smartOar®

Coach's Tablet

User Guide

Version 2.0

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smartOar® The Real-Time Force Curve Feedback System

Thank you for buying our product. You are now an owner of the first and only force measuring equipment of its kind on the market.

With smartOar® - YOU CAN

- See the actual force exerted – per oar, through every stroke
- View and record up to 8 oars – simultaneously
- See the catch and release timing – to an accuracy of 1/100 of a second
- Monitor the check in the boat and see the set – on every stroke (with our in-boat accelerometer)
- Tailor the shape of the curves – to match your coaching philosophy
- Send your crews off on their own and record workouts – for later download and analysis
- Make videos of the data – let your crews see what you see
- See the angle of the oars as they move through the stroke in real-time (with our new oar angle sensor)

Now, everyone is involved and competing on each stroke.

smartOar® - Coach's Tablet

The Tablet allows coaches to watch the force curves of up to oars in real-time. The Tablet is water resistant and has a special display that doesn't wash out in direct sunlight. Other viewing devices like laptops, tablets and smart phones, are close to unusable in direct sunlight.

The Tablet has three connectors on its side. One is a USB port that accepts a thumb drive for updating the Tablet software and for transferring saved stroke data, to a Windows computer for additional display and analysis using the smartOar® PC Display software. The PC Display software lets you add notes to the data as well as assign rower's names to the seat positions. A power connector is used to charge the Tablet with the AC adapter. Lastly, a VGA connector allows the Tablet to be connected to a large screen display.

The Tablet can display up to nine curves simultaneously. Eight curves are available for a combination of oars, gate angle sensors, and seat accelerometers. These various products are referred to as "devices". The ninth curve is available to display a boat accelerometer or an oar angle sensor. Multiple boats or combinations of devices in the same boat can be configured and the coach can switch between boats/configurations. Considerable effort was spent in providing on-screen instructions to make it easier to use the Tablet on the water.

The Tablet communicates to the oars via radio. The frequencies used to communicate are shared by many other services including Bluetooth, ZigBee, and Wi-Fi. These interfering signals can reduce the effective range of the Tablet resulting in dropouts in the curves due to lost data packets. Since boats move, the effective range of the system can change as the distance from interfering signals changes. When dropouts begin to increase, moving closer to the shell can help greatly. These variations in performance are not a defect in the system, but are due to external sources of interference which can come and go. While the Tablet excels at real-time stroke monitoring, the self-record feature of the oars is a useful tool for capturing strokes and analyzing performance without the negative effects of dropouts.

1. Using the Tablet

A. Removing the Tablet Cover

The cover of the Tablet is removable, making it easier to hold the Tablet while using it to observe your rowers' strokes. To detach the cover, lift the front latch and remove the two hitch pins on the rear hinges. To replace the cover, put it back on the Tablet loosely and insert the hitch pins back into the hinges before latching the front latch.

TIP: *Be sure to put the loose hitch pins on the cover hinges to keep them from getting lost.*

B. Turning the Tablet On

Turn on the Coach's Tablet by pressing and holding the **power** button for one second - a short press may not work. The battery/status light will turn green and the display will show the boot process. Booting takes just over one minute. When booting is complete, the "**Scan For Oars**" display will appear.

TIP: *The title of each screen is in the upper left corner of the display.*

C.   *Assigning Oars to Positions*

Turn on all the oars and other devices you want to monitor with a single press of each devices button. All devices should show a solid green light.

On Power-Up, the Tablet will be in the Scan for Oars Mode. The onscreen instructions tell you to press **play/pause** to search for oars which includes other devices.

The Tablet will list all oars/devices it detects by each oar's stickered letter/number along with its customizable name.

The screen will now say "**Assign Oars**" in the upper left corner and "Assigning devices to boat #1" over the detected oar box. Use the **forward** and **back** buttons to scroll to the oar you wish to assign to a seat position.

Assign the highlighted oar or other device in the list to a position (1-8) by pressing the position number buttons along the bottom of the Tablet. Assign a boat accelerometer to the 9th position by pressing **bookmark** on older tablets or, on newer tablets, by pressing the **boat** button just to the right of the rower buttons. Seat accelerometers and oar angle sensors are treated like oars.

NOTE: *If you want the accelerometer to indicate the set of the boat at the catch, you need to assign it to the 9th position.*

When you have assigned all the oars for that boat, press **mode select** to begin displaying curves or press **record** to configure another

boat/configuration. When configuring another boat, all the devices will reappear as options for the new boat. **If you make a mistake, you can deselect an assignment by pressing the button on the position that is incorrect and then assign the correct oar or device to that position**.

