VELOCITEK

PROSTART

Made by Velocitek in San Mateo, California

Firmware Version v46

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Contents

Introduction

The new ProStart is the distillation of more than a decade of experience and customer feedback building stand-alone, GPS-based, distance-to-line starting aids. It's all about time and distance.

Now, the best distance-to-line tool ever just got better. The new ProStart has the same great user experience you know and love and now features crystal-clear optics, zero-latency navigation, and multicolor backlight.

Made by Velocitek in San Mateo, California.

Features

Only essential features used by professional sailors are included in the product.

- High-contrast LCD bonded to Gorilla® Glass anti-reflective / anti-glare lens

- 4 Hz screen update rate (4 times per second)

- Red and white LED backlight

- 72 channel, 25Hz multi-constellation GPS receiver

- 100 Hz solid-state 6-axis inertial measurement unit (IMU)

- High-precision 3-axis geomagnetic sensor (compass)

- 100-hour Lithium-ion battery

- GPS Speed, magnetic compass, and distance to line updated four times a second

- Countdown start timer

- Maximum and best 10 second average speed recall

- Over 1000 hours of data storage at a 4 Hz (4 times per second)

- Data download through USB link

- Automatic or user configurable magnetic declination

- Shift tracking

- Line Square To

- Heel angle

- SHIFT Mode / GPS Off

- Fully customizable bonus mode

- Waterproof (IPX8) to 3m

- Two-year warranty

Installation

The ProStart comes with a cradle that interlocks with it. Install the cradle permanently on your boat. Press the tab on the cradle to unlock the ProStart from it.

The ProStart Cradle works with M4 Metric flat head countersunk machine screws. Alternatively, you can use Imperial No. 6 flat head countersunk machine screws if M4 fasteners are unavailable. Always use Marine Grade fasteners when mounting the ProStart Cradle and/or Mounting Brackets.
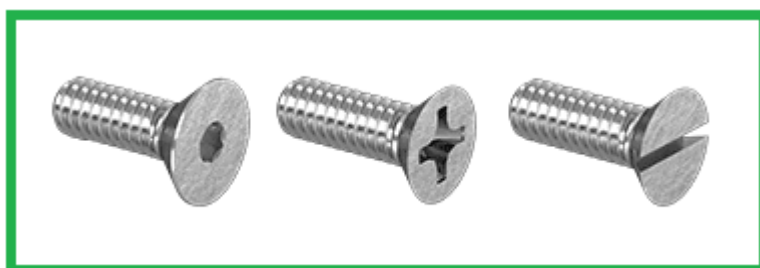
Do not use rounded head screws in the ProStart cradle. Non-countersunk screw heads will interfere with mounting the ProStart in its cradle.
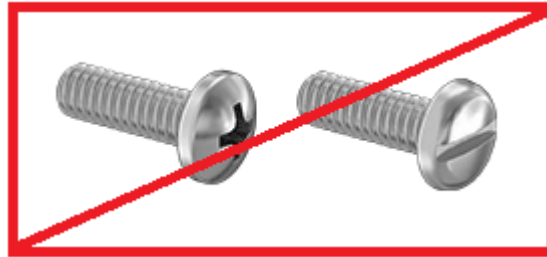
The ProStart now features a magnetic compass. The cradle should be installed at least 1.0m away from steel, iron, other ferromagnetic metals and permanent magnets.

If you only intend to use the GPS features of the ProStart, the cradle can be installed anywhere on the boat with a view of the sky.

For instructions on changing the ProStart from magnetic compass to course over ground, see the Configuration section on page 24.

Several mounting options are available for the ProStart. For details, go to https://www.velocitek.com/collections/accessories.

Batteries

The ProStart is powered by an onboard Lithium Polymer battery.

Battery life

The battery indicator is located on the bottom of the LCD screen. When the battery is fully charged, the device will last 100 hours in normal operation with the white or red backlight on. From a full charge with the backlight off, the ProStart will run for 200 hours with no additional charge. When the battery is empty the device will go into low battery mode and flash the battery outline.

When the battery is exhausted, connect the ProStart to a USB port or a phone charger using the supplied cable. From low battery the ProStart takes approximately 11 hours to charge completely using a 5 volt, 1 amp wall adapter (iPhone or similar) or 55 hours to charge completely via a USB port on a computer.

Full Battery	Half Full	Low Battery

Recharging the Battery

To recharge the battery, connect the ProStart to a USB port or a phone charger using the supplied Micro USB cable. The ProStart uses a standard Micro USB cable.

While the ProStart is charging, the LCD will display ">USb" on the lower data line and battery voltage on the upper line; 3.6V is empty and 4.2V is full. The USB trident logo will be visible at the bottom of the LCD screen and the battery icon will show the charging progress (see illustration below). USB pitchfork icon will flash when wall-cube fast charging is taking place.

When the battery is completely charged the cycling animation will stop and the battery will show full with both bars showing.

Low battery	< ½ full - One bar flashing	> ½ full - One bar solid, one bar flashing	Full battery - both bars solid	Full charge. Go sailing!

Buttons

Max Speed   On/Off   Timer Reset

Mode   Timer +1

Pin   Race Committee

Sets current   Sets current
location as   location as
pin end of   boat end of
start line   start line

Gun
Timer Start/Sync

There are a total of eight buttons on the ProStart as illustrated above.   The buttons will be referred to in capitalized blue text throughout this document as follows, PWR, MODE, MAX, RESET, +1, PIN, RC and GUN.

Icons

Speed	Heading	Timer	Distance

Max Speed	Best 10 Sec. Speed	USB	Battery	GPS Available

Modes

Start Mode: time & distance

Race Mode: speed & heading

The ProStart has three modes: Start Mode, Race Mode, and Bonus Mode. Start and Race Mode provide you with the essential information at different stages of the race, before and after the gun. Bonus mode is a great tool for tuning and speed testing.

