

**Quarterly Maintenance**

Lubricate the treadbelt and slider deck. The Biodex Lubricant Kit is designed to reduce friction between the treadbelt and the slider deck. It is required for all institutional treadmills. Proper
and timely application of the lubricant will prevent premature failures due to excessive wear and load. Items affected by inadequate lubrication are the treadbelt, slider deck, motor, and motor controller.

**Annually or Every 1,000 Hours Reverse Exact-Track Bed**
Reverse the Exact-Track bed. The Gait Trainer 3 bed is double-sided, allowing it to be reversed and used over. Once both sides have been used, the bed must be replaced.

**Replace Treadbelt**
Inspect Treadbelt for cracks or tears. If none are found, continue to use. If any cracks or tears are apparent, replace the treadbelt.

**Maintenance Procedures Belt/Deck Lubrication**

1. Using the large syringe provided, squirt one-half tube of the lubricant underneath the center of the treadbelt (see Figure 10.4).
2. Walk ten steps on the Gait Trainer 3 at a speed of 1.0 mph. This will moisten an 8-inch track underneath the center of the entire treadbelt.
3. Allow the Gait Trainer 3 to dry for approximately ten minutes.

*NOTE: Use only the Biodex lubricant kit with the Gait Trainer 3. Most standard greases, waxes and silicon sprays will build up on the rollers causing belt slippage and affecting tracking.*

To re-order lubricant kit, use Biodex part # 945-276. Each container provides 12 applications.
Treadbelt Adjustment

1. Remove the 6 Phillips head screws from the cover. Lift the cover off the treadmill.
2. Access the Quick Start Treadmill function and adjust the speed to 1.0 MPH.

3. Walk on the treadmill at 1.0 MPH and stop the treadbelt with a foot. Front roller should slip under the treadbelt.

Figure 10.6. Quick Start Treadmill Screen

Figure 10.7. Treadmill shown without cover. Note the location of front roller.
4. Front roller

5. Adjust the two belt tensioning bolts evenly at the back of the treadmill so that the front roller slows down, but continues to turn when you stop the treadbelt with your foot.

Figure 10.8. Close up of motor, showing front roller.

Figure 10.9. Back of Treadmill shown for tensioning bolt location.

Treadbelt Alignment

6. Adjust the two hex bolts so that the distance between the end of the roller and the edges of the belt are equal on both sides.
7. Turn the right hex bolt half turn clockwise to move the belt toward the left side of the roller.
8. Turn the left hex bolt half turn clockwise to move the belt toward the right side of the roller.

Figure 10.10. Hex bolts shown to adjust belt left or right.
11. Troubleshooting

**Symptom**
Gait Trainer 3 is turned ON and speed control is inoperable (belt not moving).

Check for faults on display. The following diagnostic error codes apply:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>Communication between upper/lower board inop</td>
</tr>
<tr>
<td>64</td>
<td>Safety Lanyard Removed</td>
</tr>
<tr>
<td>32</td>
<td>Control fault (no amplifier)</td>
</tr>
<tr>
<td>16</td>
<td>Grade Error</td>
</tr>
<tr>
<td>8</td>
<td>Motor Tach Output Exceeds Selected Speed</td>
</tr>
<tr>
<td>4</td>
<td>Motor Tach Output is Below Selected Speed</td>
</tr>
</tbody>
</table>

**NOTE:** The above faults indicate an issue with the treadmill. For fault 64-Safety Lanyard Removed, verify lanyard is still attached in its proper location. For all other faults, please contact Biodex Support Services department at 1-800-224-6339 and provide the fault code. Someone will provide instructions on how to proceed.
12. Electromagnetic Compatibility

Conformance to Standards

This equipment conforms to the following safety standards:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Edition and/or Date</th>
</tr>
</thead>
</table>

Accompanying EMC Documents

WARNING: This equipment/system is intended for use by healthcare professionals only. This equipment/system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as relocating the (ME EQUIPMENT or ME SYSTEM) or shielding the location.

This medical electrical equipment needs special precautions regarding EMC and needs 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.
- Use of accessories, transducers, and cables other than those specified, with the exception of accessories, transducers, and cables sold by the manufacturer of this equipment, as replacement parts for internal and external components, may result in increased emissions or decreased immunity of the equipment.
- The Gait Trainer 3 should not be used adjacent to or stacked with other equipment. If the Gait Trainer 3 is used while positioned adjacent to other equipment, it should be observed to verify normal operation in the configuration in which it will be used.

List of Cable Accessories

The table below includes all accessory cables supplied with the Gait Trainer 3 for which the manufacturer of this equipment claims compliance to EN 60601-1-2 when used with the Gait Trainer 3.

