



**Regularity Race Stopwatch**  
**by DIGITECH**  
**firmware > 3v00-beta01**  
English

DIGITECH S.r.l.  
Via Stazione di Prosecco, 29/d  
34010 - Sgonico (TS) – ITALY  
Tel.: +39/040/280 990  
Fax: +39/040/833 0561  
E-mail: [info@digitechtiming.com](mailto:info@digitechtiming.com)  
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# Introduction

**BORA-S** is a 1/1000<sup>th</sup> of a second stopwatch specifically designed for regularity race management.

It is the evolution of the earlier **BORA** model.

Up to 250 events can be programmed, such as Start Chronometric Test (SCT), Chronometric Test (CT), Theoretical Chronometric Test (TCT) and Time Control (TC), Restart (RS) and daily (START) events, Neutralization (NT) and Repeated Trials (RT).

The device has a permanent memory to store programmed settings also when it is turned off. Trials can be entered with travel and crossing times, also greatly in advance, at ease and without the pressure of the starting line.

The large-sized graphic display and the keyboard with large numeric keypad are both backlit for use in the dark at night or in poor lighting conditions.

Two separate keys and two headsets can be used at the same time to allow driver and co-driver to split when crossing the line and then choose the most appropriate detection (**DUAL-IN**® function).

The **AUDIO-CALIPER**® function generates beeps at fractions of a second for perfect synchronisation when crossing the line.

The internal clock may be synchronised in traditional way using the key input or by using the internal GPS receiver for easy synchronisation to UTC time to the millisecond. Once synchronised, the closing of the synchronisation contact at the 0 second of each minute can be used to synchronise other stopwatches via the input line.

The *mini-USB* connection can be used to download past trials to a PC and to upgrade the instrument using a specific program to solve any arising software issues.

The race programming can be easily transferred or downloaded from another **BORA-S** via Bluetooth, and consequently without needing to connect using a wire.

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## Connectors

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### START/SPLIT inputs



**BORA-S** has two external inputs (**IN\_A** and **IN\_B**) to START/SPLIT the count-down by means of two **PB5/JG-A** keys. This allows to electrically synchronise the main clock by connecting it to a synchroniser.

*The key to be used as primary input can be chosen in the “Setup” menu.*

### Headset outputs

A headset (of the CD player type, or the like) with 3.5 mm jack connector can be plugged into the specific socket to hear the beeps generated by the instrument also in noisy surroundings.

*The internal speaker will be excluded if even one headset is plugged in.*

### USB port **PC**

A **Mini-USB** port can be used to connect the **BORA-S** to a Personal Computer. This connection can be used to upgrade the instrument firmware or to upload/download programming and past trial results by means of the specific program.

*Upgrading is necessary, when available, to improve the stopwatch performance and correct software errors (see “Firmware Upgrade” chapter).*

*This connector can be used to power the stopwatch using emergency power systems for mobile phones.*

*This is very useful on long races in the dark during which backlighting, which uses a great deal of power, stays on for the whole time.*

**ATTENTION:** *do not use the car cigarette lighter to power the device. Due to tension peaks while turning on the engine or the lights, BORA-S may switch off.*



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## **In/Out port** ↑↓

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The 3.5mm stereo jack is a *RS232* equivalent to the *USB port*.

It may be used instead of a UBS port.

***The In/Out port will be deactivated when the instrument is connected to a PC via the USB port.***

## **Out\_Sync port**

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When the **BORA-S** is in “*Clock Check*” mode, a closing contact which is operated at the 0 second for each minute is available on this port.

It can be used to synchronise another stopwatch provided with input line with the **BORA-S** internal clock.









While in the race, a closing contact is activated when, during a countdown, a push-button is operated, or, if the automatic countdown is activated, when the countdown reaches 0.000.










This is helpful to activate external devices perfectly synchronised with the internal countdown.

# Keypad

The keypad is of the membrane type with keys in relief. It is completely water-proof and backlit (backlighting can be enabled in the “Setup - Display” menu.

The functions of each key are illustrated briefly below.

	<p><b>[ON/OFF]</b> Press for longer than two seconds to turn the instrument on.</p> <p><b>[SHIFT]</b> Touch once to activate the <i>SHIFT</i> function, show the “<b>Status Bar</b>” and enable the second function of some keys.</p>
	<p><b>[UP]</b> On a list, this moves the cursor upwards. When setting a time, it increases the blinking selection.</p>
	<p><b>[DOWN]</b> On a list, this moves the cursor downwards. When setting a time, it decreases the blinking selection.</p>
	<p><b>[VIEW]</b> This changes the view on the display switching from LIST and EDIT mode.</p>
	<p><b>[INSERT]</b> In LIST mode, it is used to insert the various trials. In RUN mode, it is used to change the duration time of the shown trial. In trials with given time, it is used to change the value.</p>
	<p><b>[ESC]</b> This is used to exit a setting without changing its content or deleting the current setting.</p>
	<p><b>[ENT]</b> This confirms the selection of the current setting. In “Clock Check” and RUN mode, this simulates an external button for splitting the time.</p>
	<p><b>[BACKLIGHT]</b> This selects the type of display backlighting.</p> <p><b>[CONTRAST]</b> With the <i>SHIFT</i> function on, it enables display contrast adjustment.</p>

	<p><b>[SPEAKER]</b> This turns countdown beeps on and off, allowing to select headset only or headset and speaker.</p> <p><b>[VOLUME]</b> With the <i>SHIFT</i> function on, it is used to adjust the headset volume.</p>
	<p><b>[FLAG]</b> If a “race” is programmed, in RUN mode this shows the countdown of the first incomplete trial.</p>
	<p><b>[SWAP]</b> With countdown running, this is used to select which input (<i>IN_A</i> or <i>IN_B</i>) to use to start the countdown.</p>
	<p><b>[TIME -]</b> With countdown running, this is used to <b>decrease</b> the currently expiring trial time by the amount programmed in the “Race/Delta-Step” menu.</p>
	<p><b>[TIME +]</b> With countdown running, this is used to <b>increase</b> the currently expiring trial time by the amount programmed in the “Race/Delta-Step” menu.</p>
 	<p><b>[PAD]</b> Numerical keypad for various settings.</p>
	<p><b>[1]</b> In RUN mode, by pressing this button, the sound is set alternately from automatic (sound starts from less than XX seconds) to off (no sound emission) and vice versa.</p>
	<p><b>[2]</b> In RUN mode, if the running stage is concatenated to another one, by pressing this key the current view of “duration” and “error” is replaced by the number and duration of the next stage.  This will be shown as long as the key is pressed.</p>

<b>3</b>	<p><b>[3]</b></p> <p>In RUN mode, press this key for 2 seconds so that the inputs will be disabled only in the next series of CTs.</p> <p>The activation is signalled by a message, which is activated for 2 seconds when you press the key, and by the writing "No IN", which replaces the CT start times.</p> <p>To deactivate it, press this key again without waiting.</p> <p>It stays active in the next series of CTs, which are connected to each other. This is deactivated at the end of the series, when there is no trial connected to the last trial in the series.</p>
<b>4</b>	<p><b>[4]</b></p> <p>In RUN mode, hold this key to see the end time of the next TC instead of the start time.</p> <p>The dashes indicate that there is no programmed TC or that the TC end time is not available because there is no start.</p>
<b>5</b>	<p><b>[5]</b></p> <p>In RUN mode, hold this key to see the calculated end time of the running trial instead of the start time. The dashes indicate that the end time is not available because there is no trial start.</p>
<b>6</b>	<p><b>[6]</b></p> <p>In RUN mode, it enables the acoustic countdown, even if the countdown is not running. Just by pressing one of the push buttons, the acoustic countdown will switch to the set mode. The same will happen if the [6] key is pressed again.</p>
<b>7</b>	<p><b>[7]</b></p> <p>With the countdown running, hold this key to see on the two bottom lines of the display the previous trial error.</p>
<b>8</b>	<p><b>[8]</b></p> <p>With countdown active, hold this key to see, on the two bottom lines of the display, either the start times of the running countdown or the errors of the previous countdown (if present). If the exit times are not present, only "In A" and "In B" will be shown.</p>
<b>9</b>	<p><b>[9]</b></p> <p>In the "RUN" mode, it toggles the view either of the entry time of the stage of both push buttons, or the error of either push button regarding the previous stage.</p>

**[DOT]**

In time setup, to switch between HOURS – MINUTES – SECONDS – MILLISECONDS groups. With countdown running, it allows to set the calculated time using the start time and the trial duration as timing. This is useful if timing with buttons is not available.

## ***External button simulation***

In situations in which splitting is needed to determine a crossing, the [ENT] key can be used to simulate the action of the external button.

***ATTENTION: This function must be used with care: keypad scanning is slower than the external button check and consequently the measured times may be distorted.***

## ***SHIFT function***

Some keys have a second function which corresponds to the second symbol and/or writing under the main function.

This function is activated by briefly touching the [ON] key.

When activated, the word “SHIFT” will appear on the “Status Bar” on the bottom of the display (last two lines on the bottom).