The mode indicator can be found at the upper left-hand corner of the LCD screen. There is no indicator for Bonus mode, therefore, the lack of either the Start Mode or Race Mode icon indicates that you are in Bonus Mode

Start Mode
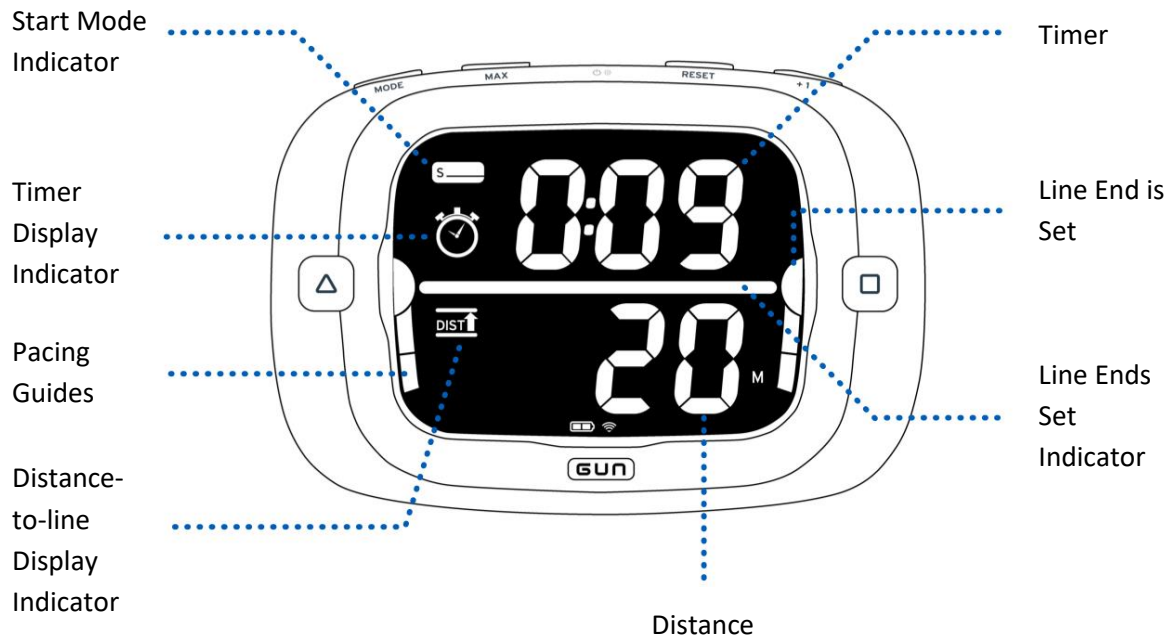
Start mode combines a timer and perpendicular distance to line display to provide the information necessary for a perfect start at the gun.

The semi-circles next to the PIN and RC buttons indicate if the respective ends are set. When both ends are set a line appears between them to illustrate that the line is set.

Timer
The count-down timer displayed as mm:ss. The timer can be set from 1:00 to 15:00.

Distance To Line
'Distance To Line' is the perpendicular distance to the user defined line. Refer to Set Start Line on page 22 for detailed information on setting the start line. 'Distance To Line' is displayed in meters.

A negative 'Distance To Line' means that the boat is over the line. Three hyphens '---' are displayed when the line is not defined and a GPS signal is available. When the 'Distance To Line' is larger than 1000 meters '>999' is displayed.

'Distance To Line' can be displayed with either 0.1m or 1m resolution. Refer to 'Setting Distance to Line Precision' on page 31 of the Configuration section

Start line pacing guides

In the final two minutes of the countdown the bar graph segments will display 'Pacing Guides,' giving you an indication of whether you are on track to be early or late to the line given your current boat speed and heading. Below is a description of how this algorithm works so that you can employ this feature in your starts with confidence.

The early / late bar graph provides a graphical representation for your estimated location at the gun based on your current position, speed, Course Over Ground, and the time remaining in the countdown.

The bar graph extends above the illustrated line if the calculated future location is over the line and below the illustrated line if your future location is under the line. When no bar graph segments are showing - the "0" display - your estimated future location at the gun is between the line and 2 meters below the line. Each segment shown represents +/- 2m from this "0" location. For example, 2 bar graph segments showing above the line represents that you are predicted to be between 2m and 4m over the line at go. For simplicity's sake this algorithm assumes the line to be of infinite length so it does not compensate for any situation where your current heading would not take you through the starting line.

The goal is to eliminate all the bar segments around the perimeter and only have the semicircles showing. This indicates that at your current speed and heading you are expected to be within 2 meters of the line at the gun.

Race Mode
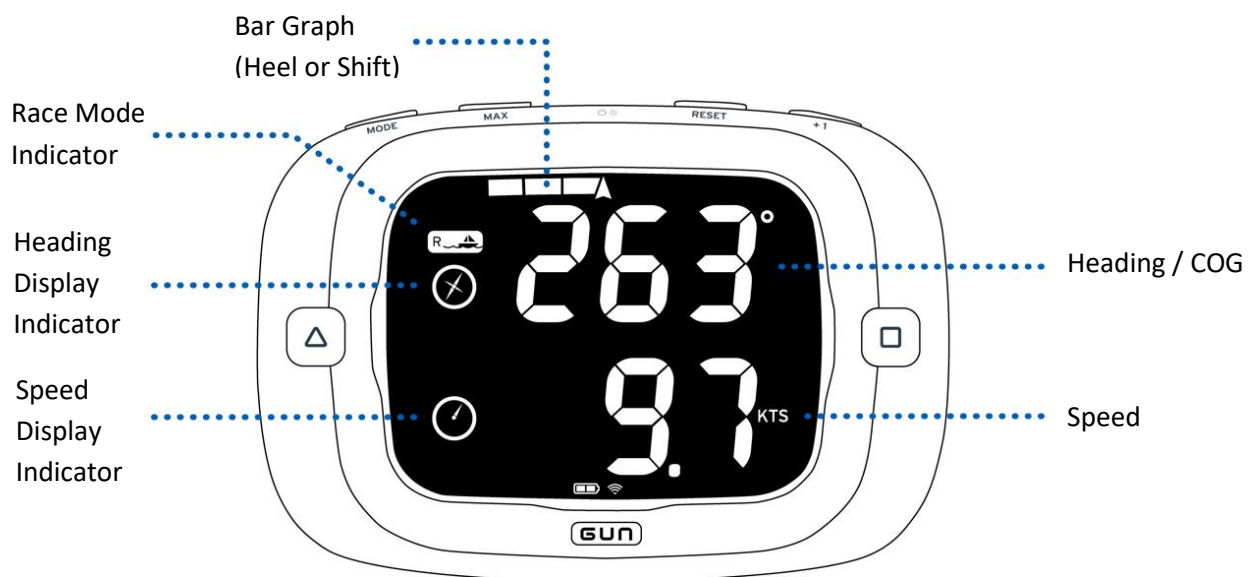
Race mode displays information crucial during the race: speed, magnetic heading or COG, and heel angle or shift angle (on bar graph).

Speed

Speed is calculated by the GPS unit by measuring the Doppler shift in GPS signals. It is displayed in Knots (Nautical Miles per Hour).