<table>
<thead>
<tr>
<th>Cable Description</th>
<th>Part Number</th>
<th>Cable Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB Printer Cable</td>
<td>Biodex # C12086</td>
<td>15ft</td>
</tr>
</tbody>
</table>
Declaración de Conformidad

Manufacturer’s Declaration Electromagnetic Emissions

El Gait Trainer 3 está destinado para el uso en el entorno electromagnético especificado a continuación. El cliente o el usuario del Gait Trainer 3 debe asegurarse de que lo utilice en un entorno similar.

<table>
<thead>
<tr>
<th>Emisión Test</th>
<th>Compliance</th>
<th>Entorno Electromagnético</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF emisiones CISPR 11</td>
<td>Grupo 1</td>
<td>El Gait Trainer 3 genera RF solo para sus funciones internas. Su RF es muy baja y no es probable que cause interferencia en equipos electrónicos cercanos.</td>
</tr>
<tr>
<td>RF emisiones CISPR 11</td>
<td>Clase A</td>
<td>El Gait Trainer 3 es adecuado para el uso en todas las instalaciones excepto las domésticas y aquellas directamente conectadas al red de suministro de bajo voltaje.</td>
</tr>
<tr>
<td>Distorsión Armónica EN 61000-3-2</td>
<td>Clase A</td>
<td></td>
</tr>
<tr>
<td>Varianzas de Tensión y Flicker EN 61000-3-3</td>
<td>Cumple</td>
<td></td>
</tr>
</tbody>
</table>

Nota: Es esencial que la efectividad real de la protección y el nivel de filtración de la ubicación blindada sean comprobados para asegurar que cumplan con los requisitos mínimos.
Table 12.4  Immunity Test Table

**Manufacturer’s Declaration Electromagnetic Immunity**

The Balance System SD is intended for use in the electromagnetic environment specified below. The customer or the user of the Balance System SD must ensure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Immunity Test</th>
<th>EN 60601-1-2 Test Level</th>
<th>EN 60601-1-2 Compliance Level</th>
<th>Electromagnetic Environment -Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD) EN 61000-4-2</td>
<td>± 6 kV contact ± 8 kV air Test level</td>
<td>Contact ± 6 kV Air ± 8 kV</td>
<td>Floor should be wood, concrete or ceramic tiles. If floor is covered with synthetic material, the relative humidity should be at least 30%.</td>
</tr>
<tr>
<td>Electrical fast transients/ burst IEC 61000-4-4</td>
<td>± 2 kV for power lines ± 1 kV for input/output lines</td>
<td>Power ± 2 kV Signal ± 1 kV</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>Surge IEC 61000-4-5</td>
<td>± 1 kV differential mode ± 2 kV common mode</td>
<td>± 1 kV diff. mode ± 2 kV com. mode</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11</td>
<td>&lt; 5% UT (&gt; 95% of dip in UT for 1/2 cycle) 40% UT (60% of dip in UT) for 5 cycle 70% UT (30% of dip in UT) for 25 cycle &lt; 5% UT (&gt; 95% of dip in UT) for 5 sec</td>
<td>&lt; 5% UT (&gt; 95% of dip in UT) for 1/2 cycle 40% UT (60% of dip in UT) for 5 cycle 70% UT (30% of dip in UT) for 25 cycle &lt; 5% UT (&gt; 95% of dip in UT) for 5 sec</td>
<td>Mains power quality should be that of a typical commercial or hospital environment. If a better mains power quality is required, it is recommended that the Gait Trainer 3 is powered from an uninterruptible power supply.</td>
</tr>
<tr>
<td>Power frequency (50/60 Hz) magnetic field EN 61000-4-8</td>
<td>3 A/m</td>
<td>3 A/m</td>
<td>If image distortion occurs, it may be necessary to position the Gait Trainer 3 display further from sources of power frequency magnetic fields or to install magnetic shielding. The power frequency magnetic field should be measured in the intended installation location to assure that it is sufficiently low.</td>
</tr>
</tbody>
</table>

**NOTE:** UT is the AC. mains voltage prior to application of the test level.
**Manufacturer's Declaration Electromagnetic Immunity**