Press [ON] again or press a key which does not have a second function to deactivate the function and to restore the previous display.

## ***Headset volume***

The headset volume can be adjusted according to needs.

Press [SHIFT] and [SPEAKER]: the status bar will be replaced by the volume indicator on the display.

Press [UP] and [DOWN] to change the level. Press [ENT.] to confirm the setting and exit. Press [ESC.] to exit without changing.

***ATTENTION: The volume adjustment is in common to both connected headsets.***

## ***Display***

**BORA-S** has a 240 x 64 pixel high-contrast transfective display visible under direct sunlight and in dark environments by turning the backlighting on.

## ***Backlighting***

The display can be backlit to use the stopwatch also in poorly illuminated environments.

onments or at night. Press the [BACKLIGHT] key to select one of the three possible backlighting conditions (see “Backlighting”).

## Contrast

Press [SHIFT] and then [BACKLIGHT] to adjust the display contrast. The status bar will be replaced by the contrast level indicator.

Press [UP] and [DOWN] to change the level. Press [OK] to confirm and exit the adjustment. Press [CANCEL] to exit without changing.

## Status Bar

When the [ON] key is pressed, the stopwatch status bar will appear on the bottom of the display. The bar shows some device states, as described below.

Press the [ON] key again to deactivate the status bar.



### Backlight status:

ON	Backlight always on
OFF	Backlight always off
When needed	Automatic backlight

### Countdown status:

▶On	Internal speaker always on	Speaker countdown beeps always on
▶Off	Internal speaker off	Speaker countdown beeps off
▶-105.	Internal speaker automatic	Speaker countdown beeps on automatically
^On	Headset always on	Beeps only headset always on
^Off	Headset off	Beeps only headset always off
^-105.	Headset automatic	Beeps only headset automatically

### Battery status:

	Batt. OK	Battery charge OK
	Batt. LOW	Blinking symbol: very low battery charge. Every 30 seconds you will hear an acoustic signal.

This signal is deactivated when the trial countdown reaches one minute. It is activated again after the zero.

**Second function:**

*SHIFT*

This indicates that the second function of some keys is active

**Main clock:**

\*12:24:55

^ *correction on*

The main clock is set to seconds with applied time correction indicated, if any (symbol blinking)

**Contrast and volume adjustment**

During display contrast or headset volume setting, the status bar will be replaced by the level indicator of the value being programmed.

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# Starting off

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## ***Batteries***

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To insert the batteries, remove the flap on the back of the instrument by operating the lever with a small screwdriver.

Insert four AA batteries respecting the polarity shown on the bottom of the compartment.

Check that the batteries are fitted correctly, then close the lid. Make sure that the lever clicks correctly. Push it with a small screwdriver in case of doubt.

## ***Turning on***

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To turn the instrument on, press the [ON] key until the word "**BORA-S**" appears. Release the key. The instrument will view the main menu (Start Menu).

## ***Turning off***

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Select "*Instrument Off*" in the menu to switch the instrument off.

The instrument will save the settings and switch off.

## ***Emergency shutdown***

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The instrument can be shutdown without removing the batteries if it freezes because of a firmware error. Simply hold the [ON] key pressed until the instrument switches off (approximately 6-7 seconds).

The last settings will not be saved.

## ***Backlighting***

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The display can be backlit to use the **BORA-S** also in dark environments or at night.

Repeatedly press the [BACKLIGHT] key to select one of the three possible backlighting conditions:

**Always**      Backlighting is always on.

**When needed**      Backlighting is turned on when any key is pressed. It remains on for 5 seconds and is turned off automatically.

**Off**              Backlighting is always off.

The backlighting state is shown on the status bar.



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## Countdown beeps

---

**BORA-S** can emit one beep a second during the trial countdown to the end of the trial.

Repeatedly press the *[SPEAKER]* key to choose one of the following settings:

- |                                      |  |
|--------------------------------------|--|
| <b>Sound always active</b>           | A beep is heard once a second during a programmed event countdown.   |
| <b>Sound automatically activated</b> | A beep is heard once a second during a programmed event countdown starting from the set “Countdown” value (see “Setup” paragraph). Beeping will stop when the trial has expired. |

***To disable the sound you have to select “Menu / Setup / Sound” and choose “Beep off”.***

***ATTENTION: every time the device is either turned on, a new race is programmed or the line inputs are cleared, the sound is set to “sound automatically activated”.***

The type of countdown is displayed on the status bar.

***The instrument generates the sound in the headset only (and not in the internal speaker) if a headset is connected.***

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# Menus

The operative parameters of the instrument are managed by means of simple menus.

To select the required item, point to it using the [UP] and [DOWN] keys and press the [ENT] key to confirm or, more rapidly, press the key corresponding to the item directly on the numeric keypad.

Press [ESC] to exit from a menu.

**BORA-S** has two main menus: **Start Menu** and **Race Menu**.

The *Start Menu* appears when the instrument is switched on and the *Race Menu* is available after starting a race by pressing the [MENU] key.

---

## Start Menu

The Start Menu is shown as soon as the stopwatch is turned on.

The following items are available:

- **1 Set Time:**  
This is used to set and synchronise the main clock.
- **2 Race:**  
This is used to continue the race previously saved in memory or to start a new race.
- **3 Setup:**  
This is used to access some stopwatch parameter programming submenus.
- **4 Instrument off:**  
This is used to switch the instrument off.
- **5 Information:**  
This displays current race programming data.
- **6 COACH-pro:**  
training function with our COACH chrono/display
- **7 Default values:**  
Sets all the settings to default values, and clears and checks all the race data (see Appendix for default settings).
- **8 TRAINING**  
This option is meant for training, two input lines are used. You can choose between “Continue” or “Lap” mode. The temporization of the B input is automatically set to 2 seconds: setting such a temporization, the rear wheels on the sensor will not be detected when you connect a pressure sensor or a radio device to the input line.

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## ***Race Menu***

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The Race Menu can only be called up in Race mode, that is after having selected “*New Race*” or “*Continue Race*” in the Start Menu.

Press [*MENU*] to display the following list on the stopwatch:

- **1 Set Clock:**  
This is used to check and correct the main clock.
- **2 Edit:**  
This is used to start a new race, delete the current timing or select a given race and to program some parameters of the race itself.
- **3 Setup:**  
This opens the stopwatch parameter programming submenus.
- **4 Instrument off:**  
This is used to switch the instrument off.
- **5 Information:**  
This displays either current race programming data or start time, end time, programmed duration time and error of every single trial.
- **6 Coach-pro:**  
training function with our COACH chrono/display.

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## Set Clock

The main clock must normally be set before the race. The **BORA-S** starts from 0.00 when it is switched on.

***It is important to note that the clock does not need to be set to program the stopwatch only. The exact time is only needed during the trial.***

Select “Set Clock” in the menus to check, set, synchronise and add a possible correction to the main clock.

---

## Setting

The clock can be set/adjusted in two different manners according to the available instruments:

- 1 *Manually*, by setting the clock and starting it by hand, then checking synchronisation with another stopwatch and correcting as necessary.
- 2 *Automatically*, using the integrated GPS receiver.

---

### Manual setting

In “Set Clock”, press [MENU] to open the setting type selection menu.

Select “Manual”: the new time request will appear.

Set current time plus one or two minutes: the clock can only be actually started later.

Set the blinking digits with the numeric keypad.

Press [DOT] to confirm the blinking selection.

Set the desired time and press [ENT] to confirm the setting and go to the “Ready to Start” step.

At the exact time signal, start the clock by pressing the external button connected to the Line input.

The stopwatch goes back to “Clock Test” after having started the clock.

---

### Synchronisation check

To check that the clock is actually synchronised, **BORA-S** must be split by actuating an external input with a key at the same time as the SPLIT key of another sample clock.

This will immediately shows discrepancies between the two clocks.

When the error is known, simply press the [MENU] key again and select “Trimming” (please see below).

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## ***Synchronisation from GPS***

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The instrument will switch on the GPS receiver when this function is selected. Data reception from the available satellites will start after the first GPS initialisation step.

### ***Satellite reception***

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Reception consists in searching for satellites in the visible portion of sky and then acquiring information needed to determine the position and synchronisation of the internal clock.

This time is variable according to the data already present in the module and the reception start time according to the data transmitted by the satellites.

The satellites transmit a data stream lasting 12.5 minutes.

This stream contains the almanac, the ephemeris and UTC time information. Furthermore, every six months (on January 1 and July 1), the International Earth Rotation and Reference Systems Service (IERS) may decide to add a second to UTC time to synchronise it with Earth rotation.

In order to be able to receive the correct time, the GPS receiver must be able to receive the notification of this change. In order to do this, it must stay on for at least 12 minutes and a half.

For this reason, a -12.5 minute countdown will appear after the first switch-on or if the batteries are removed for longer than 1 minute and consequently GPS information is lost, or if the instrument is switched on after July 1 or January 1 to indicate the reception of this information.

When it is switched on again, the module (which stores the received information also when the device is off) will require less time to make internal clock lock on because it already has an assumption from which to start.