Magnetic Heading

With the addition of a solid-state geomagnetic (compass) sensor, the ProStart's factory default direction output is magnetic heading. The default heading is magnetic heading of the device expressed in degrees with 360˚ being North.

When the ProStart's direction output is set to magnetic heading, the ProStart's top line will show compass heading with three digits at all times. Leading zeros will be displayed when the heading is not three digits, i.e. eleven degrees will be shown as 011° and three degrees will be shown as 003°.

If you are not mounting your ProStart facing forwards on your boat you can set a "heading offset" in the device settings.

See the Configuration section on page 24 for instructions on changing the heading offset or the ProStart's direction output from magnetic compass to course over ground.

Course Over Ground

The user has the option to substitute Course Over Ground (COG) in place of Heading. COG is calculated by the GPS unit by measuring the Doppler shift in GPS signals.

Either true or magnetic COG can be displayed by entering your local magnetic declination into the ProStart. "True COG" is referenced to true north. "Magnetic COG" is referenced to the local magnetic north. When using a magnetic compass in conjunction with the ProStart, displaying COG in degrees magnetic can be useful since both measurements will be referencing magnetic north.

By default, COG is displayed in degrees magnetic. This is done by automatically using the GPS location to compensate for the local magnetic declination wherever you are in the world. To display COG in degrees true the magnetic declination must be set to zero in the device settings. See 'Setting Declination' in the Configuration section on page 29 for instructions on adjusting the magnetic declination setting on the ProStart.

The ProStart displays COG only when your speed is greater than 0.5 knots. If your speed is less than 0.5 knots the ProStart will display '- - -' for COG regardless of which direction you are moving.

Unlike the magnetic heading from a compass, COG requires movement. COG depends only on the direction you are moving, not the direction the device is pointing. If your ProStart is configured to display COG, the ProStart will give you accurate COG information regardless of the orientation in which it is mounted on your boat (i.e. mounted on the sides of a boom, or a tacking bracket on a Moth).

When the ProStart's direction output is set to COG, the ProStart's top line will show COG with no leading zeros, i.e. eleven degrees will be shown as 11° and three degrees will be shown as 3°.
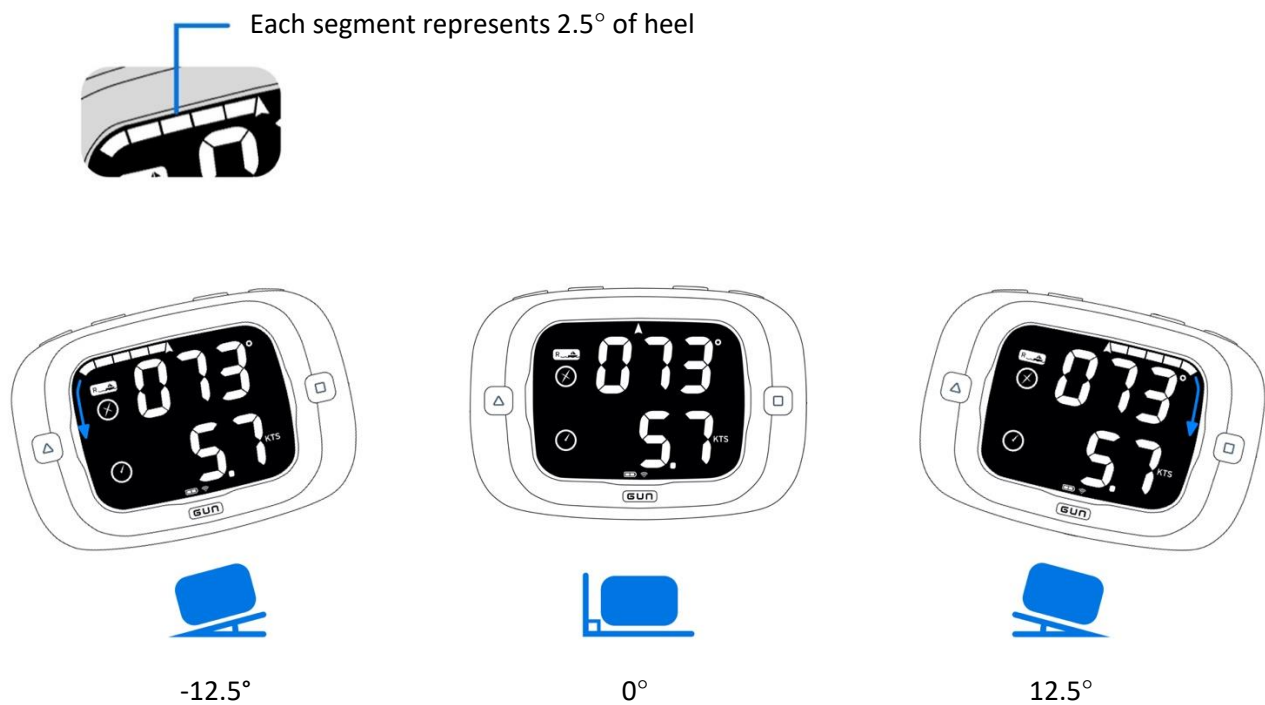
Race Mode Bar Graph
The user has the option of either displaying heel or shift angle on the bar graph while in Race Mode. By default, the ProStart displays the heel angle. See 'Setting Race Bar Graph Mode' in the Configuration section on page 26 for instructions on switching between heel angle and shift angle.

Heel Angle
Heel angle is displayed on the bar graph with each segment representing 2.5° of heel. To zero out the heel angle, press RESET when the ProStart is in Race Mode (this will also zero the pitch angle which is accessible only in Bonus Mode).

Heel angle is also recorded in the ProStart's data storage. Heel to starboard is shown as positive degrees. Heel to port is shown as negative degrees.