The Balance System SD is intended for use in the electromagnetic environment specified below. The customer or the user of the Balance System SD must ensure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Immunity Test</th>
<th>EN 60601-1-2 Test Level</th>
<th>EN 60601-1-2 Compliance Level</th>
<th>Electromagnetic Environment -Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducted RF</td>
<td>3 Vrms, 150 KHz to 80 MHz</td>
<td>3 Vrms, 150 KHz to 80 MHz</td>
<td>Portable and mobile RF communications equipment should be used no closer to any part of the Gait Trainer 3, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance:</td>
</tr>
<tr>
<td>EN 61000-4-6</td>
<td></td>
<td></td>
<td>$d = 1.2 \sqrt{P}$ 150 KHz to 80 MHz</td>
</tr>
<tr>
<td>Conducted RF</td>
<td>3 Vrms, 150 KHz to 80 MHz</td>
<td>3 Vrms, 150 KHz to 80 MHz</td>
<td>$d = 1.2 \sqrt{P}$ 80 MHz to 800 MHz</td>
</tr>
<tr>
<td>EN 61000-4-6</td>
<td></td>
<td></td>
<td>$d = 2.3 \sqrt{P}$ 800 MHz to 2.5 GHz</td>
</tr>
</tbody>
</table>
| Conducted RF  | 3 Vrms, 150 KHz to 80 MHz | 3 Vrms, 150 KHz to 80 MHz   | Where P is the maximum output power rating of the transmitter in watt (W) according to the transmitter manufacturer, and is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range.  
Interference may occur in the vicinity of equipment marked with the following symbol: |
| EN 61000-4-6  |                          |                              | ![Symbol] |

**NOTE 1:** At 80 MHz and 800 MHz, the higher frequency range applies.

**NOTE 2:** These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflections from structures, objects and people.

\*Field strength from mixed transmitters, such as base stations for radio telephones and land mobile radios, amateur radio, AM or FM broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Balance System SD is used exceeds the applicable RF compliance levels above, the Balance System SD should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Balance System SD.

\*Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.
Recommended Separation Distances

Table 12.5  Separation Distance Table

Recommended separation distances between portable and mobile RF communications equipment and the Balance System SD are detailed in the following table.

The Balance System SD is intended for use in the electromagnetic environment in which radiated RF disturbance are controlled. The customer or the user of the Balance System SD can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and the Balance System SD as recommended below, according to the maximum output power of the communication equipment.

<table>
<thead>
<tr>
<th>Rated Maximum Output Power of Transmitter [W]</th>
<th>Separation Distance According to Frequency of Transmitter [m]</th>
<th>150 kHz to 80 MHz</th>
<th>80 MHz to 800 MHz</th>
<th>800 MHz to 2.5 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$d = 1.2\sqrt{P}$</td>
<td>$d = 1.2\sqrt{P}$</td>
<td>$d = 2.3\sqrt{P}$</td>
</tr>
<tr>
<td>0.01</td>
<td></td>
<td>0.12</td>
<td>0.12</td>
<td>0.23</td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td>0.38</td>
<td>0.38</td>
<td>0.73</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1.2</td>
<td>1.2</td>
<td>2.3</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>3.8</td>
<td>3.8</td>
<td>7.3</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>12</td>
<td>12</td>
<td>23</td>
</tr>
</tbody>
</table>

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

Operating Temperature

Do not expose the equipment to a temperature change of more than 5° F (3° C) per hour. Limits of low and high operating temperature ranges are 59° to 86° F (15° C to 30° C).
13. Specifications

Dimensions: 86" l x 27" w (218x69cm)
  Walking Area: 64" l x20" w (160x51cm)
  Printer Stand: 24" l x 24" w (61x61cm)

Deck: 1" thick (2.5 cm) reversible Teflon™ impregnated high-density composite fiber

Motor: 2HP with 4Q-Pulse Width Modulation Control

Speed Range:
  Forward: 0-10 mph (0-16km/h)
  Reverse: 0-3 mph (0-4.8km/h) in 0.1mph (.16km/h) increments
  Gait Trainer Mode: Speed limited to 3 mph (4.8 km/h)

Elevation: 0-15% Grade

Heart Rate Monitoring: Polar® contact handgrips (telemetry compatible)

User Capacity: Tested to 400lb (182kg)

Certification: ETL listed to UL 60601-1 and CAN/CSA C22.2 No.:601.1.M90.
  CE conformity to EN 60601-1, EMC compliance to EN 60601-1-2

Display: 15.6" Color Touch Screen, Windows Operating System, Color Printer, USB and Speakers

Power: 115VAC, 50/60Hz, 20AMP dedicated line, or 230 VAC, 50/60 Hz, 20 AMP dedicated line. Includes hospital grade plug with 12' (3.7m) power cord.

Printing: PCL printing via USB port

Warranty: Two years on parts; one year on labor
14. References and Bibliography

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6. "On Moonlight Bay" © 1912; lyrics by Edward Madden, music by Percy Wenrich.

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15. Parts and Assembly Illustrations
Appendix A: CSV File Export

From the Gait Trainer application, two types of CSV files can be exported:

- Single (Individual) test record CSV
- Multiple test record CSV file.