TIP: *Place the oars in the boat so that their labels match the seat positions in the boat. This makes it easy to assign the oars to the available positions in the boat, without constantly referring to the letter/number labels on the oars.*

D.   *Working with Multiple Boats (not yet implemented)*

The onscreen instructions on the Assign Oars screen will allow users to set up multiple small boats, each with a combination of up to 8 of eight oars, oar angle sensors, seat accelerometers along with one boat accelerometer per boat. Up to 19 oars/devices can be captured at one time. This means you can run two eights with boat accelerometers at one time or four fours with three boat accelerometers, etc.

When you have finished selecting the oars for your first boat, press to configure a new boat. The message over the detected oar box will now say **record** "Assigning devices to boat #2". Press **mode select** when you are done configuring boats to enter the display mode.

TIP: *Mixing oars and devices between boats will lead to strange results since boats rarely row at the same rate with the same timing. Confine all configurations to the same boat. For example, if you have 8 oars and 8 oar angle sensors, you could configure a boat with 8 oars and two more "boats" consisting of the bow 4 oars/oar angle sensors and the stern four oars and associated oar angle sensors.*

In **Display Mode**, move between boats by pressing the bookmark button on older tablets for several seconds and the boat button on newer tablets. You cannot switch boats while recording.

E.   *Changing Oar Curve Colors*

When entering display mode, the highest assigned oar position is automatically the "**Stroke**" oar and is displayed in red. The Tablet uses the "**Stroke**" oar to determine when the crew has taken a stroke. Since the stroke isn't always rowing, you can change the stroke oar by pressing and holding the button of the new stroke. Release the button when the new oar turns red.

Users can change the appearance of a displayed curve and/or "hide" it by pressing button associated with that curve. In this way, users can easily identify which oar is making which curve, and can isolate different combinations in the boat, i.e., watch just stroke and seven, then stroke and six, then stroke and five, etc., or watch all ports only and then all starboards only.

Pressing an oar's button will cause it to cycle repeatedly between its unique color, off, then black, except for the current stroke oar which cycles between red and off.

F. *The Numbers*

At the bottom of the display, above each oar button, are two values for each active oar. The lower value is the oar identifier and matches the letter and number placed on the oar shaft, at the time of manufacture and programmed into the Oarpod. The personalization software allows this value to be changed.

The number above the oar identifier is the area under the rowing curve and is technically called the **"Impulse"**. It is the integration of the force of the stroke over the time it is occurring. This is not the same as power. To know the power, one needs to know how far the oar is moving while the force is applied. This gets complicated quickly because the effectiveness of the oar moving through the water, in terms of moving the boat, is a function of the position of the oar. The oar moves the boat more effectively when it is perpendicular to the centerline of the boat and less effectively at the catch and finish. smartOar® doesn't measure a rower's power—the erg is better at that. smartOar® does indicate how hard the

rowers are pulling and how long they are pulling as well as how they match up to each other throughout the stroke.

When an Oarpod battery is low, the impulse number is surrounded by a box indicating that the oar needs to be charged.

G. *Changing the Size of the Display*

In **Display Mode** and **Playback Mode**, the size of the stroke on the display can be increased by simultaneously pressing the **forward** and **oar 8** buttons. Simultaneously pressing the **back** and **oar 8** buttons will decrease the size of the curves. Repeat each key press to continue changing the size of the curves. The new size will be in effect for both **Display Mode** and **Playback Mode** until the Tablet is turned off.

TIP: *The change in size will take effect on the next stroke.*

H. *Changing the Display Brightness*

The tablet backlight display is set to maximize visibility in direct sunlight. This can be too bright for early morning rowing. Reduce brightness by simultaneously pressing **back** and **oar 7**.Increase the display brightness by simultaneously pressing **forward** and **oar 7**.

I. Recording and Playback

Press **record** to start recording strokes. The message "recording" will appear in the upper left of the screen. Press **record** again to stop recording. If something memorable happens while recording, you can press the **bookmark** button. In the PC software, you can jump to bookmarked strokes.

While in **Display Mode**, the onscreen instructions tell users they can press and hold **play** (for about two seconds) to move into **Playback Mode**. Here you can select any recorded file for viewing by using the **back** and **forward** arrow buttons to scroll to the desired stroke file.

While in **Playback** you can **pause** the display then use **forward** or **back** to move to the next or previous stroke. You can also turn each oar's curves on/off/black just as in the **Display Mode**.

In playback mode, **FAST FORWARD** the rate the strokes are displayed by pressing and holding the **forward** button for two seconds. You can repeat this several times further and increase which strokes are displayed. Pressing and holding the **back** button will reduce the rate back one step. Repeating will get you back to the base stroke rate.

TIP: *Use the mode select button to move between Oar Select, Display, and Playback Modes in the Tablet.*

I.   *Stopwatch Feature*

A stopwatch feature is activated when **record** is pressed. Elapsed time and Stroke Count are displayed on the top right of the display. When **record** is pressed again to stop recording, the total elapsed time to 100th of a second is displayed along with the number of strokes during the interval. The stopwatch is reset at the start of the next recording. During recording, the 100th of a second is not displayed because the display cannot update faster than once a second.

