QuickMedical®
Medical Equipment and Supplies

Firmware version A1.002

Heightronic® 235D
Assembly & Operation

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Section General Information

Introduction

This Manual includes Assembly, Installation and Operation instructions for:
QuickMedical Heightronic® Model 235D Stadiometer.

This Manual, with operation videos, is available at www.quickmedical.com .

Specifications

Measurement Range:		
Standard Model	70 - 200cm	28-78 inches
Tall Model	112 - 240cm	44-94 inches
Accuracy:	± .025 cm,	± .01 inch
Repeatability:	± .025 cm,	± .01 inch
Resolution:		
Default	0.1 cm	.1 inch
User Programmable	0.01 cm	.01 inch
	0.001cm	.001inch
Display Type:	½ inch tall LCD characters	
Operating Power:	Up to 3 CR123 Lithium Batteries or Connected USB cable	
Operating Temperature:	10-32° C	50 to 90° F
Max Headpiece Speed:	100cm/sec	60 in/sec
Measuring Technology:	Inductive	
Bearing System:	Replaceable liners	
Data Transfer Capability	USB cable, optional: Bluetooth or Wi-Fi radio	
Product Warranty:	1 year	
Country of Origin:	Designed and Manufactured in USA	

Section 2 Assembly & Installation

Completely unpack the box, and lay all parts on a flat, clean surface before beginning assembly.

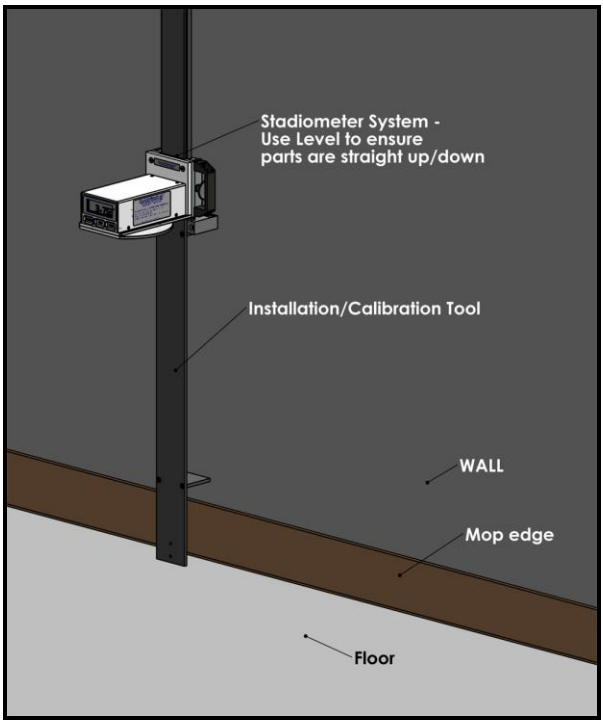
Tools necessary to complete assembly and installation:

- #1 (small) Phillips Screwdriver
- #2 (medium) Phillips Screwdriver
- Small 8mm box wrench
- Bubble level (optional)
- Electric Drill (optional)

Set the Mounting Height

Locate the Installation/Calibration Tool.
Assemble the Installation/Calibration Tool before proceeding (an assembly drawing is provided in the box and on page 22 of this manual).

1. Place the Installation/Calibration Tool against the wall.
2. Mount the Installation/Calibration tool to the Stadiometer using the supplied thumbscrews.