***In case of poor or no reception from satellites, the instrument will report the problem after 5 minutes and advise to go to a location with better visibility of the sky.  
After having changed position, press [ENT] to resume reception.***

### ***Internal clock lock on***

---

After having acquired all the necessary data, the module locks the internal clock of the instrument onto the UTC time provided by the satellites.

A sound is heard when the clock locks on.

The GPS system transmits UTC time but the synchroniser must be adapted to use local time, which depends from the location where the device is used, for correct use. So, an offset to be added or subtracted from UTC time must be set to obtain the correct local time.

---

To do this, after locking, the instrument will display the current offset value with respective sign and resulting local time.

The hour group will blink indicating that the change is possible.

Adjust the offset value to obtain the correct local time using the [UP] and [DOWN] keys.

Programming is possible within a range of “-12:00” and “+12:00” hours.

Press [ENT] to confirm programming.

Simply press [ESC] to exit without saving changes.

After confirmation, the offset needed to obtain the local time is permanently stored in the memory of the instrument so that it will be ready the next time it is switched on.

***BORA-S does not switch to summer saving time and back automatically. This means that the time must be adjusted by manually setting the offset.***

---

## DCF77 Synchronisation

Some races use the DCF77 standard instead of the UTC as official race time.

Once the **BORA-S** is synchronised with the GPS system, you can choose if the internal clock has to be locked either onto the UTC or onto the DCF system. If you choose the DCF system, the device sets automatically a **-74mSec** correction: this is signalled by a blinking asterisk next to the time on the status bar.

---

## Trimming

It allows to trim the time adding or removing a certain amount of time.

To set the value, use the same procedure as in time setting.

To add the set time to the clock, use + with the [TIME +] key.

To remove the set time, use the – with the [TIME -] key.

By pressing [ENT] you exit confirming the correction.

By pressing [ESC] you exit without saving the correction.

The activated correction is indicated by a flashing asterisk before the clock that appears at the bottom right of the status bar.

***To remove the correction, just set a time with value 0.00.***

---

## Synchronisation on Out\_Sync

In “Clock Test” you can generate an impulse on the “Out Sync” port (closing contact) in order to start another stopwatch synchronously.

Press [MENU] and select “Out Sync” to enable the impulse generation.

The following options are available:

---

1 Min.: the port is operated at the beginning of the second "0" of every minute

1 Sec.: the port is operated at the beginning of every second.

Off: the port is disabled.

The default value is "1 Min."

---

# Setup

This opens a list of sub menus for programming the operative parameters of the stopwatch.

The selections made in this menu are saved in the permanent memory and consequently maintained also when the device is off.

The following submenus are available:

## **1 Display**

---

Some parameters related to viewing on the display can be programmed here.

### **1 Key Light (Yes)**

---

This enables/disables keyboard backlighting on the display.

It is possible to choose between four backlight brightness levels, according to your needs.

### **2 LIST view (Large Font)**

---

In LIST mode, this is used to plot the race using large characters (up to 4 lines) or small characters (up to 8 lines).

### **3 Language (English)**

---

This is used to select the language for displaying texts and information of the stopwatch user interface.

## **2 Sound**

---

This is used to program some parameters related to sound emission.

### **1 Beep from -xx Sec.**

---

This is used to select from which second to start the countdown beeps and view in large digits during the countdown the time before the end of the trial.

**The minimum programmable value is -3 seconds. The maximum value is -59 seconds.**

### **2 Key\_Tone (Yes)**

---

The beep sound when you press a key may be annoying, particularly during programming.

Select this option to enable key sounds or not.

Select "Off" to turn off sounds generated when the keys are pressed or in case of programming mistakes. Select "On" to restore.



---

*The countdown beep state is not affected and depends on the programming selected by means of the [SPEAKER] key.*

---

### **3 Break\_Sec in x pps**

---

The **Audio Caliper®** function can be used to program beeps at fractions of a second during countdown beeps.

The following are available:

*1 beep per second:* no beeps within the second

*2 beeps per second:* one beep 1/2 of a second

*3 beeps per second:* beeps at 1/3 and 2/3 of a second

*4 beeps per second:* beeps at 1/25, 1/5 and 1/75 of a second

### **4 Break\_Sec from -xx Sec.**

---

This allows to set from which second to start the **Audio Caliper®** function during the countdown to the end of the trial.

The maximum programmable value corresponds to the set countdown beeps.

The minimum value is 1 second.

### **5 Beep off**

---

It turns the countdown beeps off.

This is disabled when you turn the device on, create a new race or cancel all split times of the current race: in this case, the countdown beeps is set to “Beep from xx Sec”.

## **3 Inputs**

---

Some parameters related to the **Dual In®** function can be programmed here.

### **1 Primary input: In X**

---

This selects the primary input the relative pulse of which is used as reference to determine the error in a trial and the start of a possible concatenated trial.

### **2 Window**

---

This sets the number of seconds before going to the next trial when an external button is pressed. It is used to swap the inputs.

### **3 View**

---

Allows to customize, in the RUN mode for the inputs, what to show, choosing between the entry time of the running stage or the error of the previous stage (if it exists).

By choosing “Split”, the time of both inputs of the incoming stage will be shown.

By choosing “Error”, the error of each input of the previous stage will be shown.

If the previous stage was of the IPC kind, the split time of each input will be

---

shown.

If the countdown is running, by pressing [9] it is possible to toggle between the views.

#### **4 Mode:**

---

If **DUAL-IN®** is enabled, you can choose how to operate the device if the *non primary* input line is activated before the primary input line during a special stage.

**Mode Immediate:**

if the *non primary* line is activated before the *primary*, the device passes to the next countdown, showing and sounding the new countdown.

When the *primary* line is activated, the device moves to the next countdown.

**Mode Attended:**

if the *non primary* line is activated before the *primary*, the device stores the input but does not pass to the next countdown, still showing and sounding the running countdown.

When the *primary* line is activated, the device passes to the next countdown.

If the primary line is not activated, then the device will pass to the next countdown only after the time value set in the "Window".

#### **5 In B for Race/Training:**

---

Allows you to change the temporization value of the B input line, choosing between Race and Training.

**Race mode:**

Temporization is set to 0.5 Sec.

This way there is no chance of bouncings in the hand switch, but it is still possible to have quick splittings

**Training mode:**

Temporization is set to 2 Sec.

This is meant for training, when you connect a pressure sensor or a radio device to the B input line. With a 2 Sec temporization, the rear wheels on the sensor will not be detected.

#### **6 Out Sync.:**

---

Allows both, only one or none of the input lines to give an impulse on the **Out\_Sync** port.

These options are available:

**Disabled:** neither line gives an impulse

**In A:** only A line gives an impulse

---

**In B:**            only B line gives an impulse

**In A + B:**    both lines give an impulse

### ***7 Automatism on In X:***

---

This option is available only if the option “*Automatic TC*” or “*All Automatic CD*” is activated. It allows to select which of the lines will be automatically activated to pass to the next countdown, therefore using the theoretical passing time.

## ***4 Wireless***

---

Enables or disables the wireless data connection with another ***BORA-S*** to copy a race, or to the wireless screen ***ECHO-S***.

---

# Information

---

## ***When switched on***

This shows the current race programming data.

The firmware version installed on the instrument and the serial number are shown on the top.

The number of programmed, expired and free events is shown in the lower part. The used quantity is shown for each available event type.

Press [ESC] to exit.

---

## ***During the race***

Three options are available:

---

### ***1 Race info***

This shows all the loaded race data.

---

### ***2 Trials info***

This shows a summary of all the events in the loaded race.

It is possible to choose between three sheets:

**First sheet:**

“start time” and “finish time” of each trial are shown

**Second sheet:**

“during time” and split error of each trial are shown

**Third sheet:**

errors on both inputs are shown

To toggle between the sheets use [VIEW] key.

Use [UP] and [DOWN] to scroll the trials.

Use [ESC] to go back to race.

Use [ENT] to enter the “Errors info”, which shows the average error up to the selected trial.

---

### ***3 Errors info***

This shows the average split error of all the trials (*All*), of the chronometric tests (*CT*) or of the time controls (*TC*).

It is possible to choose between two sheets:

**First sheet:**

“AVG”: shows the arithmetic mean of errors

“+/-”: shows the trend of errors

**Second sheet:**

---

“-”: shows the average of the “early” errors with the total of the “early” trials  
“+”: shows the average of the “delay” errors with the total of the “delay” trials

***In both sheets, if the average value is over 9.999 seconds, this will be shown as “>9.999”.***

To toggle between the sheets use [VIEW] key.

Use [ESC] to go back to race.

## **4 Training info**

---

This shows the average of the “early” and “delay” errors , and the total average of both lines separately.

Two windows are available with the [VIEW] key, one showing the **CD** stages and one for the **TC** stages.

The first column refers to ***In\_A*** line, the second to ***In\_B***.

This is useful if a radio device is connected to one of the lines while the other is connected to a hand switch.

---

# The Race

Select “New Race” or “Continue Race” on the Start Menu to start race mode and new event programming.