Each segment represents 2.5° of heel

-12.5°   0°   12.5°
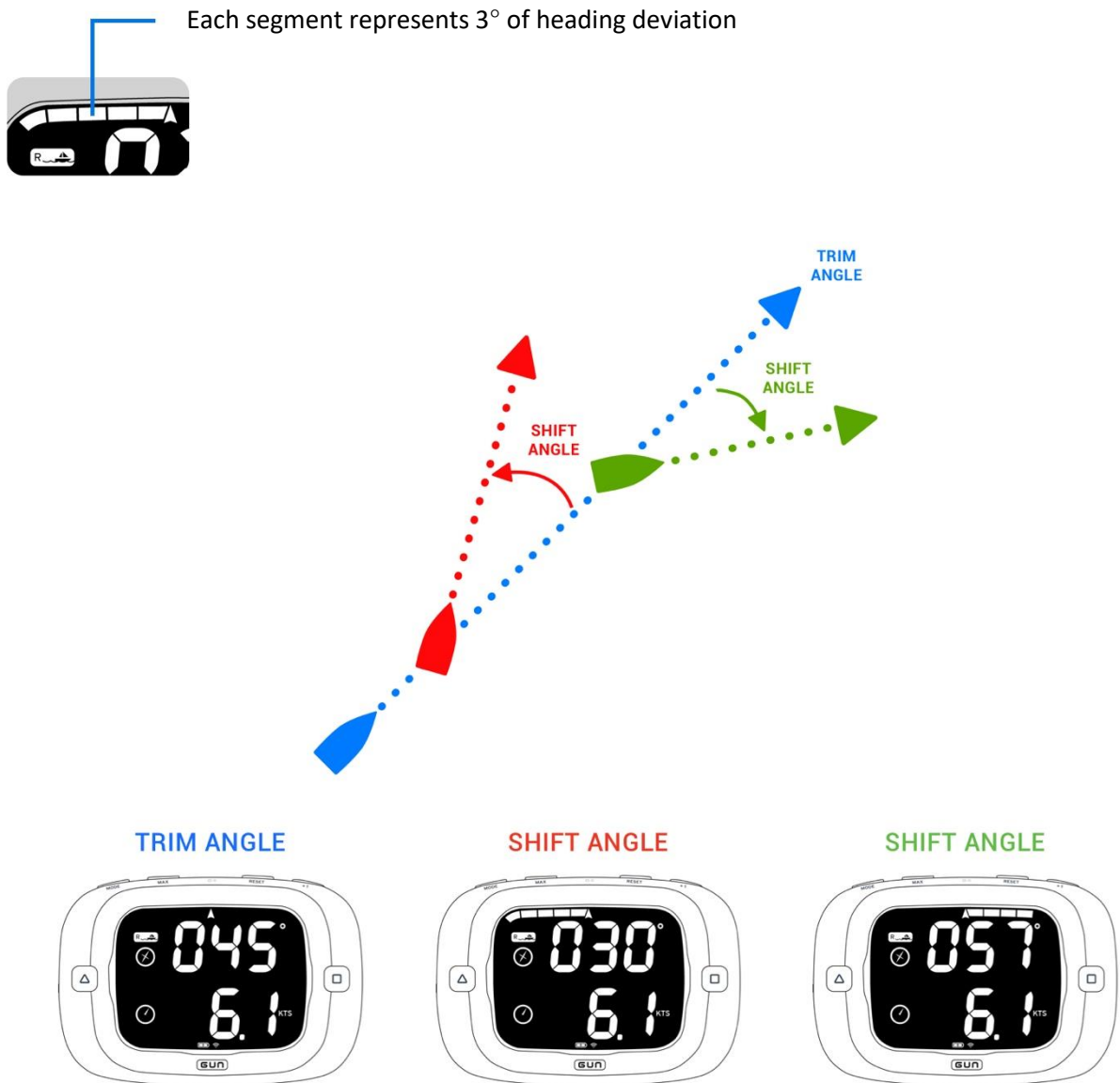
Shift Tracking
In Race Mode, the user has the option to substitute shift angle in place of heel angle on the bar graph. See 'Setting Race Bar Graph' configuration section on page 26 for instructions on switching between heel angle and shift angle.

When the race bar graph is configured to show shift angle each bar graph segment will represent 3° degrees of heading deviation from a device determined 'trim angle'. The trim angle is set automatically by the device once the boat is detected to be steering a relatively stable course for a specified length of time. The trim angle is automatically reset anytime the current heading deviates from the trim angle by more than 45°.

The trim angle can be manually reset by pressing the RESET button while in Race Mode with shift tracking activated (see 'Setting Race Bar Graph' in Configuration section). This will clear the previously used trim angle and start a fresh measurement cycle for the ProStart to find the new trim angle.

See the 'Understanding Shift Tracking' section on page 37 for more detail on how the shift tracking algorithm works.

Each segment represents 3° of heading deviation

TRIM ANGLE

SHIFT ANGLE

SHIFT ANGLE

TRIM ANGLE

SHIFT ANGLE

SHIFT ANGLE

*Press the RESET button to clear trim angle

GPS Off Mode / SHIFT Mode

GPS Off or SHIFT Mode, allows the user to hide all of the GPS features and use the ProStart as a tactical compass. In SHIFT Mode, the ProStart will function nearly identically to the Velocitek SHIFT, a tactical compass dedicated to tracking wind shifts.

By default, GPS is on and SHIFT Mode is disabled. To enable SHIFT Mode see 'Disabling GPS / Enabling SHIFT Mode' on page 31 in the configuration section.

In Start Mode, with SHIFT Mode is enabled, the ProStart will display a countdown timer on the top data field and a magnetic compass on the bottom data field.

In Race Mode, with SHIFT Mode is enabled, magnetic heading is displayed on top. When reference angles are set, shift angle is displayed on the bottom and shift magnitude and direction are displayed on the bar graph with each segment representing 3°. Read more about setting reference angles on page 40 in the Understanding SHIFT Mode section.

Bonus Mode

Bonus Mode allows you to display any two metrics on the top and bottom displays as well as an additional metric on the bar graph.

By default, Bonus Mode is disabled. To enable Bonus Mode see 'Enabling Bonus Screen' on page 31 in the configuration section.

The options for metrics to display on the top and bottom display are: Magnetic Heading, Course Over Ground, Speed Over Ground, Heel, Pitch, or Shift Angle.

The options for metrics to display on bar graph are: Heel, Shift Angle, or Off.