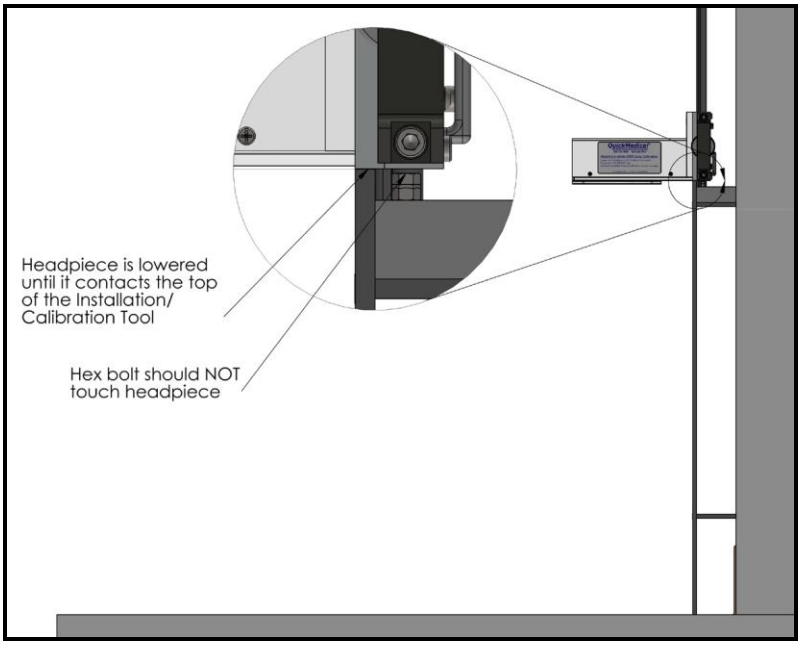


3. Hold the Stadiometer assembly upright. Use a bubble level to ensure the Stadiometer beam is vertical.
4. Mark the four mounting hole locations on the wall. (This is easily done by pressing the mounting screws through the holes in the mounts.)
5. Set the Installation/Calibration Tool and Stadiometer aside. Install the supplied screw anchors into the wall at the four marked locations.
6. If you are planning to use the USB cable to transfer measurement data from the Stadiometer, see "Section 4 - USB Cable Connection" on page 19 for information regarding the USB cable installation.
7. Mount the Stadiometer to the wall using the four included #10 mounting screws.

Set the Calibrate Position

Note: The standard Installation/Calibration tool will set a calibrate position of 69.43cm. Be sure to change the calibrate value if a different tool is used.

1. Slide the headpiece down the rail until it contacts the Installation/Calibration Tool *(NOTE: Be sure to place the calibration tool remains under the **rear** of the headpiece, NOT under the touchplate.)*



2. Press the *CALIBRATE* key. The readout is now calibrated.

If the Installation/Calibration Tool will NOT be left attached to the Stadiometer, perform steps 3-5 below.

3. Adjust the HEX BOLT (turn it counter clockwise) until the head just touches the bottom of the headpiece assembly. *Note: The displayed reading should not change during this process. If it does, the black hex bolt was adjusted too high and the headpiece was pushed up.*
4. Tighten the HEX NUT (turning it clockwise) against the mounting block. This will fix the height of the hex bolt above the mounting block.
5. Test the black hex bolt position:
    a. Lift the headpiece up.
    b. Remove the Installation/Calibration tool.
    c. Lower the headpiece down until it contacts the hex bolt.
    d. The reading on the digital readout should be the same it was during the calibration process.

Note: The black hex bolt provides a quick and repeatable means of checking the system's calibration each day.
However, the Installation/Calibration tool should also be used to verify the calibrate position once a month.

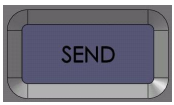
Section 3 Operation

Readout Keys

The keys on the Headpiece digital readout have multiple functions. Timing (how long a key is depressed) is important. This manual uses the terms "*momentarily*" to describe a press of less than 0.8 seconds and *"press and hold*" to describe a press of 2 seconds or longer. See Table Below**.**

	Momentarily	Press & Hold
How long a key is pressed?	Less than 0.8 seconds	More than 2 seconds
When the key function is executed:	On key release	While holding

Therefore, the execution of a key's function is performed on "key release" for momentary presses and after the allotted time for "press & hold" operations. See Table Below. Information in () indicates user programmable features.

Key	Momentarily Press Function	Press & Hold Function
	Forces the headpiece readout to show the programmed "Calibrate" value. (Pr1)	Press & Hold for 9 seconds to enter the Programming Mode.
	Sends the stored height measurement to a PC if the *Auto-Send* function is not enabled. (Pr22)	Enables/Disables Bluetooth pairing or Wi-Fi configuration if a radio module is installed.
	Selects the measurement units displayed: in, cm/mm. Enters Programming Mode when used with CALIBRATE key.	Press & Hold for 3 seconds to Enable/Disable the CALIBRATE key.

NOTE: Entering programming mode changed on firmware version A1.002 to Press & Hold CALIBRATE button for 9 seconds.

To enter programming mode with earlier versions of firmware, press & *Hold* the CALIBRATE button for 1 sec and then momentarily press the IN/CM key.

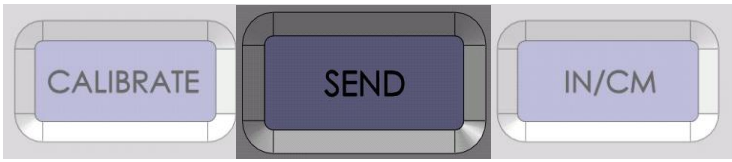
CALIBRATE Key

Momentarily pressing the **CALIBRATE** key forces the readout to display a pre-programmed value. (In most cases, this will be 69.43 cm, but this value can be changed using the programming menu – see the Programming section of this manual.)