A Single CSV file will contain all of the data for an individual test along with raw data points. However, a Multiple CSV file will contain the summary of each test under different column names. This is useful in order to create custom normative data.

**Note:** For detailed instructions on how to export a CSV file, refer to the Exporting Multiple Patient Data Sets section of the manual.


<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
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<td>Name</td>
<td>Shahidul</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>TestDateTime</td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>Height</td>
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<td></td>
<td></td>
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<tr>
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<td>DOB</td>
<td>10/10/1975</td>
<td></td>
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<td></td>
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<td>6</td>
<td>GenderID</td>
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</tr>
<tr>
<td>7</td>
<td>ElapsedTime</td>
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<td>TestDistance</td>
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<td>9</td>
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<td>1.1</td>
<td>1.82</td>
<td>0.67</td>
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<td>AvgStepCycle</td>
<td>0.76</td>
<td>1.12</td>
<td>0.58</td>
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<td></td>
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<tr>
<td>11</td>
<td>AvgStepLength</td>
<td>68</td>
<td>80</td>
<td>58</td>
<td>55</td>
<td></td>
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<tr>
<td>12</td>
<td>RtVariance</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>LtVariance</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>RtTimeDistrib</td>
<td>51</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>LtTimeDistrib</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>16</td>
<td>HistogramX</td>
<td>0</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>17</td>
<td>TotalStepCount</td>
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<td>18</td>
<td>CPTCode</td>
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<td>19</td>
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<tr>
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<td>Diagnosis</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>UnitAddress</td>
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<td></td>
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<td>23</td>
<td>GCodeResultsOption</td>
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<td>26</td>
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<td></td>
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<td></td>
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<tr>
<td>27</td>
<td>ImpCalcAvgStepCycle</td>
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<td></td>
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</tr>
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<td>2</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>ImpCalcCOV</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>ImpCalcTOF</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>ImpAmndAvgWalking</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>ImpAmndAvgStepCycle</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CSV File Format Explanation – Single Record CSV File

The CSV file can be divided into two different segments:

1. Device, Patient, Test results segment.
2. Raw Data points segment.

Segment A – Device, Patient, Test Results:

Starting from the top of the file, the Gait Test file format displays the device information and patient information followed by the different test results. The left column contains the heading/label and the right column(s) displays the corresponding values.

For this Gait Trainer example, the test/exercise results are included with G-Code information. Any Gait Trainer exercise performed with the G-Code functionality turned on will have additional fields (as illustrated below).

Table A.2. Single Test Export CSV File – Field Heading Definitions.