***BORA-S has got a permanent memory (data remains stored also when the stopwatch is off) and for this reason it may be programmed conveniently in advance with respect to the race, even days or weeks ahead.***

---

## New Race

This consists in deleting all trials stored in the device memory to start programming a new race.

Press [ENT] to confirm deletion and go to the Race function. Press [ESC] to go back to the initial menu without changing anything.

---

## Continue Race

This consists in using or programming previously inserted trials.

Also in this case, press [ENT] and [ESC] to confirm or cancel the request.

---

## Viewing mode

Select one of the two previous options: the stopwatch will go to Race mode and a “LIST” type viewing mode:

**BORA-S** can display stored data in three different modes allowing different operations.

1. List (LIST)
2. Detail (EDIT)
3. Countdown (RUN)

Use the [VIEW] and [FLAG] keys to change the viewing type.

Press the [FLAG] key to always go to RUN mode.

Press the [VIEW] key to alternatively switch between LIST and EDIT mode.

---

## LIST mode

LIST mode shows an overview of the inserted events, showing in descriptive manner the beginning of each single trial and displaying the correlations between the various trials (horizontal dashes, thicker) in graphic mode by means of vertical lines which join them.

Press the [UP] and [DOWN] keys to scroll the list up and down.

Press “SHIFT” and [UP] to go to the beginning of the list.

Press “SHIFT” and [DOWN] to go to the end of the list.

---

Point to an event using the left side indicator and press [ENT] to enter EDIT mode of the concerned event.

***ATTENTION: Events can be inserted or deleted only in these modes.***

## ***EDIT mode***

---

The details of a single event are shown in the EDIT mode.

The start time or link to a previous trial and its duration time can be set in this mode. The crossing time can also be set, if available.

A theoretical crossing time is automatically calculated in case of events without crossing time by adding the start time and duration time.

Press [VIEW] to go to LIST mode.

## ***RUN mode***

---

RUN mode is used during the race.

The countdown before the end of the current trial is always shown (Time Trial and Checkpoints).

The delay is shown if the end of trial time has elapsed.

***To enter RUN mode, press [FLAG] in LIST or EDIT mode.  
The stopwatch will automatically point to the first available active trial.***

---

## ***Event addition (LIST Mode)***

---

The first step before starting a race consists in programming the events.

Events are inserted in LIST mode.

At this point, press [INSERT] to open the “Add Trial” menu where you can select the required item.

***ATTENTION: Use the [UP] [DOWN] keys to point to the event immediately before the insertion point in order to add a new event between two existing events.  
For example, to insert a trial between CT 3 and CT 4, point to CT 3, and then press [INSERT].***

---

### ***Existing trial types***

---

The following trial types are available:

**CT:**

(**C**hronometric **T**est): all trials, the start of which is freely chosen by the competitor. In case of free input, a **SCT** type event with the same number as the newly created **CT** event is generated.

**TC:**

(**T**ime **C**ontrol): this refers to the official race schedule checkpoints for which one whole minute is available for crossing (**BORA-S** shows “Crossing now...” for the entire minute).

**NT:**

(**N**eu**T**ralization): used in Sport Regularity between a **CT** and **TCT**

**TCT:**

(**T**heoretical **C**hronometric **T**est): the crossing of which is set at a specified time.

**START:**

this is the day starting time of a stage. Only up to nine of these events can be inserted with sequential, non-programmable ID. This type of trial can only have a theoretic time. It works only as separator between trials if it is not set.

**RS:**

**Restart:**suspension within a stage.

This is similar to START but with the possibility of setting an ID number up to 999.

**SCT:**

**Start Chronometric Test:** it is the start of a **CT**

**RT:**

Repeated Trials

*Available only in the “Series of...” sub menu.*



---

It is used in those track trials, where the first lap is meant to memorize the time for the next laps.

Programming a series of **RT**, the device automatically generates, before the series:

**SRT: Start Repeated Trials**

**RTL: Repeated Trial Lap**; this is the first lap when the devices memorizes the lap time for the next laps. It starts from 0.00 and goes up from the moment the line is activated. Once the lap is over, and the line is activated again, **BORA-S** stops counting up and stores the time to the next laps, immediately starting the countdown of the first **RT**.

### **Series of...**

it is a quick way to insert many trials of the same kind. You can choose between **CT, TC, TCT, RT**.

We suggest you to try this option, as it allows to save a lot of time while programming the race; all you need will be to follow the requests on the display.

### ***Connections between trials***

---

The various trials may be connected to each other. There are three types of connections between trials:

- 1) Start at "SET TIME" (Race type). The trial is not connected to anything else in this case: the starting time is specified directly.  
A typical use is in the aforesaid theoretical start trials, i.e. trials in which there is no timing device on the trial starting line (no pressure switch or photocell, only a timekeeper who says "Go"). In this case, starting at a fixed time is assumed, regardless of the real starting time.
- 2) Start from "REAL END OF". This is a typical case of concatenated time trials: each trial ends when the previous trial is actually completed. In this case, the stopwatch will assume the previous trial arrival line split as start of trial. The trial type can be changed to SET TIME and entered as start of the next trial if the crossing time measured by timekeepers is available after the crossing. This eliminates split inaccuracies.
- 3) Start from "THEORETICAL END OF". this is the typical case of checkpoint trials. This is the case of races in which you need to make up for lost time if you are late at a checkpoint so that you arrive at the next checkpoint on time.

### ***Active/non active trials***

---

The stopwatch identifies two trial types to determine the first trial to be managed when opening RUN mode by pressing the **[FLAG]** key: active and not active.

Active trials are those which do not have an end time, are not managed by the user because the crossing splitting is missing or there is no manual setting.

Non active trials are those with an end time managed by the user and have a split-

---

ting or manual setting.

A non active trial is identified by the symbol “**x**” which appears close to its name (in the top right).

The end time must be deleted to switch a trial from non active back to active.

## ***Event editing (EDIT mode)***

---

To edit the details of an event, select EDIT mode by pressing the [VIEW] key or by pressing the [ENT] key.

From this point of view, the following fields are displayed according to the trial type:

**From:** (under the trial name): in case of connected trial start contains the type and trials to which it refers.

**Start:** (first line): start of trial time. In case of connected start, this is the end of the trial to which it refers.

**Time:** (second line): duration time of the trial.

**End:** (third line): split time of finish line crossing or theoretical calculated time.

**Err.:** (fourth line): In case of split, advance and delay with respect to set time.

**In A:** split start time of trial on input A.

**In B:** split start time of trial on input B.

Press the [UP] and [DOWN] keys to point to the field to be edited and press [ENT].

After confirming the editing, the stopwatch will recalculate the times and display the new data.

Editing the “**From:**” field will be used to change the type of connection and the trial to which it refers.

The “**Start:**” field may only be edited if the trial type is with set or theoretical start time.

Press [SWAP] to change the trial start time selecting the timing of the two inputs.

Editing the “**End:**” field allows to set the real crossing time determined by time-keepers, if available.

The “**End:**” field is also used to delete the split time making it an **active trial** again.

To go to the next or previous trial, simply enable *SHIFT* and then press [UP] or [DOWN]. The instrument goes to the new event always on the same field.

---

## **Event deletion (LIST Mode)**

---

Open LIST mode to delete an event programmed by mistake or incorrectly positioned. The list of trials will appear.

Point the selection cursor onto the event to be deleted, press [ESC]: the stopwatch will ask if you want to delete the selected event.

Press [ENT] to confirm and delete it permanently. Press [ESC] to exit without making any changes.

***If the trial you want to delete is used as start of one or more trials, a warning will appear informing you that it cannot be deleted.***

***To delete a series of connected trials, you have to start from the last one going upwards; by doing this, there will be no troubles caused by the reference of the trials.***

---

## **During the race (RUN mode)**

---

As mentioned, press the [FLAG] key to start race mode.

The stopwatch searches its memory and points to the first active event (not expired).

The following information is shown on the display:

Top left: type and number of the selected event.

In the top centre, type of connection and trials to which it refers.

In the left centre, offset added to trial time set using the [TIME+] and [TIME-] keys.

In the right centre, the current trial time.

In the centre, indication of time before reaching the finish line.

In the lower part of the display, the timing recorded to start the trial with indication of the one currently used for calculating the countdown, or the error of the previous trial for both inputs (see "Setup-Inputs-View").

Use the [UP] and [DOWN] keys to go to the next/previous trials.

***During the countdown, press [7] to replace the trial entrance timing with the previous trial error.***

---

## **Warnings**

---

**BORA-S** will beep once at one minute and thirty seconds before the countdown

---

zero.

The last seconds are articulated one by one according to the programmed countdown beep.

***ATTENTION: the warning and last second articulation must be enabled to be heard (see “Beep countdown”).***

The countdown digits will appear larger during the last seconds:

***The seconds from the final count can be edited at any time (also during the race) by opening the Race menu and selecting the “Setup” item.***

---

## ***Trial change***

Splitting on the finish line automatically switches **BORA-S** to the next event.

***ATTENTION: This means that splitting is always needed to go to the next trial.***

Once the countdown reaches zero, an indication of the “Delay” time will appear on the display: this is essential if you are actually late.