Press & Hold for 9 seconds to enter the Programming Mode.

Note: The CALIBRATE key can be disabled (locked) to prevent accidental changes to the Stadiometer's calibration. To Enable/Disable the CALIBRATE key, press and hold the IN/CM key for 3 seconds. When the CALIBRATE key is disabled, the word LOCK *will appear in the upper left corner of the Readout. When locked, pressing the CALIBRATE key causes the display to show "***Loc***" momentarily. The current position will not be changed.*

SEND Key



Momentarily pressing the **SEND** key transmits the height measurement to a personal computer via a USB cable or radio (Bluetooth or Wi-Fi) connection. It is only used if *Programming Parameter Pr 22 is set to 0.*

Press & Hold the SEND key to Enable or Disable Bluetooth pairing (or Wi-Fi configuration) when a radio module is installed.

IN/CM Key

Momentarily pressing the **IN/CM** key causes the Headpiece Readout to display measurements in inches or centimeters (or millimeters). Each key press causes the Readout to cycle to the next unit of measurement. Units appear in this order: inches, then centimeters (or millimeters).

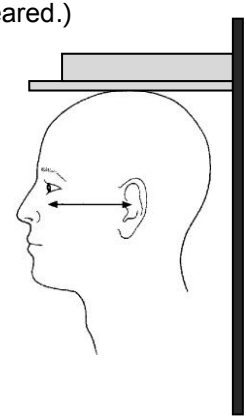
Press & Hold for 3 seconds to Enable/Disable the CALIBRATE key.

Taking a Height Measurement

To take a height measurement, complete the following:

1. Pull the headpiece locking knob toward the handle and position the headpiece to a height that is above the patient's head.
2. Have the patient stand under the Stadiometer with his or her back and buttocks against the rail of the Stadiometer. The patient should be centered left and right under the Stadiometer touch plate (use the etched line for alignment). If the optional kick-plate is installed, the patient's heels should be placed against the kick-plate.
3. Ensure that the patient's head is in the Frankfort Plane*.
4. Pull the headpiece locking knob and move the headpiece down to the top of the patients head. Upon contact with adequate pressure, the Stadiometer will beep, flash the LEDs in the touch plate, and 'Hold' the measured height on the Headpiece Readout. If the Stadiometer is connected to a PC via USB or radio, the captured height measurement may be sent manually by pressing the **SEND** key. If *Auto-Send* (Programming Pr 22 = 1) is enabled, the height measurement is automatically sent when adequate pressure has been detected.
5. Move the headpiece up slightly to allow the patient to step out from under the Stadiometer. Notice that the measured height displayed remains with **HOLD** being displayed on the Headpiece Readout. The measured height will remain displayed for 8 seconds or until the headpiece is moved more than 0.5 inches (1.27 CM) from the last measured height position.
   (See Programming Pr13 & Pr14 to change the distance or time required before measurement 'hold' is cleared.)

*Proper use of the Frankfort plane will ensure consistent and repeatable measurements are obtained.



Operational Notes

These notes pertain to the general operation of the Heightronic 235D Stadiometer.

- The touch plate of the Stadiometer Headpiece is only active after an initial movement of the Headpiece. If the Headpiece is moved and no pressure is detected after 8 seconds (Programming Pr 14), the touch plate operation will deactivate.
- Once a height measurement is completed, the 'Hold' measurement can be cleared by either moving the Headpiece more than 0.5" (1.27 CM) from the last measured height position or by not moving the Headpiece for 8 seconds. Both of these defined values can be changed by Programming Parameters Pr 13 and Pr 14 respectively.
- When the Heightronic 235D is connected to a PC via a USB cable, the batteries in the Headpiece are automatically disconnected and not used. When the USB cable is unplugged, the batteries will automatically re-connect to power the Stadiometer.
- Optional radio modules (Bluetooth or Wi-Fi) cannot be used when the Stadiometer is being operated with a USB cable.
- Once the measured height has been transmitted via USB or radio transmission, pressing the **SEND** key again will not transfer additional data. Another measurement must be completed first.
- If the Stadiometer loses power (i.e. internal batteries are dead/missing or the USB cable is unplugged), the Stadiometer will lose its Calibration. The '*Set the Calibrate Position*' must be repeated (see page 5).
- The 'RF Status' LED on the Headpiece Readout will flash while attempting to make a radio connection and switch to steady when transmitting height measurement data. If a radio module is not installed, the RF Status LED will not illuminate.
- The Headpiece Readout will turn itself off after 15 minutes of inactivity to conserve battery power. See Programming Parameter Pr6 to change the time duration.
- If the USB cable interface is used, the connected computer should be configured to disable sleep and/or hibernate modes.