<table>
<thead>
<tr>
<th>Field Heading</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The patient’s name.</td>
</tr>
<tr>
<td>Patient ID</td>
<td>Patient ID.</td>
</tr>
<tr>
<td>TestDateTime</td>
<td>Date and time the test is performed.</td>
</tr>
<tr>
<td>Height</td>
<td>Height of the patient in CMs.</td>
</tr>
<tr>
<td>DOB</td>
<td>Patient’s date of birth.</td>
</tr>
<tr>
<td>GenderID</td>
<td>Male = 1, Female = 2.</td>
</tr>
<tr>
<td>ElapsedTime</td>
<td>Total test time in seconds.</td>
</tr>
<tr>
<td>TestDistance</td>
<td>Total distance of the exercise in meters.</td>
</tr>
<tr>
<td>AvgSpeed</td>
<td>Average walking speed in meters/sec. The first two columns display the norm value and the third column displays the actual exercise value.</td>
</tr>
<tr>
<td>AvgStepCycle</td>
<td>Average Step Cycle. The first two columns display the norm value and the third column displays the actual exercise value.</td>
</tr>
<tr>
<td>AvgStepLength</td>
<td>Average Step Length in CMs. The first two columns display the normative value and the third column displays the actual exercise value for the right leg. The fourth column represents the</td>
</tr>
<tr>
<td>Field Heading</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>RtVariance</td>
<td>Coefficient of variation displayed as a percentage for the Right Leg.</td>
</tr>
<tr>
<td>LtVariance</td>
<td>Coefficient of variation displayed as a percentage for the Left Leg.</td>
</tr>
<tr>
<td>RtTimeDistrib</td>
<td>The time spent on the right foot displayed as a percentage.</td>
</tr>
<tr>
<td>LtTimeDistrib</td>
<td>The time spent on the left foot displayed as a percentage.</td>
</tr>
<tr>
<td>HistogramX</td>
<td>Value for Histogram displayed in Steps/Time/Distance format.</td>
</tr>
<tr>
<td>TotalStepCount</td>
<td>The number of steps taken during the test.</td>
</tr>
<tr>
<td>CPTCode</td>
<td>The CPT code (if used) for the test.</td>
</tr>
<tr>
<td>Comments</td>
<td>Any pertinent comments about the test.</td>
</tr>
<tr>
<td>ICDCode</td>
<td>The ICD code information.</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>The diagnosis information.</td>
</tr>
<tr>
<td>UnitAddress</td>
<td>Unit address of the device.</td>
</tr>
<tr>
<td>GCodeResultsOption</td>
<td>Indicates whether or not the G-Code option was turned on or off.</td>
</tr>
<tr>
<td>GCodeCategory</td>
<td>The category for the G-Code.</td>
</tr>
<tr>
<td>GCodeStatus</td>
<td>Status of G-Code, where: 0= Current, and 1= Discharge.</td>
</tr>
<tr>
<td>ImpCalcAvgWalking</td>
<td>Impairment value for the Average Walking Speed.</td>
</tr>
<tr>
<td>ImpCalcAvgStepCycle</td>
<td>Impairment value for the Average Step Cycle.</td>
</tr>
<tr>
<td>ImpCalcAvgStepLength</td>
<td>Impairment value for the Average Step Length.</td>
</tr>
<tr>
<td>ImpCalcCOV</td>
<td>Impairment value for the COV.</td>
</tr>
<tr>
<td>ImpCalcTOF</td>
<td>Impairment value for the Time on Each Foot.</td>
</tr>
<tr>
<td>ImpAmndAvgWalking</td>
<td>Amendment reason (if any) for the Average Walking Speed.</td>
</tr>
<tr>
<td>ImpAmndAvgStepCycle</td>
<td>Amendment reason (if any) for the Average Step Cycle.</td>
</tr>
<tr>
<td>ImpAmndAvgStepLength</td>
<td>Amendment reason (if any) for the Average Step Length.</td>
</tr>
<tr>
<td>ImpAmndCOV</td>
<td>Amendment reason (if any) for the COV.</td>
</tr>
<tr>
<td>ImpAmndTOF</td>
<td>Amendment reason (if any) for the Time on Each foot.</td>
</tr>
</tbody>
</table>
Segment B – Raw Data Points Segment:

For the Data segment, cell A represents the Minimum Tolerance Range, cell B represents Step Length on the Left foot, cell C represents the Step Length on the Right foot, and cell D represents the Maximum Tolerance Range.


<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<td>57</td>
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<td>61</td>
</tr>
<tr>
<td>68</td>
<td></td>
<td>41</td>
<td>54</td>
<td>58</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td></td>
<td>41</td>
<td>56</td>
<td>59</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Data end</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CSV File Format Explanation – Multiple Record CSV File

The Gait Trainer application allows exporting multiple records to a single CSV file, and can be used to create personalized normative data. Figure A.1 is an example of a previously exported CSV file.

Each row in the table represents an individual test record. There will be more columns for each row than displayed on the sample report. It is suggested that the unnecessary data columns be deleted or hidden. The statistical analysis can easily be performed on this data.

Figure A.1. Multiple Record CSV Export Sample File Format.
The file starts with the basic information about the patient/test performed, after which it contains the actual scores/data for the test result.

A more concise illustration of the exported file is presented in Figure A.2 below:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>TestDate</td>
<td>Height</td>
<td>DOB</td>
<td>ElapsedTime</td>
<td>TestDistance</td>
<td>AvgSpeedMin</td>
<td>AvgSpeedMax</td>
<td>AvgSpeed</td>
</tr>
<tr>
<td>Sh</td>
<td>172</td>
<td>2</td>
<td>0</td>
<td>0.96</td>
<td>1.68</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sh</td>
<td>172</td>
<td>9</td>
<td>3</td>
<td>0.96</td>
<td>1.68</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sh</td>
<td>172</td>
<td>2</td>
<td>0</td>
<td>0.96</td>
<td>1.68</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sh</td>
<td>172</td>
<td>15</td>
<td>4</td>
<td>0.96</td>
<td>1.68</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure A.2. CSV File Format Explanation – A More Concise Illustration of the Exported File.

The first record within the exported CSV file illustrates values of AvgSpeed = 0.25 and the normative data minimum and maximum for this category as 0.96 and 1.68 respectively (see Figure A.3 extracted from the Test Results screen that matches the exported CSV file value).

The same interpretation applies for the adjacent columns, AvgStepCycle, AvgStepLength, etc. in the CSV file.

Note: The data used in the above example may not necessarily represent real data. It is presented to demonstrate the information contained in the exported CSV file.
Appendix B: Use of Music Therapy and the Biodex Gait Trainer

About the Author

Hope Young, MT-BC has been a music therapist for more than 25 years. The Center for Music Therapy was founded in 1990 to make music therapy more accessible to the Central Texas area. She focused on working with children, adolescents, adults and geriatric patients.