When enabled, you can access the Bonus Screen at any time in either Race or Start Mode by pressing both the MODE and '+1' buttons at the same time (in either order). Pressing any button while in Bonus Mode will exit Bonus Mode
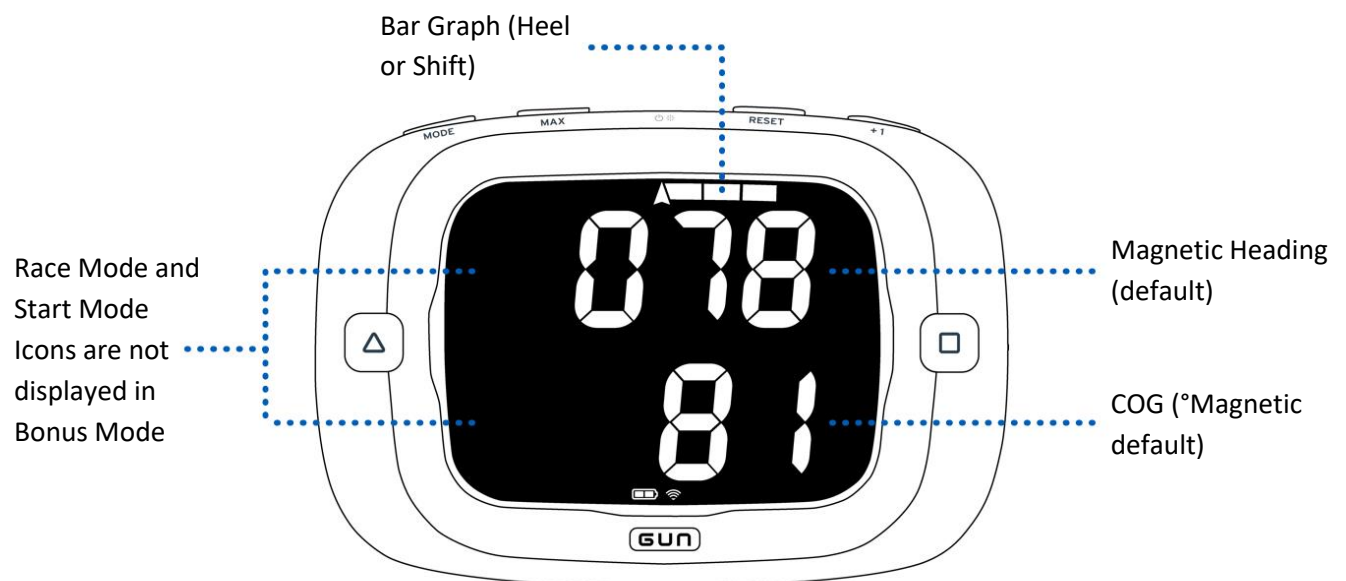
Operation

Power On and Off

Press the POWER / LIGHT button (top-center) to turn on your ProStart.

Press and hold POWER / LIGHT for three seconds to shut down your ProStart.

Acquire a GPS Signal
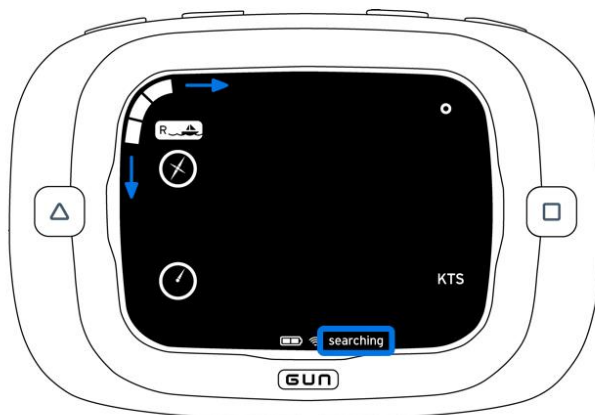
Searching for GPS signal

Searching indicator is displayed at the bottom and bar segments travel around the circumference of the LCD.

GPS Search   GPS Acquired

GPS Signal Acquired

The operation of the ProStart relies on low-power radio signals from GPS satellites that orbit the earth at an altitude of approximately 20,000 km. As a result, the ProStart must be outdoors with a clear view of the sky to function properly. Stay away from tall buildings and forests when acquiring a signal off the water since these obstacles block or reflect the signals making it difficult to obtain signal.

When the ProStart is first turned on, it must download information from GPS satellites before it can acquire a GPS signal.

The satellite acquisition process can take up to 5 minutes.

Using the Backlight

The ProStart features a white or red LED backlight.

With the ProStart powered on, press POWER / LIGHT to cycle the backlight between: off, white, and red.

If your ProStart has a low battery, the backlight will automatically turn off to reduce power consumption and extend the runtime of your ProStart.

Show Off Your Maximum Speeds

Everyone likes to know how fast you went. The ProStart max speed recall pulls your best speeds up with the click of a button.

Press MAX to display max speeds temporarily on a 5 second timer.

Press RESET while max speeds are displayed to reset the max speeds

Maximum 10 second Average Speed

Maximum Instantaneous Speed

Display both your instantaneous and 10 second average maximum speed by pressing the MAX button. Your maximum speeds will display for 5 seconds before returning to the previous mode. The maximum speeds are stored in non-volatile flash memory and are stored until overwritten with higher speeds or the user resets the maximum speeds.

The ProStart's max speed Instantaneous Max is a two second average and the Ten Second Average Max is self-explanatory. These max speeds are calculated from Doppler speeds.

The maximum speeds are not limited by track storage capacity.

To reset the maximum speeds, press RESET while holding MAX.

Keep Your Hand on the Tiller

 when timer expires

 when RC, PIN, GUN, RESET, +1 is pressed

Modes switch automatically to minimize the need for your input. The mode switches from Start to Race mode when the timer expires. The mode switches from Race to Start mode when any of the start related buttons, RC, PIN, GUN, RESET and +1, are pressed.

Set the Start Line

No Ends Set
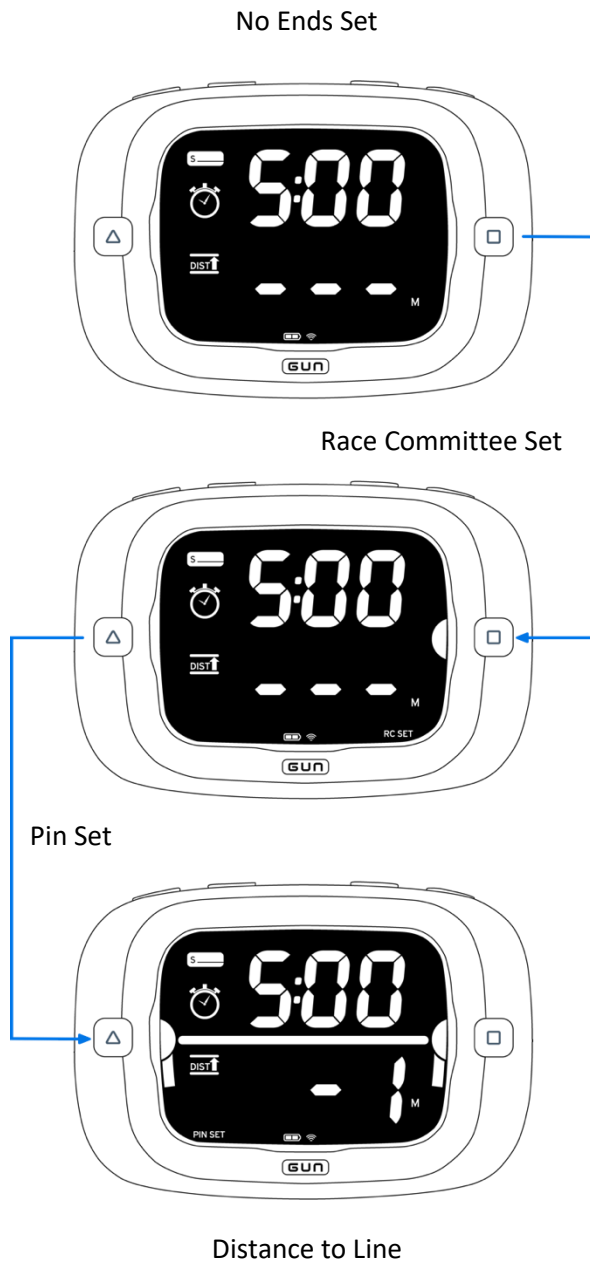
Set the start line pin and race committee ends by pressing PIN and RC respectively.