Changing the Headpiece Batteries

A battery symbol will appear in the lower left corner of the Headpiece Readout when new batteries are needed. To replace the batteries:

1. Move the Headpiece to a convenient position.
2. Using a Phillips screwdriver, remove the six screws securing the top cover of the Headpiece assembly.
3. Remove the top cover by pulling it straight up.
4. Remove the battery retention clips and the old batteries.
5. Install up to three new CR123 3V (or equivalent Lithium battery) noting the proper orientation.
6. Replace the battery retention clips.
7. Replace the top cover and re-install the six screws.
8. Move the Headpiece to the Calibrate position and press the **CALIBRATE** key to calibrate the Stadiometer.

Batteries shown with battery retention clips removed.

Readout Auto Off

The Headpiece Readout will turn itself off after 15 minutes of inactivity to conserve battery power. Press any key once or simply move the Headpiece to wake up the Readout with no loss of calibration. (See Programming Parameter Pr6 to change the time duration before the Readout 'sleeps'.) Note that the longer the Readout stays on, the more battery power the Stadiometer uses.

Readout Messages

no Enc
If the position sensor inside the Headpiece is unplugged from the readout assembly (or if the Headpiece is moved too fast) the **no Enc** message will appear on the Headpiece Readout. To clear the error message, plug the connector into the readout assembly or unplug the sensor connector from the readout assembly for 5 seconds and then reconnect it.

no PoS
The **SEND** key was Pressed when no valid height measurement data was available. Measurements remain available for 8 seconds or until the headpiece is moved more than 0.5 inches (1.27 CM) from the last measured height position. (See Programming Pr13 & Pr14 to change the distance or time required before data is cleared.)

no rF
The radio module is inoperable or, Programming Parameter Pr 15 (Radio Type) is set to a value other than 0 and the Stadiometer does not detect the installed radio module.

no nE
The Stadiometer is configured for Wi-Fi operation (Pr 15 = 4 or 5) but the Wi-Fi radio cannot access the configured wireless local area network. This is typically caused by an incorrect Wi-Fi password or SSID.

no Con
- Bluetooth - The Stadiometer Bluetooth radio cannot contact the host. This is typically caused by a pairing issue, or the host's Bluetooth radio is turned off.
- Wi-Fi - The radio cannot make contact with the host IP address.

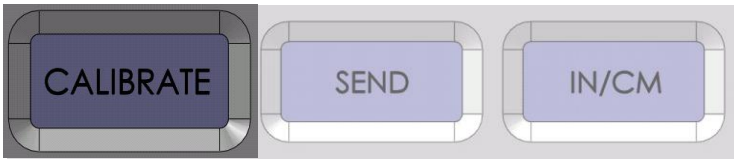
Snd
This message is displayed when height measurement data is sent from the Stadiometer to a computer or network via USB or radio. This occurs either:
- When the Auto-Send function is enabled (Pr 22 = 1) and the touch plate is activated as a result of a measurement.
- The touch plate has been activated as a result of a measurement and the **SEND** key is pressed.

deF

This message indicates that ALL Programming Parameters have been reset to FACTORY DEFAULT values. This should only occur when programming parameter Pr 24 is set to 1 AND the program mode is exited.

Programming the Stadiometer

Several functions of the Heightronic 235D Stadiometer can be customized to suit your needs. The following section describes what functions can be customized and the available options for each.



To Enter the Programming Mode: Press & Hold the **CALIBRATE** button for 9 seconds. The Headpiece Readout will momentarily display:

PG on *then….*
Firmware version, i.e. **A1.002** *then….*
Pr 1 *then….*
The value of (parameter) Pr 1, i.e. **69.4 cm**

You can now release the CALIBRATE button.

Once you are in the Programming Mode, momentarily press and release the **CALIBRATE** key to advance through the Programming Parameter list. When the end of the list is reached, the list will start over at Pr 1.

To change a Programming Parameter's value:

Momentarily press the **SEND** key to increment the value (+).
Momentarily press the **IN/CM** key to decrement the value (-).

To Exit the Programming Mode: Press & Hold the **CALIBRATE** key for 3 seconds. The Headpiece Readout will momentarily display:

PG Off *then….*
The Headpiece position will be displayed on the Readout.

