

CHRONOCURL

meet your potential



CHRONOCURL PRO FOR IOS

Instruction Manual

Version 1.3

FCC ID: 2AIVICHRONV21F

Contains FCC ID: 2AB6YHM-1011V1



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Any tampering of the instrument not approved by the responsible party could void the user's authority to use the instrument.

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Instruction manual for iOS Chronocurl software V1.3— November 2016

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QUICK START GUIDE

STEP 1

Turn on all the Chronocurls needed to run your practice, put them at the desired locations and align their laser onto the reflectors.

See page: 5

STEP 2

Open the app and press play.

See page: 6

STEP 3

Connect to each Chronocurl by tapping the black **NO** buttons.

See page: 10

STEP 4

Select the information you would like to have broadcasted on the Main Display and on the Secondary display using the wheels.

See page: 14

STEP 5

Press Start.

See page: 16

THANKS FOR YOUR PURCHASE

At Chronocurl, we are dedicated to customer service and quality instruments.

Your satisfaction is our priority and we pride ourselves in giving world class service to all of our clients.

If at any time, you are not satisfied with the performance of your instrument, contact us and we will do our best to find a solution for you.

Chronocurl is a Canadian company founded by two brothers from Amos, Canada. All products are designed and manufactured in Canada and USA.

Good Curling!

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CHRONOCURL

HARDWARE

Hardware Operation

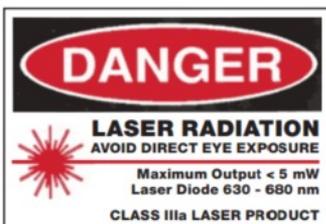
Your Chronocurl is a powerful instrument and this manual will help you get the most out of it.

INSTALLING BATTERIES

Your Chronocurl uses three (3) AA batteries. We recommend using alkaline batteries for better stability. To install batteries, first make sure the instrument switch is at the off position, then using a Philips screwdriver unscrew the four black screws located underneath the instrument. The cover should pop out and reveal a insulating foam block and a battery holder. Gently pull out the holder and insert three AA alkaline batteries. Make sure the polarity of the batteries is correct, inversion of the polarity could damage the instrument. Insert back the holder in the instrument battery side up then put back the insulating foam block. Push the cover on and then screw back the four black screws.

LASER EXPOSURE WARNING

Care should be taken to avoid any direct eye exposure.



SETUP OF THE INSTRUMENT

Apouse the reflector on the carrying case or on the optional retro-reflector holder. Position the retro-reflector at the desired location.

While pointing the brass laser towards the ice to avoid eye exposure turn on the switch at the back of the instrument. The laser should turn on within three seconds. Install the instrument on the ice then adjust the swivel head and the orientation of the instrument so that the laser beam points at the retro-reflector. The retro-reflector will return a scattered laser beam to the instrument that is harmless to the human eye.

The setup is complete.

CHRONOCURL IOS

Software Operation

INTRODUCTION

Technology goes super fast and we update the application quite frequently. Please look online for the latest instruction manual.

Download the app from the iTunes store onto your device. Note that the app is compatible with iOS 9.3+ and



FIGURE 1. SPLASH SCREEN

required and iPhone 4s, iPad 2 or more recent devices.

Once the app is installed launching it will provide [Figure 1](#) splash screen. After a few seconds, you should enter the main screen as depicted in [Figure 2](#).

MAIN SCREEN

The main screen is separated in two distinct sections, the upper part where you will find the setting button (gear icon) the start button (play button with circle) and the result section (N/A) currently empty.



FIGURE 2. MAIN SCREEN

In the lower section (currently empty), a data table will be displayed with all the information related to your current practice.

SETUP PREFERENCES

To setup your preferences press on the gear icon located in the top right corner of the app.