The semi-circles next to PIN and RC indicate if the respective ends are set. The semi-circles flash when the end is not set and go solid when set.

The ends can be set in either order.

Race Committee Set

Set the right end by pressing RC.

The set end is indicated by a semi-circle next to RC in the illustration.

When an end is set, an indicator will flash for 3 seconds at the bottom of the LCD at the respective ends.
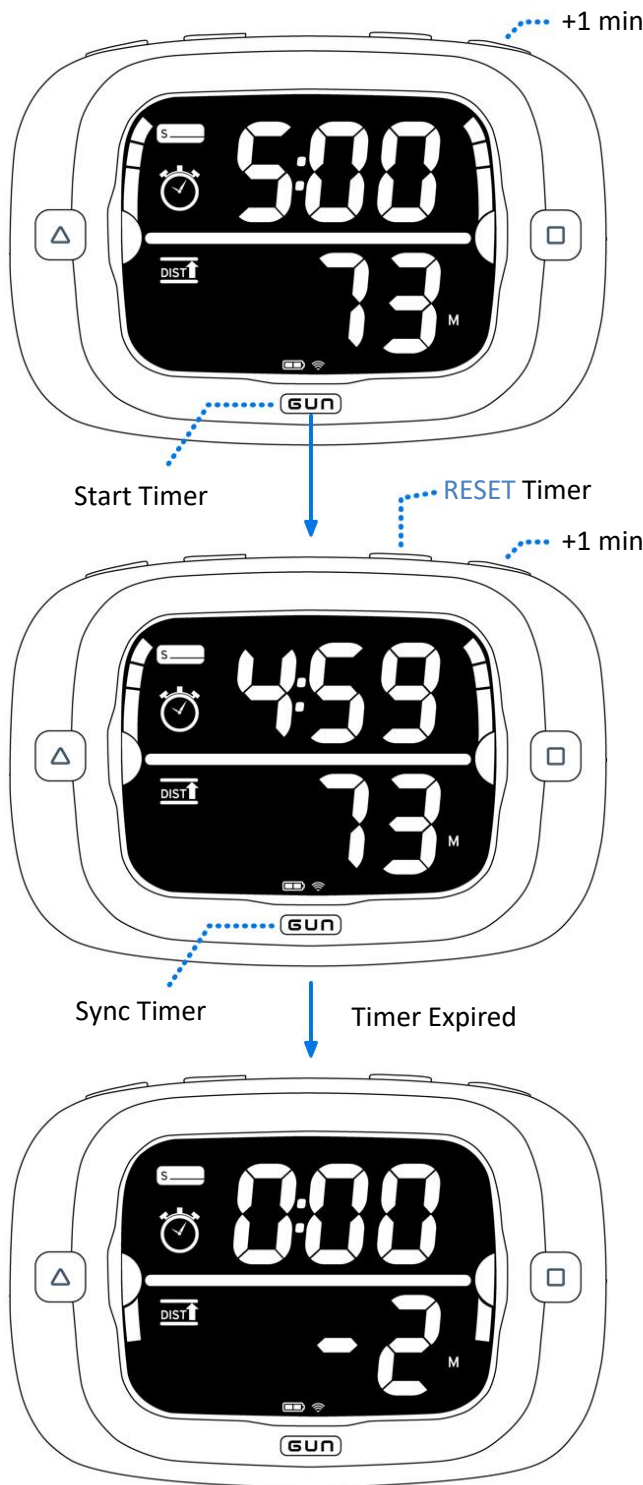
Pin Set

Once the start line is set, the ProStart will display a line between the semi-circles to indicate that the line is set.

The ends can be set again by pressing PIN or RC.

Press both PIN and RC simultaneously to clear the ends.

Perpendicular distance-to-line is displayed numerically, in Meters.

Distance to Line

Use the Timer

+1 min

Start Timer

Timer Reset

Change the reset time by pressing +1 to scroll through the minutes.   The timer can be set to 1:00 ~ 15:00.

Start the timer by pressing GUN.

RESET Timer

+1 min

Sync Timer   Timer Expired

Timer Counting Down

Add one minute to the timer without stopping the timer by pressing +1.

Reset timer by pressing RESET.

Sync timer by pressing GUN.   The timer will round down to the nearest minute, 4:00 in this case.

Post Timer Expired

The timer will display the 'Distance to Line' at 0:00 for 10 seconds after the timer expires.

After the 10 seconds, the display will switch automatically to race mode.

Using 'Line Square To'

The ProStart features the ability display the magnetic bearing the starting line is square to.

With the start line set you can access the 'Line Square To' measurement by pressing MODE and MAX button simultaneously (in either order). The 'Line Square To' measurement will now display on screen for 5 seconds before returning to Start Mode.

You can exit 'Line Square To' prematurely by pressing the RESET button.

Please see "Understanding 'Line Square To'" section on page 36 for more information.