Note: The readout will automatically exit programming mode after 60 seconds if no keys are pressed.

The Stadiometer's Programming Parameters are listed below. The values shown in ' **[ ]** ' indicate the range of values that are acceptable for that parameter. Factory defaults for each parameter are shown in ***Bold Italics***. Parameters in GREY are Factory Set and should not be changed.

Pr 1 – **Calibrate Key** **[**0 to ±999.99cm**]**
This is the value that will be displayed when the CALIBRATE key on the Headpiece Readout is pressed during normal operation.
Factory Default = 69.43cm (27.33 inches)

Pr 2 – Measurement Direction **[**0 or 1**]**
This parameter controls the direction of measurement when the Headpiece is moved. A setting of 1 will cause the displayed measurement to increase when the Headpiece is raised. A setting of 0 will cause the displayed measurement to decrease when the Headpiece is raised.
Factory Default = 1

Pr 3 – Readout Resolution **[**1, 2 or 3**]**
This parameter sets the number of decimal places displayed.
A value of 1 will display measurement as: x.x (one decimal place)
A value of 2 will display measurement as: x.xx (two decimal places)
A value of 3 will display measurement as: x.xxx (three decimal places)
Factory Default = 1 (1 decimal place)

Pr 4 – Movement to Wake Readout **[**0.01 to 1cm**]**
This parameter sets how far you need to move the Headpiece (when the Readout is in 'Sleep' mode) to automatically wake the Readout.
Note: Increasing the movement required does not affect accuracy or repeatability of the system.
Factory Default = 0.01cm (0.004 inches)

Pr 5 –Measurement Units **[**0 to 6**]**
This parameter controls the Measurement Units that are displayed on the Headpiece Readout. The table below illustrates the possible combinations of measurement units that may be configured.
Factory Default = 3 (decimal inches or centimeters)

Value of Pr 5	Measurement Units displayed on Headpiece Readout
0 or 2	Decimal Inches and millimeters
1	Millimeters only
3 or 4	Decimal Inches and centimeters
5	Centimeters only
6	Decimal inches only

Pr 6 – Readout Auto-Off Timer **[**0 to 240 minutes**]**
This parameter controls how much time must elapse before the Readout is turned off (goes into Sleep mode) to conserve battery power. The available values represent time in minutes of idle operation (no Headpiece movement or readout key presses) before the Readout turns off.
*Note: A value of '**0**' means 'Sleep' mode is disabled.*
Factory Default = 15 (15 minutes)

Pr 7 – Linear Scaling Multiplier **[**0.0001 to 99.9999**]**
This parameter sets a linear multiplier (correction factor) in the Readout that is applied to the measurement before it is displayed.
Note: Do not change the default setting for this parameter without first contacting the factory.
Factory Default: 1.00000

Pr 8 – Readout Contrast Adjustment **[**1 to 31**]**
This parameter controls the Readout contrast. Higher numbers will increase the Readout contrast.
Factory Default = 27

Pr 11 – Touch Plate Activation Force **[**1 to 10**]**
This parameter configures the amount of pressure required to activate (take a measurement) the Headpiece touch plate when it contacts the patient's head. Each increment is equal to approximately 1 ounce.
Factory Default = 2 (approximately 2 ounces)

Pr 12 – Touch Plate Activation Time **[**1 to 10**]**
This parameter configures the amount of time that the Headpiece touch plate must be in contact with the patient's head for a valid height measurement to be acquired. Each increment is equal to 0.1 second.
Factory Default = 3 (0.3 seconds)

Pr 13 –Hold Reset Distance **[**0.5 to 5 inches**]**
This parameter controls the distance of Headpiece movement required since the last valid height measurement to clear, or reset, the Headpiece Readout.
NOTE: This setting is in INCHES.
Factory Default = 0.5 inches (1.27 CM)

Pr 14 –Hold Reset Time **[**3 to 30 seconds**]**
This parameter controls the amount of time required since the last valid height measurement to clear, or reset, the Headpiece Readout.
Factory Default = 8 (8 seconds)

The following Programming Parameters apply ONLY if the Stadiometer has an optional Bluetooth or Wi-Fi radio installed.