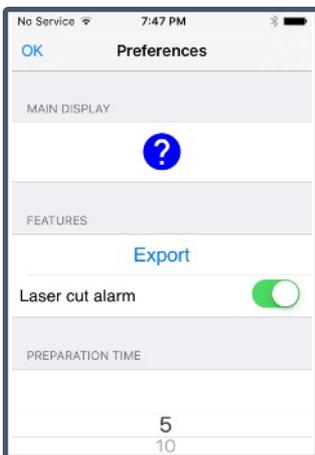


FIGURE 3. PREFERENCE

Pressing OK in the top left corner will bring you back to the Main Screen ([Figure 2](#)).

MAIN DISPLAY

The blue question mark ([Figure 3](#)) brings up the Information Menu that will be covered later in this manual ([pp. 11](#)).

FEATURES

The export button ([Figure 3](#)) gives access to the list of practices that

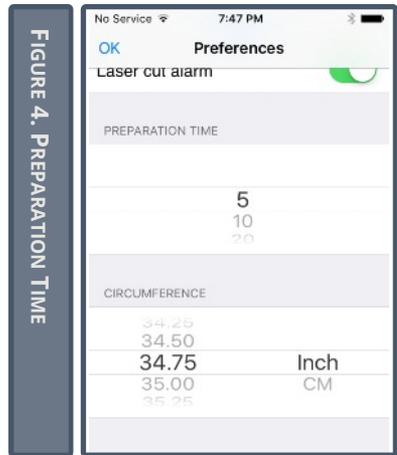
were saved. This feature will be covered later in this manual (pp. 19).

When the laser cut alarm is on (Figure 3), a sound will be emitted by the application when the rock crosses the laser beam. This feature allows the player to know where he is on the sheet without taking his eyes off his target. This feature is typically used to locate the initial or final location of the release.

After a shot has been recorded, the lasers from all the instruments present on the ice will stay off to leave time for the player to come back to the hack. This is the Preparation Time (Figure 4). The preparation time can be adjusted from 5 seconds to 50 seconds. A time of 20 seconds is usually sufficient to come back.

CIRCUMFERENCE

The speed of the rock is determined from its diameter and the amount of time the laser beam is cut. If an accurate speed reading is desired, the stone circumference (Figure 4) should be measured with a tailor tape and entered in this section. While most curling clubs have stones of matching diameter, stones can break and unmatched stones could be brought in to replace them. In application where very precise measurement is required, we recommend measuring stones and making sure that their circumference



is within 0.5 inch or 1.3 cm. Staying within that range will ensure accuracy or +/- 0.025s on a back line to hog line calculated split time (see units sections [pp. 11](#)).

NORMAL OPERATION

From the main screen shown in [Figure 1](#), pressing on the play button will bring you to the practice configuration screen ([Figure 5](#)).

That screen is where the user configures the system according to the type of training to be performed.

In the top section of the screen you can see the cancel button, the current Bluetooth scanning status (currently scanning...) and the grayed out Try Again button. Below that title bar is the list of Chronocurl that were found in the initial scan.

The list is populated automatically. If your Chronocurl does not appear in that list, you may hit the Try Again button to scan again for new devices Bluetooth devices.

The middle section of the display where you can see Main Display and Secondary Display, is where you can select what will be displayed in the main screen. In [Figure 6](#) you can see how two large number (2.19/2.55) are displayed. The left number correspond to the Main Display whereas the right number correspond to the Secondary display.