Press MODE and MAX simultaneously.
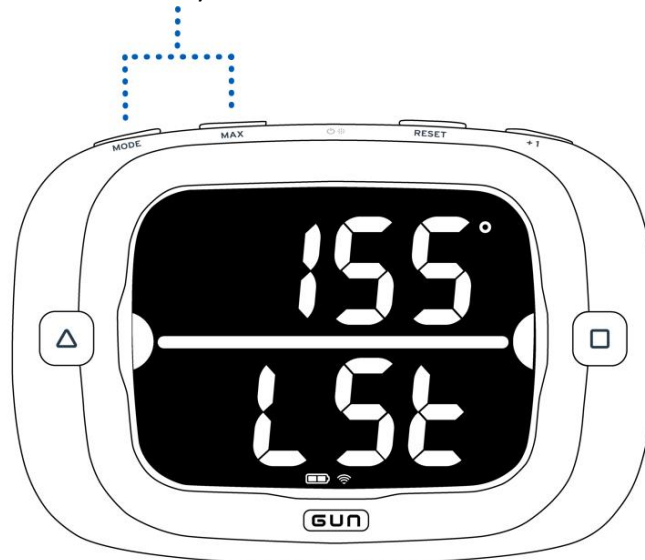
Configuration

The ProStart has the following user configurable settings:

- Direction Output (Heading / COG)

- Race Bar Graph (Heel / Shift)

- Timer

- Compass damping

- Heading Offset

- Magnetic Declination

- DTL (On / Off) (diSt to LinE)

- Bow offset (b OFFSEt)

- DTL Precision (0 / 0.0) (diStancE PrEciSion)

- GPS On / Off

- Hard Reset (On / Off)

- Bonus Mode (On / Off) (bonuS ScreEEn)

- Bonus Mode (Top and Bottom Metrics)

- Bonus Mode (Bar Graph Metric)

Configuring your ProStart

To enter user setup and configure your device, press and hold RESET for 3 seconds.

In each of the config menu pages the PIN and RC Buttons are used to change the current setting being configured. For example; while setting declination, pressing the RC Button will increase declination, and pressing the PIN button will decrease declination.

Pressing the GUN button will save the current setting and progress to the next configuration menu (or exit if you are on the last config page).

Pressing RESET at any time will exit the configuration menus. **Pressing RESET will exit the configuration menu without saving the menu currently displayed; however, all previous configurations settings will be saved.**

Setting Direction Output

Options: [Magnetic Heading | Course Over Ground]   Default: Magnetic Heading

Once you have entered user setup by holding RESET for 3 seconds, your first menu is Direction Output.

You will see either 'HEAding,' (default) or 'COG' scrolling across the screen.

You can select magnetic heading (compass) or COG (GPS direction you are moving) for your direction output. This information is displayed on the top line of data in Race Mode.

When 'heading' mode is selected the angle displayed during Race Mode will be the magnetic compass heading of the boat. When heading is selected your heading will be displayed in three digits at all times (ie. 7° will show as 007°.

When 'COG' mode is selected the angle displayed during Race Mode will be the GPS direction you are traveling. By default, the ProStart will use the GPS to automatically calculate your local declination and display this angle in degrees magnetic. If instead you want COG displayed in degrees true, then you will need to manually set the declination to 0, see the 'Setting Magnetic Declination' section on page 29.

When COG mode is selected, your course will be displayed without leading zeros (ie. 7° will show as 7°)

Press GUN button to save your selection and progress to the next config menu, or press RESET to exit config without saving.

Setting Race Bar Graph

Options: [Heel | Shift]   Default: Heel

The second config menu selects between displaying boat heel or shift angle on the bar graph during race mode.

You will see either 'HEEL' or 'SHIFt' scrolling across the bottom display. You can toggle between the two using the PIN and RC buttons.

See 'How to Use Shift Tracking,' section on page 39 for a description of what shift tracking will show and how to use it.

Press GUN button to save your selection and progress to the next config menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Countdown Timer

Options: [Reset | Rolling | Count Up]   Default: Reset

The third config menu selects between the countdown timer behavior.

You will see the Start Mode Icon and the Timer Icon lit up in the upper left corner of the display and 'rESEt' will be scrolling on the bottom display. You can toggle between 'rESEt', 'rolling' and 'Count UP' using the PIN and RC buttons

Reset

Reset is the factory default timer behavior. When the countdown timer expires, the timer resets to last time it was set for and it waits for the user to restart a new sequence.

Rolling

When a rolling timer is enabled, a new countdown begins immediately when the countdown timer expires. The new countdown will be for the same amount of time as the countdown which immediately preceded it.

Count up

When Count Up is enabled an elapsed timer begins counting up when the countdown timer expires. On screen the elapsed time is displayed in minutes and decimal minutes.

Press GUN once to stop the timer. Your elapsed time will be displayed on screen in decimal minutes.

Pressing GUN button again will restart the countdown timer.

Pressing RESET will reset the timer and wait for you to start the countdown.

All timer activity is now logged in .VTK files.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Setting Compass Damping

Options: [0 - None | 1 - Low | 2 - High]   Default: 0 - None

The fourth config menu selects between the 3 levels of compass damping.

You will see 'd LEvEL' scrolling across the top display and either 0 (default), 1, or 2 on the bottom display. You can toggle between the three levels using the PIN and RC buttons.

The damping rate affects the response of the ProStart to a change in heading. The greater the damping value the smoother the heading change will be, but the slower the response will be to a change in heading.

Selecting the appropriate damping level is a personal preference usually based on the boat being sailed, the wind and the water conditions.

For example, in steady wind and flat water, no damping (level 0) is recommended. However, in high wind with lumpy water damping will eliminate large heading variations that can make judging a wind shift difficult.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Setting Heading Offset

Options: [-90° to +90°]   Default: 0°

The fifth config menu selects a heading offset. The default is 0°.

You will see 'HEAding OFFSEt' scrolling across the bottom display and either 0 (default), or some other number between -90 and +90 on the top display. Pressing the RC button will increase the heading offset by 1° and PIN button will decrease it by 1°.

Heading Offset can be used to add a fixed offset to the compass output. This is useful if the ProStart is mounted at any angle other than perpendicular to the centerline of the boat.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Setting Magnetic Declination

**Options: [Automatic | -45° to +45°]   Default: Automatic**

The sixth config menu allows you to select between automatic (default) or a fixed magnetic declination.

You will see 'dEcLinAtion' scrolling across the bottom display and either 'dEF' (default), or some angle between -45° and +45° on the top display. Pressing the RC button will increase the declination by 1° and PIN button will decrease it by 1°. Positive declination represents east and negative declination represents west.

Declination is used to display COG and 'Line Square To,' in degrees magnetic (vs degrees true). This is beneficial when using a magnetic compass in conjunction with the ProStart since both instruments will be referenced to magnetic north.