---

## ***Trial change on START***

If a **START** trial is stored with set expiration time, when the countdown reaches 0 it is possible, within the next 3 seconds, to split the time to move to the next trial.

Otherwise, after 3 seconds, the device will automatically move to the next trial.

---

## ***No splitting (calculated time)***

If you forget to split the stopwatch when you cross the finish line or if the external button is not working, the stopwatch can be instructed to use the theoretical crossing time, that is the time calculated using the actual start time and the theoretical duration time of the trial.

To do this, press [DOT] and then [ENT].

In this way, **BORA-S** will consider the “calculated time” as an actual splitting of the key determining a net time of 0:00 and passing automatically to the next trial.

***ATTENTION: This mode will not work if the trial does not have a start time (dependent from another trial which is not yet managed) and for SCT (Start Chronometric Test) events.***

---

## ***Timing error***

Splitting in advance by mistake at any time, and consequently starting the next trial, can happen.

---

Simply press [*UP*] to correct this problem.

The stopwatch will go back to the previous trial and resume the correct time count.

The split and error times shown on the stopwatch are those of the incorrect previous timing and do not influence the time count.

***For a clear vision of the trial, the splitting can be cancelled by pressing the [*ESC*] key and confirm the deletion request that appears.***

---

## ***Change duration time***

If the duration time of the expiring trial is a set duration time (i.e. an **ST** or a **TC** starting from a previous event), by pressing the [*INSERT*] key you can change the duration time.

Once the new value is set, the device will automatically calculate the new expiration time and will show the updated countdown.

---

## ***Change prescribed start time***

If the beginning of the expiring trial is set to a given time (i.e. a **START** or a **TC** with a set time), by pressing the [*INSERT*] key you can change the value.

Once the new start time is set, the device will automatically calculate the new expiration time and will show the updated countdown.

---

## ***Change TCT start time / duration time***

If a **TCT** is expiring, by pressing the [*INSERT*] key it is possible to change its duration time.

By pressing [*SHIFT*] and then [*INSERT*] you can change the start time.

---

## ***Edit Menu***

During the race, press the [*MENU*] key to view the Race Menu.

This is identical to the Start menu, except for the “Edit” item, which contains the following items:

---

### ***1 New Race***

This consists in deleting all trials stored in the device memory to start programming a new race.

Press [*ENT*] to confirm deletion and go to the Race function. Press [*ESC*] to go back to the Start Menu without changing anything.

---

## 2 Delete Timing

---

Confirmation to delete all previous timing will be asked to make the race trials available again.

Also in this case, press [ENT] and [ESC] to confirm or cancel the request.

## 3 Automatic TC

---

Enables and disables the automatic TC function.

Sometimes, it may be useful to have this function enabled.

If this function is enabled, when the countdown reaches 0.00, the device will move automatically to the next **active trial**, assuming the split time is "0.000".

This will be reminded on the display by "Calc." shown.

Enabling the "Automatic TC" will be reminded on the display by "aTC" shown in the status bar next to "SHIFT".

**ATTENTION: this setting is saved in the permanent memory of the instrument. The "automatic TC" function will be active the next time the device is turned on.**

## 4 All Automatic CD

---

It is possible to have all the countdowns set to automatic.

If enabled, any countdown, when reaching 0.00, will automatically move to the next **active trial** assuming the split time is "0.000".

This will be reminded on the display by "Calc.".

Enabling the "All Automatic CD" will be reminded on the display by "ALL" shown in the status bar next to "SHIFT".

**ATTENTION: this setting may be "tricky" and is not saved in the permanent memory of the instrument. The "All Automatic CD" function will be active the next time the device is turned on.**

## 5 Go to...

---

This is used to go to a given event. Select type and respective number. The instrument will point to the event in EDIT mode, if the selection was made in RUN or EDIT mode. Otherwise, it will remain in LIST mode.

## 6 Start Trial

---

While in the LIST or EDIT mode, this options allows to enter the RUN mode of the selected trial. All the previous trials will be "expired" and all the next trials will be waiting to start.

This will not work if the selected trial is connected to a previous one without a finish time.

---

## **7 Delta\_Step (0.000)**

---

This sets the value in milliseconds which is added or removed from the trial time in progress by pressing the [TIME+] and [TIME-] keys.

Programmable value from 1 to 999 milliseconds.

## **8 RUN mode xSec.**

---

**BORA-S** has an automatic feature for going back to RUN mode only after a given time when a trial is about to expire, to avoid remaining in a view other than RUN, e.g. for editing a time or a trial start time and consequently splitting without result.

For *RUN mode xSec* set a value comprised between 1 and 30 to make the instrument go back to RUN mode of the expiring trial after no keys have been pressed for a given number of seconds.

Set 0 to deactivate the automatic function (“--> *RUN mode: Not active*”).

## **9 BORA-S --> AVE-S**

---

Using this option you can program length and prescribed average speed of a **CT**.

If you connect **BORA-S** to **AVE-S** with a **CV JK/JK** cable, the device sends length and average when you start the trial (please see chapter “BORA-S ---> AVE-S”).

---

## Wireless

Through the wireless data connection it is possible to copy a race with another **BORA-S**, or to connect with the wireless screen repeater **ECHO-S**.

### **Enable/Disable**

---

To enable the wireless connection, the “*Enable*” option from the “*Wireless*” menu has to be selected.

Once enabled, **BORA-S** shows more options in the options list, thus making possible to disable the connection.

***Enabling/disabling the wireless connection is saved in the settings, so when the BORA-S is switched on, the wireless connection will be in the same status as when the BORA-S was switched off last time.***

### **Visible/Invisible**

---

To establish a connection, **BORA-S** has to be “visible” to other devices, so it can be found and picked to copy a race from it or to be connected to **ECHO-S**.

Once the connection is activated, every time the device is switched on, it will be “visible”, therefore connectable, to other devices for 5 minutes.

During these 5 minutes, another **BORA-S** or **ECHO-S** can find the device and connect to it.

After 5 minutes, the device will switch to “invisible”.

To make it “visible” again, select the “*Make visible again*” option from the “*Wireless*” menu.

***The device being visible for 5 minutes when switching on is necessary to avoid any other BORA-S to copy the race without permission.***

Once visible, it is possible to make the device “invisible” again just by selecting the “*Make not discoverable*” option.

### **Trial copy**

---

Once connected, it is possible to copy the race from another device.

***ATTENTION: to copy the race from another BORA-S, this last one has to be “visible” for the wireless connection. To check this, enter the “Wireless” menu of the device you wish to copy the race from, and make sure it is “visible”.***

Selecting the option “Trial copy”, the device starts to scan other visible devices.



---

Once finished, it shows a list of the devices found.

***Occasionally it may happen that, due to background noise, no other device is found.  
Just repeat the “Trial copy”.***

Now it is necessary to choose the device which to copy the trials from with the [UP] and [DOWN] keys.

Select with [ENTER].

The device connects to the chosen **BORA-S** and starts to copy the race.

Once copying is over, the race is stored in the device memory.

Then **BORA-S** shows the “LIST” view of the loaded race.

***Once the race has been copied, BORA-S switches to “invisible”.***

## **Connection to ECHO-S**

---

If connected with the remote display **ECHO-S**, **BORA-S** allows you to choose what to show on the remote display.

With **BORA-S** in *RUN* mode, the option “Remote View” has two options:

**BORA View:** Remote display is synchronised with **BORA-S** display.  
Changing trial on **BORA-S**, it will change also on **ECHO-S**.

**CD View:** Remote display is linked to the running trial.  
Changing trial on **BORA-S**, it will not change on **ECHO-S**, which will keep showing the countdown.

---

## COACH-pro

Program that allows, with the use of our **COACH-pro** training kit, to easily train to the precision steps.

With a series given time trials, operating the push button when passing on the pressure sensor connected to the **COACH-pro**, it is possible to check the error made, both on the ground (**COACH-pro**) and in the car (**BORA-S**).

Choosing the option **COACH-pro**, the device asks for the operating mode and then the value of the cycle period that should be used for the repetition of the trials.

***ATTENTION: To be compatible with COACH-pro, the cycle time must be within increments of 10 seconds. In case of incorrect programming, the device sets the number of seconds to less than a multiple of 10 seconds.  
For example, planning a 27-second cycle, the BORA-S will set 20 seconds.***

***ATTENTION: the measurements made in this application are not stored in the device memory. So in case of accidental or forced exit, it will not be possible to scroll the results.***

---

## Operating modes

Two operating modes are available:

### ***Lap***

---

This mode programs a series of **CT**, connected one to the other, with same duration time.

After programming the duration time, the device moves to **SCT1**, waiting for a line to be activated.

After starting, the countdown begins.

When the line is activated, the device freezes the display on the advance or on the delay, while the countdown moves to the next **CT**.

Also start and finish time of the expired **CT** are stored.

After 5 seconds, the display is unlocked, displaying the countdown of the next trial.

The maximum number of CTs that can be stored is 250.

If this limit is reached, the instrument does not pass to the next test, but always remains on the same, overwriting the previous data.

---

## ***Continue***

---

This mode programs a series of CTs with a given time.