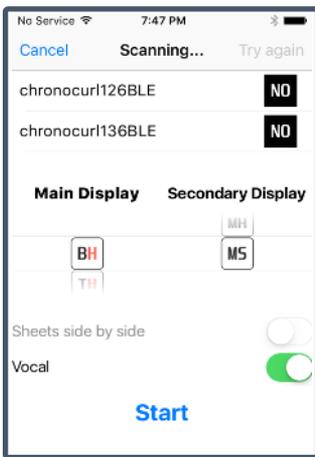


FIGURE 5. CONFIGURATION SCREEN

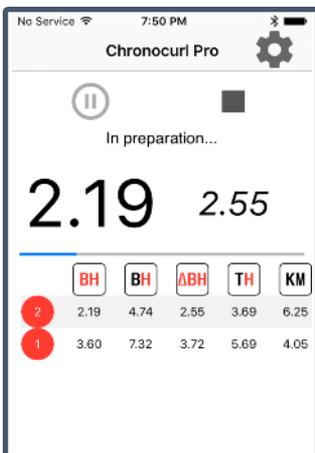


FIGURE 6. TYPICAL PRACTICE DISPLAY

Chronocurl lets you select from a broad range of data to put in these two displays. We will cover this subject later in the manual (pp. 11).

In the bottom of the screen you can select if you would like to use Chronocurl on two sheets side by side using only one tablet (requires two Chronocurls) and lets you select if you would like to have TTS audio feedbacks (Vocal). The audio feedback will read the value being broadcast on the Main display via either the device speaker, headphones or Bluetooth enable headphones or speakers.

CONNECTION PROCEDURE

Once the list of available Chronocurl is available, you can select which one(s) you would like to use by pressing on the black NO squares. (Figure 7)

The software then automatically attempts to connect to the selected instrument. Connection succeeds if the square turns green. You will also notice that the name is now in bold fonts and that the Chronocurl laser is now flashing.

Pairing a second instrument is done the same way, after pressing on the black NO button, you can see the name of the Chronocurl being highlighted in bold and the laser of the second machine is now flashing instead (Figure 8).

FIGURE 7. CONNECTING TO CHRONOCURL



FIGURE 8. PAIRING A 2ND CHRONOCURL



To identify a Chronocurl, you can either look underneath the switch for the serial number sticker or watch press on the name of the Chronocurl and see which is flashing.

Once Chronocurls are paired with one device, they stop broadcasting their presence. Hence, if somebody else start a practice on another sheet, your practice will not be affected.

SELECTING DISPLAY CONTENT

Chronocurl can display information in many different ways depending on the training objective.

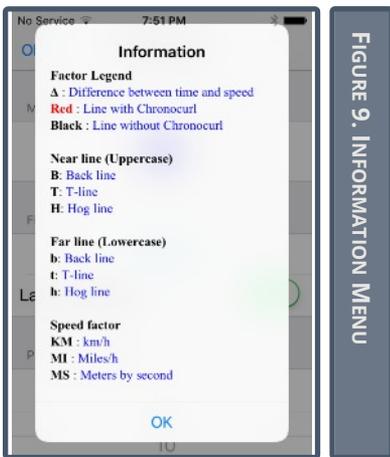
In [Figure 3](#) we saw that the Information Menu can be pulled out from the setup menu by pressing the blue question mark button. As a reminder, you can access the setup menu by pressing the gear icon at any time.

The Information Menu contains the naming convention used in Chronocurl app ([Figure 9](#)).

Chronocurl can provide two types of data: Speed data and time interval data.

SPEED DATA

Speed data, also referred to as calculated split times is determined using one instrument. It uses the diameter of the rock and the amount of time the laser is being cut by the passing rock to determine a speed.



Speed units available in Chronocurl include: km/h, mph and m/s respectively abbreviated KM, MI, MS. Speed units are all colored in black and are all quantity of distance divided by time.

Since curlers use stopwatches times to estimate speed of curling rocks, it is natural to desire a representation of speed in units of time.

To do that, Chronocurl uses the speed value obtained from the laser reading and a fixed distance (either the distance between back-line to hog-line or T-line to hog-line). It will then ask the following question:

How much time would a stone traveling at that speed take to travel that distance?

The answer comes from dividing that fixed distance by the speed determined by the instrument.

That number is called a Calculated Split time and is therefore a representation of the speed of the rock.