J.   *Transferring and Deleting Data*

The Tablet saves up to 50 files in memory. If there are already 50 files saved, and you record another, the Tablet erases the oldest file.

To transfer/save files using the thumb drive, just insert it into the Tablet. Regardless of the screen you are in, after about ten seconds, the Tablet detects the thumb drive and the display switches to the **Transfer/Delete** screen.

Use the **back** and **forward** buttons to highlight the desired file in the list. The Tablet has a list of instructions on the left side of the display. Press **play** to copy to USB thumb drive. Remove USB thumb drive and press **mode select** to exit.

NOTE: *The thumb drive must be removed to use the Tablet in other modes. If you don't, pressing Mode Select will cause it to leave then jump right back to the transfer/save screen.*

K.   Reassigning Oars

At any time, use the **mode select** button to move between **Assign Oars**, **Display Mode**, and **Playback Select Mode**. By returning to **Assign Oars**, you can reconfigure boats if desired.

L. Turning the Tablet Off

To turn the Tablet off, press the **power** button. A message will appear telling you to press the power button again within three seconds to complete the process. The intent is to prevent inadvertently turning the Table off at an inopportune time (repeated personal experience).

M.   The Special Button Presses

There are several special combinations of button presses designed to engage special features or reduce the risk of inadvertently deleting files.

<u>Display Size</u> — Increase the size of the displayed strokes in the **Display and Playback Modes** by simultaneously pressing **forward and oar**

8. Decrease the size of the displayed strokes in the **Display and Playback Modes** by simultaneously pressing **back and oar 8**.

Brightness — Increase the display brightness by simultaneously pressing **forward and oar 7**. Reduce brightness by simultaneously pressing **back and oar 7**.

Delete File — To delete a recorded file in the Tablet, first insert a thumb drive into the USB port on the side of the Tablet. After about 10 seconds, the thumb drive is recognized and the list of recorded files appears. Select the file you wish to delete and press the **record and oar 7** buttons simultaneously.

Hard Reset — The Tablet contains a special watchdog timer that engages if the high-level software fails to "tickle" it periodically. There is always some chance that the high-level software can lock up while continuing to tickle the watchdog timer. Concurrently pressing the **back and oar 2** buttons will force a hard reset of the Tablet. Operating systems don't like this so, only use this feature if the Tablet is truly non-responsive, and you have waited at least three minutes.

Hint: *Print this page and use it a s a reference while coaching*

2. Configuring the Tablet

The Tablet has a configuration screen that can be entered from the **Scan For Oars** screen, or the **Assign Oars** screen by pressing the **bookmark** button.

The software versions are shown in the upper part of this screen. There are three "computers" in the box and each has its own version of software.

The oar channel box is the rf channel that the oars use when transmitting data. While the tablet is booting, it is also scanning all the available rf channels for the one with the least noise and interference. After capturing the oars/devices, it moves them to the lowest noise channel and operates from there.

The date boxes and time boxes are self-explanatory. **Play/pause** jumps from box to box, and the **back** and **forward** buttons change the values.

The threshold multiplier field affects the sensitivity of the stroke detector. It is probably best to leave this set to "2", although the curious may certainly play with the setting.

If you press the **record** button to exit, the changes will be saved.

If you press the **mode select** button to exit, the changes **won't** be saved.

3. The VGA Output Connector

The VGA Output Connector is a standard DB15 female connector for connecting to an external monitor. Many large-screen TVs can accept VGA signals. This makes the Tablet useful for larger audiences.

If you have an indoor tank that works with standard oars, there are many possibilities for displaying strokes on a large monitor, so that the rowers can see each other's force curves. They can work to match up their strokes including, curve shape, catch and release timing, or just "go after" each other—seeing who can outperform the others while still rowing well.

4. Charging and Care of the Tablet

The Tablet is not truly waterproof. There is an air pressure equalizer on the front of the Tablet that can let water in if submerged. The connectors and front panel are watertight so rain shouldn't interfere with tablet operation.

The display screen has special coatings that reduce glare from sunlight. It should be cleaned carefully with a lens cleaner for plastic lenses or LCD TV screens, and it is very important that the cleaning cloth is guaranteed not to scratch plastic. Some paper products can have bits of wood residue in them, and can scratch the display screen.

The batteries in the Tablet are good for several hours of usage. When the Battery Level indicator in the top right of the screen no longer says "OK", immediately wrap up the session and recharge the Tablet using the supplied charger.

Any questions? We're here to help. Call us at 303.570.6749 or email us at sales@smartoar.com.

Happy rowing!