The center is also the first and oldest for profit music therapy facility in the world designed specifically designed to treat neurologic movement conditions and disorders through music. In its long history, the Center for Music Therapy has provided services for many area hospitals including St. David's Hospital and Warm Springs Rehabilitation Hospital as well as facilities in Austin, San Antonio, Houston, and Corpus Christi. All of the music therapists are certified by the Certification Board for Music Therapists and our physical therapist by the State of Texas. The Center for Music Therapy is a licensed physical therapy facility by the State of Texas.

Introduction to Music Therapy

A relationship between music and healing has been acknowledged as far back as early civilization. The notion that music can influence health and promote healing dates back centuries. The 20th century music therapy discipline began after World War II. Doctors and nurses noted the patients' responses to music and music programs. They then began to set up music plans to help patients regain movement. This occurred in facilities all throughout the country. Over the last 50 years music therapy has gained increasing popularity in the medical field, schools and recreational programs. Today many medical and rehabilitation facilities offer music therapy as one of their treatment modalities.

The idea of a preventive approach to health became popular in the 1970's. Music therapy gained further momentum. The gaining acceptance for the practice and use of music therapy to help with motor function and healing is in part due to the writings of various authors explaining the biological foundations between neuroscience and music therapy. Today there are many approaches to music therapy combined with clinical applications that assist in restoring movement in all populations.

The desired end result for this performance program is directed towards assisting patients in regaining their independence as well as their ability to participate in activities that are important to them. This performance plan utilizes current concepts which link movement and music to help gain neuromuscular control.

Concepts

Rhythmic Auditory Stimulus (RAS)

A technique that facilitates movements that are intrinsically rhythmical in a repetitive pattern; such as gait. This technique uses music as an external cue to regulate the body’s movement in time and allows patients to become in tune with their own rhythm. It typically occurs during closed-chain gait activities
Patterned Sensory Enhancement (PSE)

A broader application than RAS as it facilitates movement and movement patterns that are not biologically rhythmical. These movement patterns are incorporated into a series to form functional movement patterns. For example, hand and arm movements for eating, dressing, and other ADL’s as well as whole body movements required to shift from a seated to a standing position.

PSE is defined as a technique using rhythmic, melodic, harmonic, and dynamic acoustical elements of music to provide temporal, spatial, and force patterns to structure and to cue functional movements. It typically occurs during open-chain parameters of gait.

Pitches or Octaves

Higher – effects head, upper body alignment, head height
Lower – effects mid trunk
Lowest – effects lower legs and feet

Fitting the Music to the Steps per Minute

1. It is important to complete the majority of the music discussion prior to the beginning of gait training. Typically, the patient will fatigue and the data will not be as accurate during walking while you are attempting to establish preference/context and set up the music.

2. Measure a patient’s gait speed - On the initial rehab visit, the therapist can determine the tempo of music to begin the gait training using one of the particular walk tests that apply to the patient’s ability (e.g., 6 MWT, 6 meter walk test). Lower level patients can ambulate for 15 seconds with the therapist counting each heel strike and multiplying the total by four. The total number will be steps per minute (SPM). Initially, the tempo of music should be a few beats slower than the initial walk test.

3. If the calculated steps per minute from the baseline gait test do not match a preset tempo, adjust the GT3 music bpm first, then the GT belt speed to match the GT3 bpm. Use following guidelines to choose a song tempo:
   a. Choose the song tempo that is at or just below patient’s baseline SPM.
   b. Tempo change the music upward as a general rule during the treatment phase as you do 5%-10% incremental increases.

4. When it is time to start gait training, start with just one gait component heel strike (HS). The goal is for the patient to walk step-over-step bilaterally at the established tempo.

5. Allow the client to walk to this music tempo (bpm) for 3-5 minutes to allow entrainment to occur during treatment phase.
   a. Based on analysis of the person’s gait pattern, the therapist will adjust the music (the therapist must get familiar with music library in order to make distinctions in each composition to select the appropriate usage of songs). Ex orthopedic vs. those with cognitive and severe gait impairments such as Animals Everywhere exercise.
b. Observe and watch for subtle entrainment:

1) This will be observed when the person appears to walk naturally to the music in a more relaxed and natural gait pattern. (We use the Histogram screen to observe subtle entrainment patterns.)

2) Observe and watch for subtle functional corrections or exacerbation of movement issues. Discontinue music playback if exacerbation is observed and return to metronome option until the correct fit of music is determined to improve the person’s overall functional movement.