TIME INTERVAL DATA

When multiple Chronocurls are used at the same time, the system can be used to determine time intervals identical to what would be achieved with a stopwatch but with greater accuracy and completely hands free. When the stone passes the first laser,

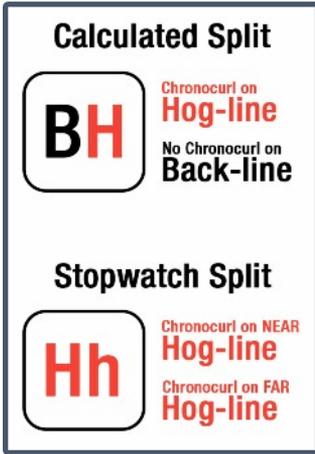


FIGURE 10. NAMING CONVENTION

the stopwatch is started then when the next Chronocurl records a stone passage, it will record time. You can put up to

NAMING CONVENTION

The naming convention used in the application is really simple (Figure 10). It uses two letters and a color code. The letter corresponds to the name of the line used for the split/interval timing.

Therefore a B stands for “Back-Line”, T stands for “T-Line” and a H stands for “Hog-Line”.

The color codes for the presence or absence of an instrument on a specific line. Red coding for the presence of a Chronocurl, black for the absence. Therefore a time interval between both hog lines using two Chronocurl will be represented by two red H (Figure 10). Whereas a calculated split time between the back-line and the hog-line would be represented by a black B and a red H. The H is red due to the presence of the Chronocurl on the hog line (Figure 10).

Another easy way to remember is if both letters are red, it’s an interval time.

If one letter is red and the other one is black, it’s a calculated split time.

If both letter are black, it’s a speed.

DISPLAY SELECTOR WHEELS

No matter how many Chronocurls you use for a specific practice, you will be able to select up to two different data point to display in the Main Screen. Depending on the data needed, you might require one, two or three instruments.

Two selecting wheels, one for each display position, are automatically populated with possible configuration of instrument (Figure 11) based on how many Chronocurl are paired to the software (pp. 10). Hence, if two instruments are available, the possible choices will include speed options as well as interval time options, but if only one Chronocurl is available, only speed options will be displayed.

Depending on which display options are selected, the status of each of the connected/paired Chronocurls will be updated following the color coding of Figure 12.

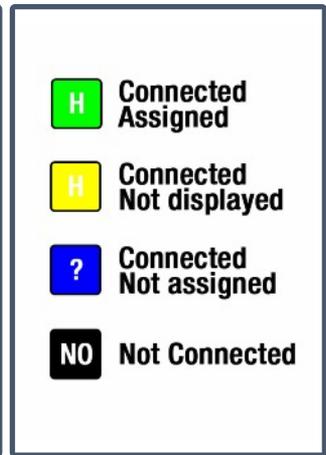
Hence, if a Chronocurl is connected/paired and required to calculate values displayed either in the Main or Secondary Menu, it will be considered assigned and colored in green and a letter will indicate its proposed location.

If the Chronocurl has been paired and is not used to calculate either values displayed in the menus, it will be colored blue with a question mark

FIGURE 11. ONE INSTRUMENT REQUIRED



FIGURE 12. CONNECTION STATUSES



and considered connected but not assigned. Upon the start of the practice, this Chronocurl will get disconnected automatically and no data from that instrument will be collected.

If the user desires to collect data from that instrument or use it as a location detector, pressing the blue question mark button will activate data collection and the icon will turn yellow.



FIGURE 13. NON-DISPLAYED LOCATION

The data can be found in the result table during the practice (pp. 17) and can also be saved by the user at the end of his practice (pp. 19).

By repeatedly pressing the button, different letters will be displayed at the center of the yellow icon representing the different locations where the Chronocurl can be located (Figure 13). Selecting the right location is crucial to insure the system functions properly. This subject will be discussed further in this section (XXXXX)

SIDE BY SIDE PRACTICE

It is possible to use your Chronocurl on two sheets side by side using one instrument per line, per sheet.

That function can be activated using the toggle switch name Sheets side by side.