After programming the duration time, the device moves to "STOP" and shows the internal clock.

Pressing the [ESC] key, you will move to the "RUN" mode.

Now the device calculates the expiration time of the CT and shows the countdown.

For example, planning a duration time of 30 seconds, equal to the current time 10:10:15, the device shows a countdown of -15, -14, etc. that is, the time left to get to 10: 10: 30,000.

By operating the push button, the device stores and shows on display the advance or the delay and recalculates to the next CT deadline.

This will also store the time of the split.

After 5 seconds, the instrument moves to show the countdown of the next CT.

To go back to "STOP" just press [ESC].

The maximum number of CTs that can be stored is 250.

If this limit is reached, the device does not pass to the next CT, but always remains on the same, overwriting the previous data.

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## ***Visualization***

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Pressing the [VIEW] key, the BORA-S switches to show the stored data for every single passage. Three views that show different figures are available.

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### ***View 1/3***

---

Lap mode: start and finish time on the primary line shown.

Continue mode: theoretical and actual time of a CT on the primary line are shown.

---

### ***View 2/3***

---

The set time and the error on the primary line are shown.

---

### ***View 3/3***

---

The errors of both lines are shown separately.

With [UP] and [DOWN] you can scroll all the passages.

With [ESC] you return to the race.

With [ENT] you enter the "Errors Average Info" menu which shows the average error up to the last selected passage.

---

## Menu

---

Pressing the [MENU] key, the following options are available.

### 1 Errors Average Info

---

Two views are available:

**View 1/2:**

"AVG" shows the arithmetical average of the errors

"+/-" shows the trend of the errors

**View 2/2:**

"-" shows the average of the advance errors with the number of trials

"+" shows the average of delay errors with the number of trials

***In both pages, shall the average value exceed 9,999 seconds, ">9999" is shown.***

To move from one view to the other, use the [VIEW] key.

Press [ESC] to exit.

### 2 Change Period

---

It allows to change the cycle duration time.

***ATTENTION: by changing the cycle duration time, all previous impulses are cleared and BORA-S goes to the first passage.***

### 3 Setup

---

You can enter the "Setup" menu (please see "Setup" chapter).

### 4 Finish

---

Exit the menu and goes back to main.

***ATTENTION: when you exit, all impulses are cleared and can not be recovered.***

---

## TRAINING

Using this program you have a 1/1000 second resolution stopwatch with two input lines.

**ATTENTION: the temporization of the B input line is automatically set to 2 seconds and this cannot be changed.**

Setting such a temporization, the rear wheels on the sensor will not be detected when you connect a pressure sensor to the input line.

When you exit this program, the temporization is set again to 0.5 seconds (standard value).

**ATTENTION: this program cannot be used with ECHO-S.  
If the connection is active, ECHO-S shows only the BORA-S clock.**

---

## Continue & Lap

Before you enter the program, you have to choose between two modes:

**Continue:** it shows the internal clock time every time you operate the input lines.

**Lap:** it shows the time elapsed since the previous operation on the same input line.

**Once you are in the stopwatch function, you can toggle from one mode to the other just by pressing [VIEW].**

---

## Operating mode

Three columns are shown:

- **Left column:** split times of A input.  
In Lap mode, the time elapsed since the previous operation on the same input.
- **Right column:** split times of B input.  
In Lap mode, the time elapsed since the previous operation on the same input.
- **Central column:** the “early” or “delay” error of the split time of A input compared to the split time of B input.

**ATTENTION: in order to match the times on both input lines, the second splitting must be done within 2 seconds. This interval cannot be changed.**

Press [UP] and [DOWN] to scroll the list.

---

When the line gets the impulse, the device positions itself automatically on the last split time.

*The device can store max. 250 time pairs. Once you get to this limit, the new split times will replace the older ones.*

## **Menu**

---

You can choose between the three following options:

### **1 Errors info:**

---

It shows these pieces of information:

**#Tot.:** number of complete passages (split times of A input and B input).

**AVG Tot.:** overall errors average (“early” or “delay” errors) of A input compared with B input.

**#Plus:** number of passages too late.

**AVG Plus:** average of “delay” errors.

**#Minus:** number of “early” passages.

**AVG Minus:** average of “early” errors.

### **2 Delete split times:**

---

It deletes the times previously taken and the device shows again an empty list.

### **3 Finish:**

---

The program is finished and the device goes back to Start Menu.

All split times are deleted and the race previously stored can be loaded again.

---

## BORA-S ---> AVE-S

**ATTENTION:** *in the BORA-S devices of the first “hardware generation” the communication with AVE-S is stopped when you connect an emergency charger to the PC port or when it is connected to the car cigarette lighter with an adapter.*

*In this case the BORA-S data are not sent and the described procedure does not work.*

*To see the “hardware generation”, choose “Menu / Info” and check the writing “PCB XvX”, which you will find next to the device serial number.*

*The “first generation” has got the number 1v6 (not working).*

*The “second generation” has got the number 1v7 (working).*

Connecting an **AVE-S** (with firmware higher than 3v01) with the **CV JK/JK** cable, you can send “length” and also “prescribed average speed” at the beginning of a Chronometric Test, so as to see the distance you still have to drive until the end of the trial or the error in average trials.

**You can program the length which has to be sent to AVE-S only for CTs.**

You can enable this option in the “RACE menu”, where you have to choose “Edit / BORA-S ---> AVE-S / Length”.

If you set “Length” as “Active”, this enables the programming and sending of the length.

If you set “Average” as “Active”, this enables also the programming and sending of the prescribed average speed.

If you set “Swap ECHO-S” as “Active”, **ECHO-S** (if this is used as “Dual Device”) goes from the **BORA-S** to the **AVE-S** view, when you send the length.

### **Enabled length**

When you are entering a **CT**, after having programmed the duration time, **BORA-S** asks for the trial “Length”, if “Length” is enabled and “Average” is disabled. You can set a number between 1 and 999999.

Confirm with [**ENT**] to store the number and go back to the normal programming.

When you are editing a trial (“Edit mode”), the length is shown at the top of the display, next to the trial name, and it is indicated by the letter “L” (Length).

To change this, select “L=xxxx” (blinking writing) with the [**UP**] and [**DOWN**] keys and confirm with [**ENT**]: this is the same procedure you use to change also the other fields.

---

In “List mode”, CTs with programmed length are indicated by the symbol “|-|” next to the trial start.

Once you have programmed the length, **BORA-S** sends this datum to **AVE-S** when you start the trial.

**AVE-S** goes immediately to “Trip mode” and to **RUNtrip** state. It shows the name of the running trial and the distance counter on the upper line. On the lower line (“PARTIAL”) it shows the number 0.

While you are driving your car through the route, the upper counter decreases, showing the distance until the trial end.

On the contrary, the lower counter increases, showing the distance you have driven.

With the [RESTART] key of **AVE-S** you can reset the counter on the lower line (“PARTIAL”), so as to have partial results that can be compared with the road-book.

***If you set the number 0, for this trial you disable the length sending to AVE-S: as a result, AVE-S does not change its operating mode and state.***

If you have gone to the next trial by mistake and you go back on **BORA-S**, this piece of information is sent to **AVE-S** too: in this way the previous count goes forward.

## ***Enabled average***

---

When you are entering a new trial with “Length” and “Average” enabled, the device asks for the Length and after that for the Prescribed Average.

***In average trials, the duration time of the trial is not necessary and so you do not have to set it.***

For the Average you can set a number between 3000 and 199999.

In order to make the race management easier, **BORA-S** converts **CTs** with programmed Average into **AVG** (Average) trials and uses another numbering: in this way the numbers referred to the CTs can be compared with those used in the roadbook.

If you enter a single average trial, the device generates a new **sAVG** (Start Average) trial.

When you start the trial, **BORA-S** sends length and average.

**AVE-S** goes immediately to “AVG mode” in the **RUN** state. It shows name of the running trial, prescribed average speed, trial length (“Real”), virtual distance (“Virt.”) and error (“Err.”).

While you are driving your car through the route, the real distance counter decreases, showing the distance until the trial end.



---

***You can set the number 0 for the average: in this case, when you start the trial, BORA-S sends only the length and AVE-S does what we have written above (“Enabled length”).***

***ATTENTION: if you have gone to the next trial by mistake on BORA-S, the fact that you go back will not affect in any way AVE-S. AVE-S will continue calculating using the previous values.***

During the average trial, the stopwatch shows only “Length” and “Average”. You have to manage the trial using **AVE-S**.

At the end of the average trial, you have to inform **BORA-S** by operating the external button. In this way the stopwatch can go to the next programmed trial.

### ***Examples:***

#### ***Series of five CTs followed by an average trial. All trials are concatenated***

To program this, you only need to enter a series of **CTs**.

When the device asks how many trials you want to enter, set the number 6 (five **CTs** plus one Average trial).

Choose a different “duration time”.

After you set the “duration time”, in the first five trials you can enter the value for the “Length” but the value for the “Average” must be 0.

Once you have programmed the **CT5**, the device will ask for the “duration time” of **CT6**: confirm without entering any value.