IMPORTANT! Reassess the person’s progress at the next scheduled follow up session. A person who is able to independently ambulate will rehearse per the therapist instructions using the therapist approved music program that is downloaded into a mobile device for personal home use and/or into the treadmill gait training system thumb drive for therapist’s and person’s use during therapy sessions.
<table>
<thead>
<tr>
<th>Everywhere:</th>
<th>Cue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>45-108</strong></td>
<td>Initial Contact/ (heel strike)</td>
</tr>
<tr>
<td><strong>45-108 BPM</strong></td>
<td>Initial Contact (heel strike)</td>
</tr>
</tbody>
</table>

- **RAS**
  - Constant music
  - Facilitates heel strike

- **Metronome/Down beat of songs**
  - A crisp sound with greater force assists with increasing stride length
  - Tends to get people to stroll
  - At slower movement ranges, it helps with continuity of movement; (helpful with Parkinson’s and FOG).
  - (79,89,108bpm) Can use this beat for gait, but can take a person to \( \frac{1}{2} \) time. Helps with increasing stride length and decreasing walking speed.
  - Cues the patient slow down and take longer steps.
  - Helps to reset the person’s automatic movement ability (once mastered, cue patient to step/walk and increase tempo again).

- **With 89/108 BPM Piano/Bass together**
  - Downbeat to facilitate heel strike and with more force to encourage step height.
  - Due to the two different alternating notes, weight shifting will be facilitated
  - Useful with patients with neglect. Unilaterally, PT can cue lead foot to coincide with sensory cue to effected side.

- **BASS & KEYS created to be on opposite side which helps bilaterally during ambulation**

<table>
<thead>
<tr>
<th>42-108 BPM</th>
<th>Upper Trunk Mid Swing</th>
<th>Guitar</th>
<th>RAS (PSE provides anticipatory pattern for lift, mild swing)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>45-108BPM</strong></td>
<td>Mid Trunk Initial to Mid Swing</td>
<td>Saxophone</td>
<td>PSE</td>
</tr>
<tr>
<td><strong>45-108</strong></td>
<td>Posture elevation</td>
<td>Clarinet</td>
<td>PSE</td>
</tr>
<tr>
<td><strong>45-108</strong></td>
<td>Posterior WS Lower legs midstance</td>
<td>Trombone</td>
<td>PSE</td>
</tr>
<tr>
<td><strong>45-108</strong></td>
<td>Endurance Burst</td>
<td>Mid way 2-3min cues built in emotionally followed clarinet quicken sound</td>
<td>PSE</td>
</tr>
</tbody>
</table>

- **Facilitates**
  - Trunk rotation and anterior trunk posture for those in extension.
  - Arm swing and initial swing phase of gait cycle.
  - More a side-to-side movement (makes a person want to swing side-to-side).

- **Created as a gently wave – relaxing feeling.**
- **Helps with movement initiation.** Helpful with patients with FOG.
- **Pulling sensation at lower walking speeds; for trunk rotation and upward trunk extension**
- **Forward movement and smooth UE swing (especially at slower tempos).**

- **Higher pitch octave for more trunk elevation.**
- **Pulling sensation.**
- **More UE/spine/height extension than SAX since octave is higher.**

- **Facilitates hip/trunk rotation.**
- **Forward smooth momentum with pulling through core and hips.**
- **Ground LE movements.**

- **Helps when person is not moving forward.**
- **Helps provide “extra boost” when person is fatiguing.**
- **It is only used in short bursts not continuous sound and movement.**
- **Monitor patients prone to ambulating with a festinating gait pattern.**
Music