A Chronocurl cover only one sheet, so if both sheets require a Chronocurl at the near hog line, you should put one Chronocurl on the left sheet hog-line and one Chronocurl on the right sheet hog-line.

Figure 14 shows such a setup with the < (left) and > (right) signs showing which Chronocurl to put on which sheet. In this example the users decided to broadcast a calculated split time on the left sheet and on the right sheet to display and a speed in m/s on the right side of the display.

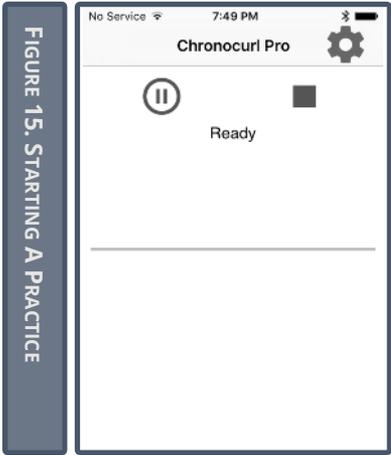
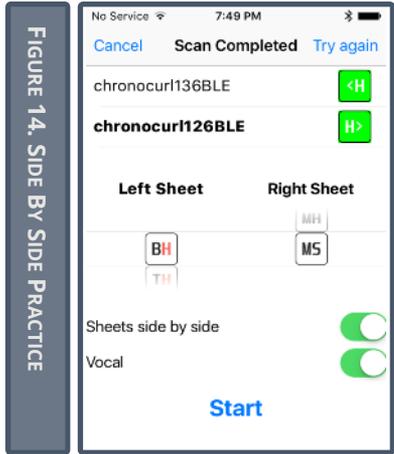
VOCAL

The vocal toggle button activates the text to speech (TTS) audio feedback. Once activated, the values of the Main display will be read to the user through the phone speakers. The audio can also be broadcasted to headphones/speakers either wired or Bluetooth wireless according to your device capabilities.

In Sheets side by side mode, no audio is being reported.

STARTING THE PRACTICE

Once you practice if fully configured, you can start your practice by pressing the start button. The last practice configuration will be kept in memory until it is changed by the user. Starting the practice will then bring you back to the main screen (Figure 15).



The Chronocurl should be positioned properly with the laser pointed at the reflector prior to pressing the start button. This insures that the automated calibration process will function properly. When Calibration is in progress, you will see the laser shut down and come back on. You will see a message saying calibrating then, ready as depicted in [Figure 15](#).

DURING THE PRACTICE

Once the system is configured and launched, you are ready to go.

The system is designed to minimize the amount of interaction between the user and the software. Several automated features will work in the background to keep the player focusing on the ice instead of the system itself.

The system displays Ready when the calibration is done and the system is ready to receive a shot.

Once the rock is crossing the first laser beam, Running will be displayed until the results appears ([Figure 16](#)).

As soon as a laser records a stone passage, it will turn the laser off to allow the player to come back to the hack and display In Preparation... ([Figure 17](#)). The laser will be off for the amount of time specified in the Setting menu Preparation time wheel selector. The blue progress bar

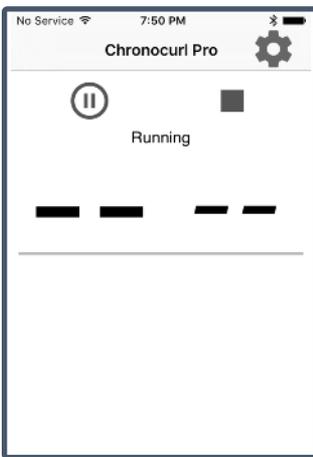


FIGURE 16. A SHOT WAS RECEIVED

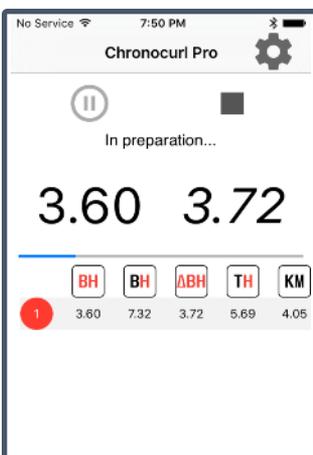


FIGURE 17. IN PREPARATION

indicates how much time is remaining before the system recalibrates. When recalibration occurs, the software will display Calibrating... for a brief moment, lasers will flash (Figure 18). When calibration is done, the system will display Ready again and will wait for a rock to cross the laser beams.