Pr 15 – Radio Type and Configuration **[**0 to 5**]**
This parameter defines the type and configuration of the optional radio module installed in the Stadiometer. See table below:
Factory Default = 0 (No Radio module installed)

Value of Pr 15	Radio Type and Configuration
0	No radio module installed
1	Bluetooth Radio configured as keyboard
2	Bluetooth Radio configured as Master COM port
3	Bluetooth Radio configured as Slave COM port
4	Wi-Fi Radio configured as Master (Client)
5	Wi-Fi Radio configured as Slave (Server)

Pr 16 – Bluetooth Pairing Time **[**30 to 240 seconds**]**
This parameter controls the amount of time the Bluetooth radio remains active to pair with a host, typically a PC or tablet.
Factory Default = 90 (90 seconds)

Pr 17 – Wi-Fi Configuration Time **[**60 to 480 seconds**]**
This parameter controls the amount of time the Wi-Fi radio remains active in configuration mode for remote configuration by a host PC over TCP/IP.
Factory Default = 300 (300 seconds)

Pr 18 – Wi-Fi Network Access Time **[**3 to 20 seconds**]**
This parameter configures the amount of time the Wi-Fi radio will wait to attempt to gain access to the predefined Wi-Fi network.
Factory Default = 5 (5 seconds)

Pr 19 – Radio Connection Time **[**3 to 60 seconds**]**
This parameter defines the amount of time that either a Bluetooth or Wi-Fi radio module will wait listening for a data connection to occur.
Factory Default = 30 (30 seconds)

Pr 20 – Radio Delay Time **[**.1 to 2 seconds**]**
This parameter configures the amount of time, in .1 second increments, that either a Bluetooth or Wi-Fi radio module will delay before transmitting data. This provides a time delay to allow the RF data path to complete initialization after a valid connection has been established.
Factory Default = 1.3 (1.3 seconds)

Pr 21 – Radio Slave Connection Time [**5 to 90 seconds**]
This parameter controls the maximum amount of time, in seconds, that either a Bluetooth or Wi-Fi radio will remain active waiting for host commands to be received. This parameter only pertains to Pr 15 Radio Types 3 or 5 where the Stadiometer waits for a host query command to be received.
Factory Default = 45 (45 seconds)

NOTE: Any radio 'on time' will substantially affect battery life. Use settings that require the minimum 'on time' to accomplish the task.

Pr 22 – Auto Send Data Configuration [**0 or 1**]
This parameter determines how Height Measurement Data is sent to a host computer. If set to 0, the operator must press the **SEND** key after a valid measurement. If set to 1, the Stadiometer automatically sends the data after a height measurement via a connected USB cable or by an installed Bluetooth or Wi-Fi radio.
Factory Default = 0 (Press SEND key)

Pr 23 –Message Terminator [**0 to 3**]
This parameter defines how the height measurement data is terminated after being transmitted via USB or radio. The options are shown below:
Factory Default = 1 (Carriage Return)

Value of Pr 23	Terminator
0	No terminator. (No carriage return)
1	Carriage return
2	Carriage return/Line feed
3	Carriage return/Carriage return
4	Tab

Pr 24 – Default Programming Parameters [**0 or 1**]
This parameter is used to set all of the Programming Parameters to a FACTORY DEFAULT state. To activate this function, a 1 must be programmed into Pr 24 AND the programming mode must be exited. The defaulting process does not occur until programming exit so momentarily setting this parameter to 1 has no effect.
WARNING: DO NOT USE THIS FEATURE UNLESS YOU ARE SURE THAT YOU WANT TO RESTORE FACTORY DEFAULT PARAMETER VALUES. ONCE COMPLETED, THIS OPERATION CANNOT BE UNDONE.
Factory Default = 0

To Exit the Programming Mode: Press & Hold the **CALIBRATE** key for 3 seconds. The Headpiece Readout will momentarily display: **PG Off**

Section 4 USB Cable Connection

The Heightronic 235D is supplied with a 10 foot long USB cable that can be used to connect the Stadiometer to a computer in order to acquire the Height Measurement Data via wired connection. The use of the USB cable is optional. The Stadiometer can also be ordered or retrofitted with either a Bluetooth or Wi-Fi radio system for wireless data transfer.

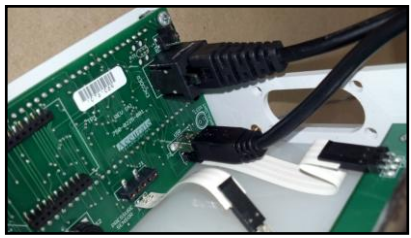
When using the USB cable, the Stadiometer appears to the computer as a USB keyboard. (This allows the Stadiometer to be used with any type of software, without the need for special software drivers.) Simply click in the desired text box of the software that you are using, and take a height measurement. When Programming Parameter Pr 22 is set to 1, the Height data will automatically fill in the selected text box.
When Programming Parameter Pr 22 is set to 0, the operator must press the **SEND** key to transmit the height measurement data.