After that, set the “Length” and necessarily the prescribed “Average”: this informs the stopwatch to convert **CT6** into **AVG1**.

Back in the LIST view, the device shows the concatenated series of **CT1,2,3,4,5**, followed by **AVG1**.

#### **Single not concatenated average trial**

To enter a single not concatenated “Average” trial, you have to enter a CT with not concatenated start.

You must not program the “duration time”.

Set “Length” and “Average”.

The stopwatch converts the **CT** you have just programmed into an **AVG** and inserts automatically a **sAVG**: you need the **sAVG** to start the average trial and to send to **AVE-S** the trial's data.

---

# Features

---

## Inputs and outputs

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### Audio output

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Two ø 3.5 mm stereo jacks are present on the bottom of the **BORA-S** for connecting two separate headsets.

The countdown beep will be heard in both, if this function is enabled.

The sound generated by pressing the single key is emitted on only the respective headset. If a key is pressed on input IN\_A, the sound will be heard on headset A and not on headset B.

***The sound generated by the internal speaker will be deactivated by plugging in a headset.***

### External button input

---

**BORA-S** has two external inputs for connecting two **PB5/JG-A** keys to split time separately for the driver and the co-driver.

### PC port

---

Mini-USB port for connecting **BORA-S** to a PC for upgrading the firmware or for downloading acquired data.

***ATTENTION: The IO port is deactivated when this port is connected to a Personal Computer.***

### IO port

---

3.5 mm jack port for connecting via specific cable to the RS232 serial port of a PC.

***This replaces the USB connection via PC port in case of need.***

***ATTENTION: the IO port is not active if the USB port is connected to the PC or to an emergency charger.***

### Out\_Sync port

---

5.5/2.1mm Power-Jack for synchronising a stopwatch with electric input line.

Select the “Clock Check” function on **BORA-S** to actuate a closing contact every 0 seconds of every minute on this connector.

In this manner, the clock of another stopwatch can be started in perfect synch

via a specific cable.

During the race, this port is operated by the external buttons or by the [ENT] key to go to the next trial. Otherwise, it is operated if the function “All automatic CD” is enabled, when the countdown reaches 0.000 or at the end of Time Controls.

## Battery life

The battery life of **BORA-S** depends on its use.

With alkaline batteries:

backlighting off:	> 150 hours
display backlighting only always on:	> 75 hours
display and keypad backlighting always on:	> 30 hours

**Switch keypad backlighting off as soon as possible. Switch it on only when it is really needed. The keypad backlighting will drastically decrease battery life.**

A residual battery life indicator is shown on the status bar.

The battery indicator will start blinking when the battery charge drops under 10%.

The message “Battery Low” will appear briefly on the bottom of the display during normal operation with status bar when the batteries are low.

At this point, you will have a residual battery life of 5-10 hours if the “backlighting when needed” option is used and more than 30 hours if the backlighting is off.

Replace the batteries as soon as possible or connect to a power source via the USB connector!

**ATTENTION: Remove the batteries from the device if you plan on not using BORA-S for a long time. This will avoid damage caused by battery leakage.**

---

# Warranty and assistance

## Warranty

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The **BORA-S** stopwatch is guaranteed free from material or manufacturing faults by Digitech S.r.l. for 24 months from date of delivery to the buyer.

During the warranty validity period faulty components will be repaired or replaced free of charge by sending the stopwatch ex-works to Digitech.

The warranty will be cancelled if the device was accidentally damaged as a result of misuse, negligence or tampering by any person not authorised by Digitech.

No other warranty is expressed or understood.

**In no case may Digitech be liable for damage not included in this warranty.**

Batteries and damage caused by batteries are not covered by the Digitech warranty. Contact the battery manufacturer for the battery warranty.

### ***If the stopwatch needs to be repaired***

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If your instrument needs to be repaired, call our assistance service on +39 040 280 990 (from 9:00 to 12:00 and from 15:30 to 18:30, Mondays to Fridays).

Please include the following in the package you send:

- the address where to send the device back
- a short description of the problem and the procedure for reproducing it, if applicable
- if the device is still covered by warranty, include a copy of the purchase receipt and other documents which prove date of purchase.

The instrument and accompanying information must be sent in the original package or other equivalent packaging to prevent damage during shipment. This damage is not covered by the warranty.

Sending by insured mail is recommended.

Digitech will send back the repaired instrument using similar means.

Cost of sending to Digitech will be charged to the owner.

Any packages with mail charged to the receiver will be rejected.

### ***Repair warranty***

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Repairs out of warranty are guaranteed free from material and workmanship faults for 90 days from the date of repair.

Repairs carried out under warranty do not extent the original warranty period in any manner.

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## ***Functional problem notification***

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If functional problems are found during use of **BORA-S** and for questions related to instrument management, please contact us:

by mail to:

**DIGITECH - Via Stazione di Prosecco 29/D - 34010 Sgonico (TS) - Italy**

by email to:

**info@digitechtiming.com**

This will help us check and solve any problems as rapidly as possible.

---

## Technical specifications

<b>Technology:</b>	ARM CortexM3 32 bit microprocessor
<b>Dimensions and weight:</b>	240x 110 x 35 mm, 680 g, including batteries.
<b>Display:</b>	Graphic LCD 240x64 pixel monochromatic, transfective with backlighting
<b>Power supply:</b>	Four 1.5 volt (AA) batteries
<b>Consumption:</b>	Without backlighting: 18 mA With display backlighting only: 50 mA Display and keypad backlighting: 100mA
<b>Battery life:</b>	More than 150 hours using alkaline batteries
<b>Audio outputs:</b>	For headset 2 x 32 Ohm on 3.5mm jack
<b>USB port:</b>	Mini-USB port for connecting to PC or emergency external power supply
<b>RS232 port:</b>	3.5mm jack for connecting to another device via RS232 protocol
<b>Accuracy:</b>	$\pm 0.5$ ppm ( $\pm 0.0018$ sec./h) ppm from -10°C to +70°C.
<b>Programmable trials:</b>	250 (SCT, CT, TCT and TC)
<b>Connectable accessories:</b>	External <b>PB5/JG-A</b> key (included). Personal Computer via: - mini-USB cable - CV BORA-S-232 cable

---

## Firmware upgrade

The following elements are needed to upgrade the stopwatch firmware:

- 1 **mini-USB** cable
- 2 a PC with Windows XP operating system or higher
- 3 “Multi-Update\_1v4.exe” upgrade program or higher
- 4 “BORA-S-XvX.hex” file, where “XvX” is the upgrade version.

Connect the instrument to the PC using the **mini-USB** cable.

Wait for the computer to recognise the new hardware.

If required, install the drivers you can download from the website.

Hold [7] pressed while turning the instrument on.

The instrument will be turned on with the backlighting set to medium brightness. Nothing will appear on the display and the keypad will be deactivated.

Launch the “Multi-Update\_1v4.exe” program and open the “BORA-S\_XvX.hex” file using the “Open File” key.

The program will show the upgrade version.

Press “Connect” if the version is correct.

The program will search for the instrument among the PC devices.

After finding the stopwatch, the current installed firmware version will appear.

Press “Start” if everything is OK.

Upgrading will start.

After upgrading, if the procedure was successful, the instrument will be turned on normally and will be ready for use.

**ATTENTION: Do not disconnect the instrument or remove the batteries once upgrading has started.  
The instrument will not work if the upgrade stops before completion.  
In this case, the instrument must be sent to us for complete reprogramming.**

---

# DECLARATION OF CONFORMITY

According to EN45014 and ISO/IEC Guide 22 Publication

Manufacturer's name: DIGITECH S.r.l.

Manufacturer's address: Via Stazione di Prosecco, 29/d - 34010 Sgonico  
(TS) - Italy

*declares that*

Product type: Programmable stopwatch

Product name: **BORA-S**

*complies with the following directives*

Directive 73/23/EEC Safety: IEC950: 1991/EN60950: 1993

Directive 89/336/EEC EMC: EN55022: Class B  
EN50082-1: 1992  
IEC801-2: 1984 - 4kV CD - 8kV AD  
IEC801-3: 1984 - 3V/m

## **Additional notes:**

The **BORA-S** programmable stopwatch was tested in a typical configuration with the DIGITECH **PB5/JG-A** key.

**Trieste, 14 August 2014**

**Diego Gustin**  
**QA Manager**



# Appendix

## Repeated Trials

Sometimes, often in a track, these trials may be needed. This kind of trials request a free first lap, the time of which will be the given time of the other laps.





**BORA-S** can easily handle this trials simply by using the “*Series of RT*” option in the “*Insert*” menu.










Choosing this option, the device, after requesting the number of the laps and the id number of the first one, automatically generates the Start Repeated Trials (**SRT**), the Learn Repeated Trial (**LRT**) and the number of the Repeated Trials (**RT**) requested.













Then you can move to RUN mode and select the **SRT**.

You enter the track and start the first lap, starting it with the push button; the device will show a time running up, starting from 0.000. Once you reach the end of the “learn” lap, finishing it with the push button, the device will stop counting up and will immediately show the countdown of the first RT.