You will notice that all the data gathered by the Chronocurls is being compiled in a table which can be consulted while the instrument is being used. The first two columns correspond to the Main Display values and the Secondary display values.

PAUSING THE PRACTICE

At any moment, if you need to access the ice without having to worry about tripping the lasers, or need to relocate the instruments, you can press the Pause button. A menu will appear while on pause and pressing the OK button will bring you back to the Main Screen (Figure 19).

ENDING A PRACTICE

To end the practice, press the STOP button represented by a square. A popup window will appear (Figure 20). Pressing No will bring you back to the practice while pressing Yes will close the practice. You will notice a toggle button Save Practice. If that toggle is on, all the data gathered in the practice will be available in the

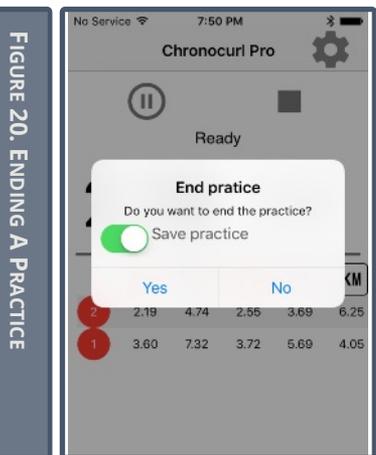
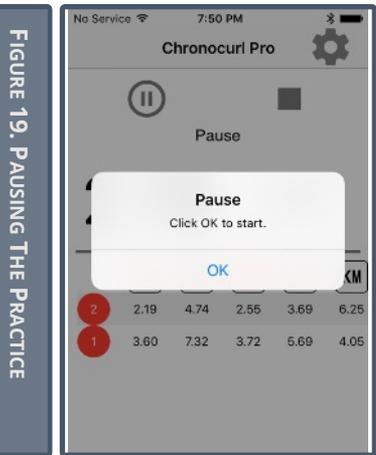
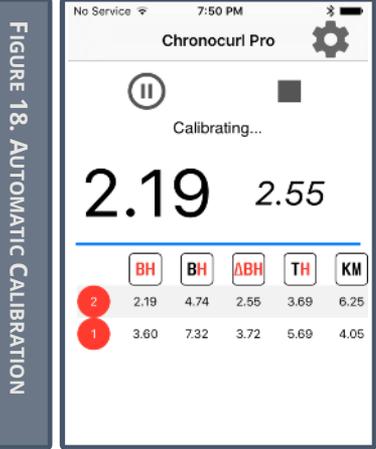




FIGURE 21. THE EXPORT WINDOW

Export screen (Figure 21), if the toggle button is off, all data will be lost.

EXPORTING AND MANAGING DATA

All raw and processed data are available in the Export window (Figure 21). The export window is accessible from the Setting menu (Figure 3) and lists every saved practices by date and time.

To delete, select them by pressing, a check mark should appear next to each. Then press the red Delete button. A warning message will ask for confirmation (Figure 22).

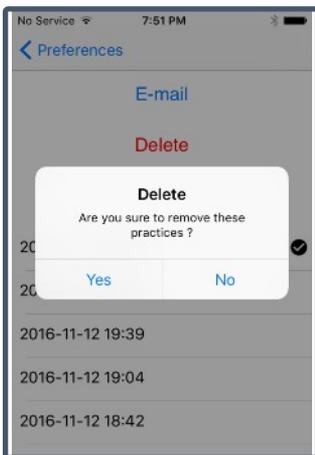


FIGURE 22. DELETING SAVED PRACTICES

You can send data over email if your device has access to the Internet and a configured email account. Selecting practices the same way as mentioned previously and pressing on the E-mail button will open your email application with a pre-embedded file containing all the information (Figure 23).