When the USB cable is used, the Stadiometer receives its power from the computer's USB port. In this case, the batteries are not used and can be removed if desired. If the batteries are left installed, the power will automatically switch back to the batteries if the USB cable is unplugged.

To install the USB cable:

1. Remove the six (6) screws from the top cover of the Stadiometer Headpiece. Cut the small wire tie that secures the encoder cable to the encoder mounting plate (see photo).

2. Slide the mini-USB connector through the encoder mounting plate and into the headpiece housing. Plug the mini-USB connector into the female USB connector on the rear of the Readout assembly circuit board (see photo).
3. Use a new wire tie to secure the encoder and USB wires to the encoder mounting plate.



4. Re-install the Headpiece cover and screws.
5. Plug the USB connector into a USB port on the PC. Windows may install an HID keyboard driver to support the Stadiometer transmission.

Section 5 Maintenance

Several components of the Model 235D Stadiometer may require occasional adjustment and/or cleaning.

Daily

Verify the Stadiometer is properly calibrated – see pages 5 and 6.
Note: Deviations of +/- .02 centimeters are considered normal and are not cause for concern.

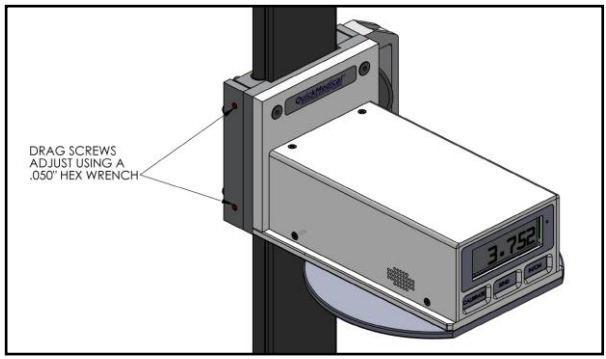
Weekly

Clean the beam using alcohol wipe.

Monthly

1. Check the screws that mount the Stadiometer to the wall to ensure they are tight.

2. The drag screws (shown in red in the image) can be adjusted to control the headpiece drag on the beam. Use a 0.050" hex wrench to adjust these, testing the drag after each 1/16 clockwise turn.



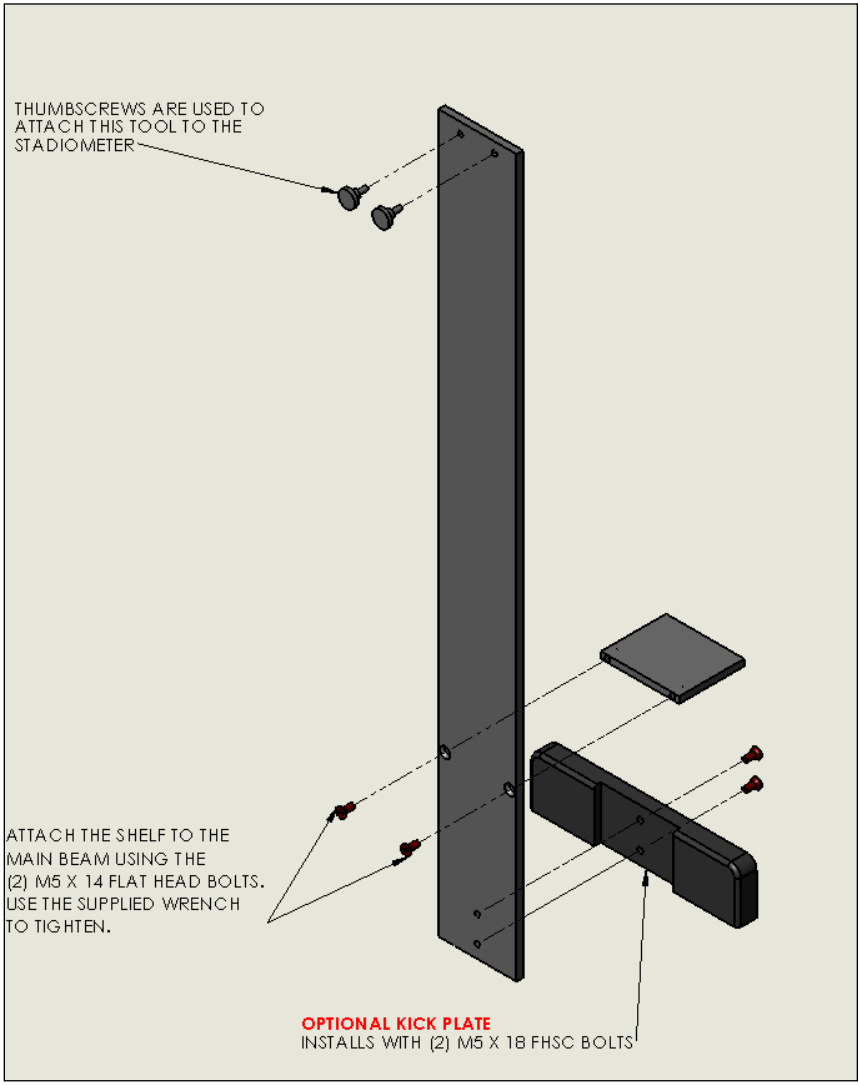
Note: Do <u>not</u> over tighten these screws or permanent damage to the system's bearings can occur. These are intended to adjust the <u>drag</u> of the headpiece only.