Samples from compositions designed for use in Biodex GT3 Systems

**Animals Everywhere** (gentle forward-pulling sensory experience throughout piece):

<table>
<thead>
<tr>
<th>BPM:</th>
<th>Time:</th>
<th>Activity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 BPM:</td>
<td></td>
<td>Guitar pattern for leg lift, extension and drum playing down beat for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>consistent heel strike from beginning through end of song.</td>
</tr>
<tr>
<td></td>
<td>2:08</td>
<td>At 2:08 time mark wind instruments added to provide sensory cue to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>smooth out movement and cue UE upward postural alignment.</td>
</tr>
<tr>
<td></td>
<td>3:30</td>
<td>Medium enhancement of forward/progressive sensation to music for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>endurance boost.</td>
</tr>
<tr>
<td></td>
<td>4:15</td>
<td>Musical cue for UE and head floating upward, as well as cue for home</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stretch to end.</td>
</tr>
<tr>
<td></td>
<td>5:09</td>
<td>Music builds stronger layers of instruments such as bass line for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>enhanced sense of forward movement, with further smoothing out of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>movements and overall increase of quality of movement.</td>
</tr>
<tr>
<td>57 BPM:</td>
<td>0:00 -</td>
<td>Metronome begins for 15 seconds alone for heel strike. Guitar pattern</td>
</tr>
<tr>
<td></td>
<td>0:26</td>
<td>again, for let lift and extension. Acoustic quality of a march to enhance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>upward and longer stride.</td>
</tr>
<tr>
<td></td>
<td>2:30</td>
<td>Mark bass line with texture of instrumentation with accent and texture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to facilitate rotation.</td>
</tr>
<tr>
<td></td>
<td>3:40</td>
<td>Simple lighter texture quality to music to relax, support endurance.</td>
</tr>
<tr>
<td></td>
<td>4:30</td>
<td>Bass line to support longer stride cue.</td>
</tr>
<tr>
<td></td>
<td>4:53</td>
<td>Music adds eighth notes towards end to support progressive feel at</td>
</tr>
<tr>
<td></td>
<td></td>
<td>end of song when fatigue can become issue.</td>
</tr>
<tr>
<td>72/36 BPM</td>
<td>0:00 -</td>
<td>Stronger layering of down beat for heel strike and initiation of</td>
</tr>
<tr>
<td></td>
<td>0:26</td>
<td>movement. Use bass line at 36 bpm to open and elongate stride them</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bring them back to drum/metronome at normal 72 bpm.</td>
</tr>
<tr>
<td></td>
<td>0:53</td>
<td>Use music cues to support increased postural alignment.</td>
</tr>
<tr>
<td></td>
<td>1:05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1:20</td>
<td>Sensory patterns to support weight shift and UE Rotation. 4:12 Head</td>
</tr>
<tr>
<td></td>
<td></td>
<td>floating, body well balance over mid foot.</td>
</tr>
<tr>
<td>89/45 BPM</td>
<td>0:00 -</td>
<td>Bass again at 45 bpm to open stride and with piano/bass combination</td>
</tr>
<tr>
<td></td>
<td>0:21</td>
<td>to provide L/R weight shift cues. Can exaggerate dystonia for patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with strong one side dystonia (i.e., exaggerate a curled arm or upward</td>
</tr>
<tr>
<td></td>
<td></td>
<td>leg cur use other Animals Everywhere tempo track or Street Walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>either tempo range if this happens).</td>
</tr>
<tr>
<td></td>
<td>1:08</td>
<td>Music cues smoothing quality to movement.</td>
</tr>
<tr>
<td></td>
<td>3:20</td>
<td>Increased texturing of instruments to better integrate postural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>alignment and smoother quality in gait.</td>
</tr>
<tr>
<td>108/54 BPM</td>
<td>0:00 -</td>
<td>Bass again at 45 bpm to open stride and with piano/bass combination</td>
</tr>
<tr>
<td></td>
<td>0:21</td>
<td>to provide L/R weight shift cues. Can exaggerate dystonia for patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with strong one side dystonia (i.e., exaggerate a curled arm or upward</td>
</tr>
<tr>
<td></td>
<td></td>
<td>leg cur use other Animals Everywhere tempo track or Street Walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>either tempo range if this happens).</td>
</tr>
<tr>
<td></td>
<td>1:08</td>
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</tr>
<tr>
<td></td>
<td>3:20</td>
<td>Increased texturing of instruments to better integrate postural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>alignment and smoother quality in gait.</td>
</tr>
</tbody>
</table>

Street Walking:
<table>
<thead>
<tr>
<th>72 BPM:</th>
<th>0:00 - 0:26</th>
<th>Heel strike first.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:19</td>
<td>Gentle pushing quality to sensory pattern, builds movement up then backs off and gives anticipatory cues for more complex UE/LE complex coordination.</td>
</tr>
<tr>
<td></td>
<td>2:13</td>
<td>Integrate texture for full hip extension and UE rotation, arm swing. Throughout piece more up/down as well as sideways (rotate/weight shift) enhanced quality for more complex gait movements.</td>
</tr>
<tr>
<td>90 BPM:</td>
<td></td>
<td>26 Heel strike first. With smooth progression of movements, coordination to integrate hip flexion, rotation, and more open, relaxed natural arm swing.</td>
</tr>
</tbody>
</table>

**Silvery Moon Medley:**

| All Tempos: | Simple (RAS) Heel Strike for functional improvements in stride length and symmetry. (PSE) Swing pattern for normalized gait. Only 3 simple instruments, no confusing extra sensory, or over stimulating patterns present. |

*All other songs preloaded in the GT3 systems are meant for use with patients who have mild to moderate gait impairment with mild to no known cognitive or sensory sensitivity issues such as the orthopedic population.*