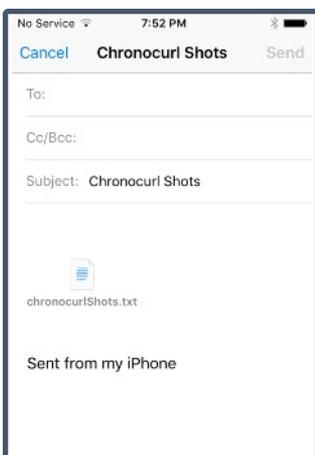


FIGURE 23. DATA EXPORT IN IOS MAIL

The file is a semi-column delimited file using UTF-8 character encoding and contains all raw and calculated data.

ERROR MESSAGES

CALIBRATION ERROR (FIG 24.)

In order to work properly, your Chronocurl needs to calibrate its sensor. It will do so in flashing the laser and recording how much light falls naturally in your device and how strong the laser signal is.

If no signal is recorded, the most probable cause is poor laser alignment, meaning that the laser is not on the reflector. Realign the laser and retry.

If this error occurs while the laser is on the reflector, the distance between the laser and the reflector could be in cause. In this case, make sure that the distance is greater than two meters and press retry.

If you still have no signal, contact Chronocurl customer service.

DETECTED VIBRATIONS (FIG 25)

Your Chronocurl filters events that are physically impossible. If the laser beam is cut for an amount of shorter than a four second hog to hog peel would generate, you will get a vibration error.

This error would normally occur while someone mistakenly walk through the laser beam. The system will go through an

FIGURE 24. CALIBRATION ERROR

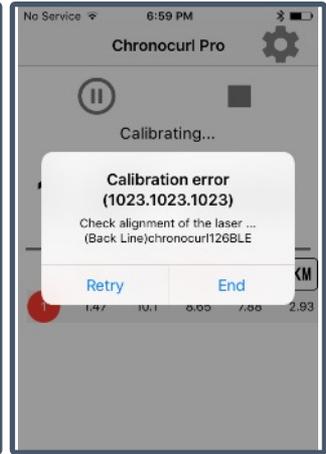
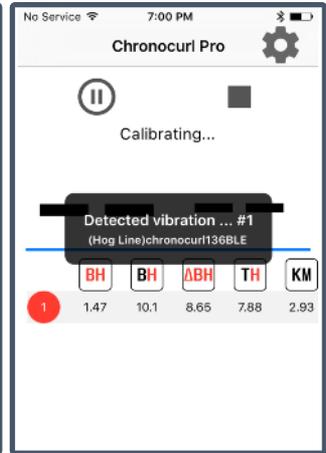


FIGURE 25. DETECTED VIBRATION



automatic calibration and get back to its ready state.

In some instance, this error might occur when operating in poor conditions such as:

- Low batteries
- High incident light
- Scratched or damaged reflector

If after checking all these sources, the error persists, please contact Chronocurl customer service.

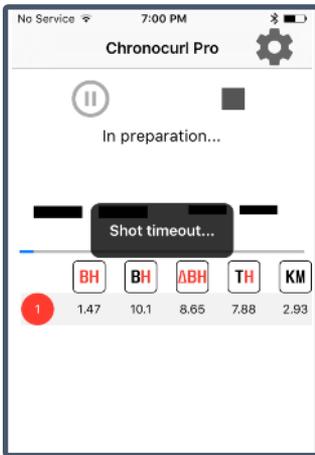


FIGURE 26. SHOT TIMEOUT

SHOT TIMEOUT (FIG. 26)

When using multiple instruments, Chronocurl also filters events that are physically impossible.