3. Inspect the black side rails of the Stadiometer beam. If any silver is showing where the drag screws make contact on the left, or where the pressure knob contacts on the right, the bearing liners should be replaced.

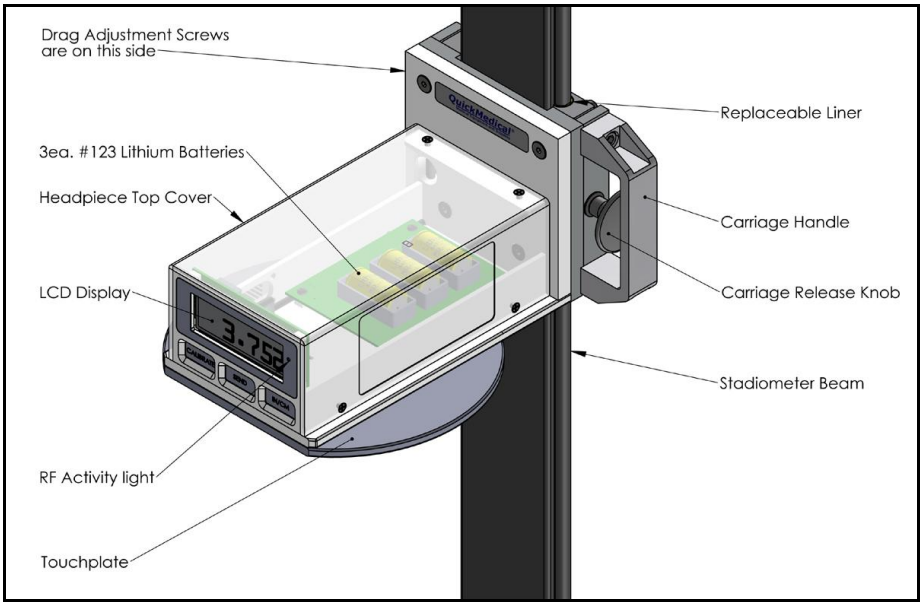
Every 6 months

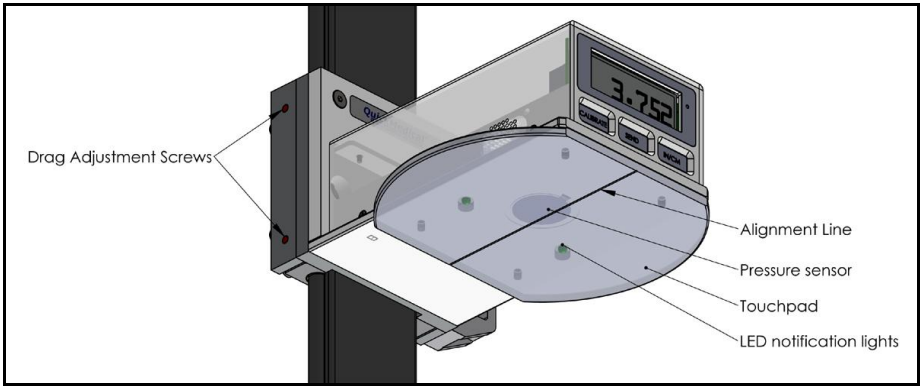
Replace the batteries. If the Stadiometer is not being used (or if it is being powered by USB connection), the batteries should be removed.

Addendum 1: Installation/Calibration Tool Assembly:



Addendum 2 : Headpiece Part Descriptions





Thank you for choosing an
AMERICAN MADE PRODUCT

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www.quickmedical.com

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