## Keys summary


RUN Mode		
FUNCTION	KEY	NOTE
Set the theoretical start time, in case the line has not been activated		Time will be calculated starting from the previous input and adding the given time
Show the start time of the running trial or the errors of the previous trial referring to the given time		Toggles between the two options
Show the end times of the running trial (if present)		Keep pressed to see the times. If there is no split time, only “In A” or “In B” will be shown
Show the error of the previous trial (on the primary line)		Keep pressed to see the error











Enable the acoustic countdown in SCT events (Start Chronometric Test)		Once the CT has started, the acoustic countdown will be turned off
Show the calculated end time of the running trial. If the calculated time is not available, you will see some dashes		Keep pressed to see the calculated end time of the running trial
Show the calculated time of the next TC, if the TC is programmed. If the TC does not exist or the calculated time is not available, you will see some dashes		Keep pressed to see the calculated end time of the next TC
Enable/disable the inputs' blocking only in the CTs, when the function "All automatic CD" is enabled		Keep pressed for 2 seconds to enable the blocking. Press the key again to remove it
In RUN mode, by pressing this key the current view of "duration" and "error" is replaced by the number and duration of the next stage. This will be shown as long as the key is pressed.		Only for CT, TC, TCT, NT
Toggles the sound from "off" to "automatic" and viceversa		Allows to quickly enable/disable the sound without entering the "settings" menu
Clear the inputs of the running trial		Shall the input be given accidentally, it clears it
Move to the previous trial		Shall the input be given accidentally, you can go back to the countdown
Move to the next trial		To see the trial data



Increase the delta you have to add to the programmed duration time of the trial		"Trim" the duration time if the input is inaccurate
Decrease the delta you have to add to the programmed duration time of the trial		"Trim" the duration time if the input is inaccurate
Clear the delta setting of the running trial	  	The programmed duration time of the trial is immediately set to the programmed value
Change main input line		Used to change the split time of the trial start if you have made a big mistake by operating the main input line
Enable acoustic countdown		To set acoustic countdown to continue (ON) last seconds (-10Sec)
Simulate external button		It generates an impulse simulating the main input line
Change the duration time of the running trial		Only in CTs or TCs, whose start is connected to a previous trial
Change the given start time of a trial	 	Only in trials with a given start time, i.e. a START or a TC with a given time
Move to <b>EDIT Mode</b>		To edit the running trial





EDIT Mode

FUNCTION	KEY	NOTE
Move to next field		To move from a field to another while programming
Move to previous field		To move from a field to another while programming
Edit field		To insert or change values in the field
Move to the same field in the next trial	  <b>SHIFT</b>	To move to the next trial without needing to scroll all the fields
Move to the same field in the previous trial	  <b>SHIFT</b>	To move to the previous trial without needing to scroll all the fields
Clear an input		Clears only the inputs of <i>In A</i> and <i>In B</i> . Other fields can be changed but not cleared
Move to <b>RUN Mode</b>		Moves immediately to RUN mode, showing the countdown of the running trial
Move to <b>LIST Mode</b>		To insert or clear trials

LIST Mode		
FUNCTION	KEY	NOTE
Insert trials		It inserts a new trial next to the position shown by the cursor

Delete a trial		Only trials which are not the beginning of a next one can be deleted
Move to the next in list		It moves the shown list one step up
Move to the previous in list		It moves the shown list one step down
Move to the beginning of the list	 <b>SHIFT</b> 	It moves the list to the first event in the list
Move to the end of the list	 <b>SHIFT</b> 	It moves the list to the last event in the list
Edit the selected trial		It moves to <i>EDIT Mode</i> to change the selected trial
Move to <i>EDIT Mode</i>		It moves to <i>EDIT Mode</i> of the selected trial
Move to <i>RUN Mode</i>		It moves immediately to <i>RUN Mode</i> , showing the countdown of the running trial

Various		
FUNCTION	KEY	NOTE
Display contrast adjustment	 <b>SHIFT</b> 	With and you can adjust contrast Confirm with

Headset volume adjustment	 <b>SHIFT</b>		With and you can adjust volume Confirm with
Clear the value you are programming	 <b>SHIFT</b>		It clears the value being programmed

---

# Reminder MENU

Overview of the items available in the various menus:

---

## 1 Set Clock

<u>1 Manual</u>	<i>Set value</i>
<u>2 Trimming</u>	<i>Set value</i>
<u>3 From GPS</u>	<i>Docking GPS satellite system</i>
<u>4 Out_Sync</u>	<i>Enable synch output</i>
<u>1 1 Min.</u>	<i>Impulse at the second 0 of every minute</i>
<u>2 1 Sec.</u>	<i>Impulse at every second</i>
<u>3 Off</u>	<i>Impulse is disabled</i>

---

## 2 Race

<u>1 New Race</u>	<i>Start a new race</i>
<u>2 Continue Race</u>	<i>Continue the previous race</i>

---

## 2 Edit

<u>1 New Race</u>	<i>Delete the current scheduled race and start a new one</i>
<u>2 Delete Timing</u>	<i>Delete all split times of trials</i>
<u>3 Automatic TC (No)</u>	
<u>1 Disable</u>	
<u>2 Enable</u>	
<u>4 All automatic CD (No)</u>	
<u>1 Disable</u>	
<u>2 Enable</u>	
<u>5 Go to ...</u>	
<u>6 Start Trial</u>	
<u>7 Delta_Step (0,010)</u>	<i>Set value</i>
<u>8 → RUN Mode: Not active</u>	<i>Set value</i>





---

## 9 BORA-S ---> AVE-S

---

- |               |  |
|---------------|--|
| 1 Length      | <i>Enables/Disables sending of length to AVE-S</i> |
| 2 Average     | <i>Enables/Disables sending of prescribed</i>      |
| 3 Swap ECHO-S | <i>Enables/Disables swap on ECHO-S</i>             |

## 3 Setup

---

### 1 Display

---

#### 1 Key light

---

- 1 Off
- 2 25%
- 3 50%
- 4 75%
- 5 100%

#### 2 List View (Large Font)

---

- 1 Small
- 2 Large

#### 3 Language

---

- 1 Italian
- 2 English
- 3 German
- 4 Spanish

## 2 Sound

---

1 Beep from -10 Sec. \_\_\_\_\_ Set value

#### 2 Key Tone (Yes)

---

- 1 Enable
- 2 Disable

#### 3 Break\_Sec in 3pps

---

- 1 1 Beep x Second
- 2 2 Beep x Second

---

3 3 Beep x Second  
4 4 Beep x Second  
4 Break\_Sec from -5Sec Set value  
5 Beep Off

### 3 Inputs

---

1 Primary Input : In A  
1 In A  
2 In B  
2 Window: of 5 Sec. Set value  
3 View: Error  
1 Split  
2 Error  
4 Mode: Attended  
1 Immediate  
2 Attended  
5 In B for  
1 Race Temporization 0.5 Sec  
2 Trainna Temporization 2.0 Sec  
6 Out Sync.  
1 Off  
2 In A  
3 In B  
4 In A + In B  
7 Automatism on xx  
1 In A  
2 In B

### 4 Wireless

---

1 Enable  
1 Disable  
1 Logout Only if connection is active  
2 Make Visible for 5 Min Only if connection is down

---

2 Make not discoverable Only if offline

2 Remote View Only if there's connection with **ECHO-S**

1 BORA View

2 CD View

3 Trial Copy Only if connection is down

4 Turn off

---

## 5 Information

---

1 Race info

2 Trials info

3 Errors info

4 Training info

---

## Default parameters

---

Please see below the default parameters, which can be reset using the option “Set default values”.

<i>General</i>		
	<i>Backlight</i>	<i>5 Sec. (when needed)</i>
	<i>Acoustic countdown</i>	<i>From -10 Sec.</i>

<i>Display</i>		
	<i>Key light</i>	<i>50%</i>
	<i>List view</i>	<i>Small font</i>
	<i>Language</i>	<i>Italian</i>

<i>Sound</i>		
	<i>Beep from</i>	<i>-10 Seconds</i>
	<i>Key tone</i>	<i>Enabled</i>
	<i>Break_Sec in</i>	<i>1 pps (parts per second)</i>
	<i>Break_Sec from</i>	<i>-3 Seconds</i>

<i>Inputs</i>		
	<i>Primary input</i>	<i>In A</i>
	<i>Window</i>	<i>Not active</i>
	<i>View</i>	<i>Split</i>
	<i>Mode</i>	<i>Immediate</i>
	<i>In B for</i>	<i>Race (temporization 0.5 Sec)</i>
	<i>Out Sync.</i>	<i>In A + In B</i>

<i>Wireless</i>		
	<i>Enable</i>	<i>Disabled</i>

<i>Race</i>		
	<i>Automatic TC</i>	<i>Not active</i>
	<i>All automatic CD</i>	<i>Not active</i>
	<i>Delta Step</i>	<i>0.010 Sec (1/100)</i>
	<i>→ Run Mode</i>	<i>Not active</i>
	<i>BORA-S ---&gt; AVE-S</i>	<i>Not active</i>