If after a first Chronocurl is triggered, the second instrument does not record the passage of a stone for more than 5 seconds in a back-line to hog-line configuration and 22 seconds in a hog-line to hog-line configuration, a time out error will be sent.

If this error occurs while operating the system in normal condition, the communication between the phone and the Chronocurl generating the error might be hindered. Make sure there's a clear line of sight between the instrument and the smartphone or device.

INVALID CROSSING (FIG. 27)

When using multiple instruments, Chronocurl also filters events that are physically impossible.

In a hog to hog configuration, if after a first Chronocurl is triggered, the second instrument records a stone passage that appears significantly faster than the initial one, an Invalid Crossing error is triggered.

The instrument will try to recalibrate and reset the system before the rock arrives.

In most occurrence, this error will be the result of someone walking through a laser beam.

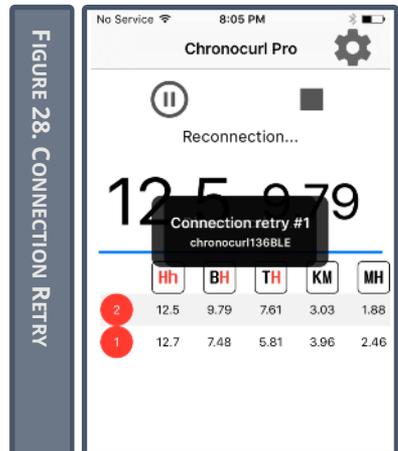
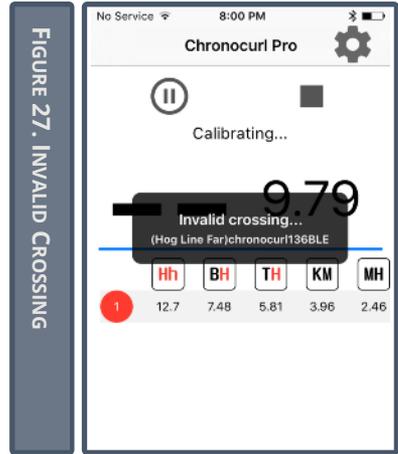
If the error occurs seemingly randomly, refer to the Detected Vibration error (Figure 25. Detected Vibration) for resolution or contact Chronocurl customer service.

CONNECTION RETRY (FIG. 28)

CONNECTION TIMEOUT (FIG. 29)

Bluetooth communication protocol is designed for short range communication. Chronocurl leverage this ubiquitous system to connect to your smart device.

When your phone or tablet disconnects from the Chronocurl, the software will try to reconnect automatically at least three times.



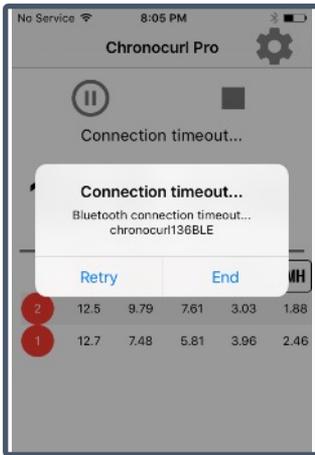


FIGURE 29. CONNECTION TIMEOUT

If after three attempts, the phone still is unable to communicate with the Chronocurl, the practice is paused and a Connection Timeout error is displayed.

Factors that influence Bluetooth communication in order of importance include:

- Line of sight
- Height of antennas (Fresnel Zone)
- Ceiling height
- Bluetooth protocol
- Electromagnetic noise at 2.4GHz
- Age of devices
- etc.

As the sources can be very diverse and sometimes impossible to overcome, it is important to understand that all these factor can contribute to a better signal.

If your Chronocurl tends to disconnect in your particular situation, make sure that you keep a clear line of sight while maintaining the device at least a meter above the ice surface.

In the eventuality that you cannot have your device connecting properly after optimization, contact Chronocurl customer service.

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