By default, the ProStart will use the current GPS location to calculate the local declination. This means that unless you manually set the declination to some angle other than "dEF" the compass output will display in degrees true.

You can find out what the automatic value is set to simply by pressing the either the PIN or RC button while 'dEF' is displayed. In either case the first declination angle displayed will be the value that the default is set to. If you save (by pressing GUN button), while the display is showing any other value other than 'dEF' your ProStart will no longer automatically determine and use the local declination on power up. To ensure automatic declination is enabled you must press GUN button while 'dEF' is displayed.
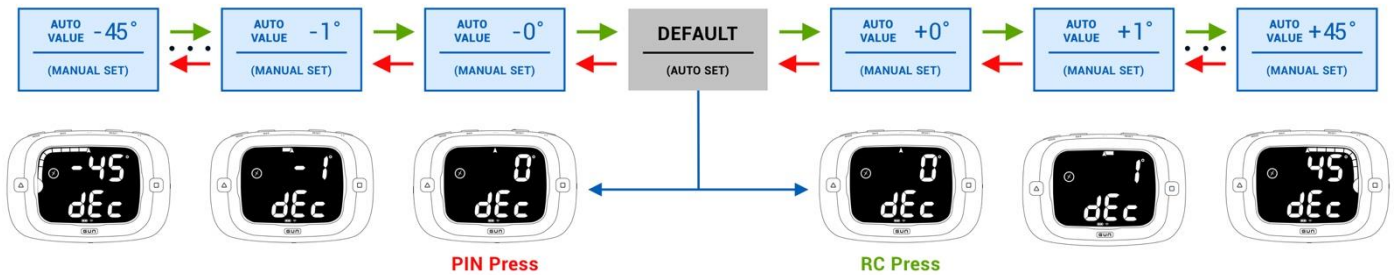
In the case where the ProStart is powered on where there is no GPS signal the automatic declination value will be 0. However, as soon as a GPS signal is acquired the ProStart will automatically update it to the determined local declination.

Three resources for finding your Local Magnetic Declination

- Enter http://www.magnetic-declination.com/ into your web browser

- Enter https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml into your web browser

- Search "magnetic declination calculator" in the search engine of your choice

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Disabling Distance to Line
Options: [On| Off]   Default: On

The seventh config menu allows you to turn on or off the distance to line feature. The default is On.

You will see 'diStAncE to LinE' scrolling across the top display and either 'On' (default), or 'OFF' on the bottom display. Pressing the RC or PIN button will toggle between on and off.

When 'OFF' is selected, Speed Over Ground (SOG) will be displayed on the bottom display instead of the distance to line. Alternatively, when 'On' is selected the distance to the line will display if the start line has been set.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Setting Bow Offset
Options: [0m to +12.5m]   Default: 0m

The eighth config menu selects a bow offset. The default is 0m.

You will see 'b OFFSEt' scrolling across the bottom display and some distance from 0 (default), to 12.5m on the top display. Pressing the RC button will increase the bow offset by 0.1m and PIN button will decrease it by 0.1m. You can also hold either the PIN or RC button for larger changes.

Bow offset is the distance in meters from where the ProStart is mounted to the bow of your boat. In start mode the offset is used to calculate the distance between the tip of your bow and the start line.

For more information on setting the line with and without the bow offset see Understanding Distance to Start Line section on page 34.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Setting Distance to Line Precision

Options: [0.0 | 0]   Default: 0.0

The nineth config menu selects a precision level for the distance to line feature. The default is one decimal place (0.0)

You will see 'diStAncE PrEciSion' scrolling across the top display and either '0.0' (default), or '0' on the bottom display. Pressing the RC or PIN button will toggle between "0.0" and '0'.

When 0.0 is selected the distance to line will display in increments of 0.1m when the start line is set and the ProStart is in Start Mode. Alternatively, when 0 is selected the distance will display in increments of 1m.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Disabling GPS / Enabling SHIFT Mode

Options: [On | Off]   Default: On

The tenth config menu is GPS On / Off or SHIFT Mode. The default is GPS On.

You will see 'gPS' will be displayed on the top display and "On' on the bottom display. Pressing the RC or PIN button will toggle between on and off.

When GPS off is selected, no GPS functions are available. The ProStart will function as a tactical compass and timer, nearly identically to the Velocitek SHIFT. The SHIFT was a tactical compass made by Velocitek dedicated to tracking wind shifts.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Hard Reset

Options: [On| Off]   Default: Off

The eleventh config menu allows you to perform a hard reset of your ProStart. The default is Off.

You will see 'Hard rESEt' scrolling across the top display and either 'OFF' (default), or 'On' on the bottom display. Pressing the RC or PIN button will toggle between on and off.

When 'On' is selected, the ProStart will wipe all of the configurations and reload the firmware on the next off and on power cycle.

Press GUN button to save your selection and progress to the next menu, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Enabling Bonus Screen (On or Off)

Options: [On| Off]   Default: Off

The twelfth config menu allows you to turn on or off the bonus screen feature. The default is Off.

You will see 'bonuS ScrEEn' scrolling across the top display and either 'OFF' (default), or 'On' on the bottom display. Pressing the RC or PIN button will toggle between on and off.

When enabled bonus screen allows you to display any two metrics on the top and bottom displays as well as choose any metric to display on the bar graph.

When enabled, you can access the Bonus Screen at any time in either Race or Start Mode by pressing both the MODE and '+1' buttons at the same time (in either order). You can exit bonus screen by pressing any button.

To configure which metrics display on the bonus screen press GUN button while 'On' is displayed. This will take you to the screen to 'Selecting Bonus Screen Top and Bottom Metrics.'

If you press GUN button while 'OFF' is displayed it will skip over the config menus to select the metrics for bonus screen and exit the config menu.

Press GUN button to save your selection and progress to the next menu or exit, or press RESET to exit config without saving the current menu (all previous menus will still have been saved).

Selecting Bonus Screen Top and Bottom Metrics

Top Display Options: [Mag Heading | COG | SOG | Heel | Pitch | Shift]   Default: Mag Heading

Bottom Display Options: [Mag Heading | COG | SOG | Heel | Pitch | Shift]   Default: COG

The thirteenth config menu is only accessible if 'On' was selected on the previous config menu page - 'Enabling Bonus Screen.' This config menu will let you select which metrics you want displayed on the bonus screen. The default metrics are: Heading on the top display, COG on the bottom display, and Heel on the bar graph.

First you will set the Top Metric as shown by it scrolling across the screen. Progress through the various metrics available by pressing either the PIN or RC button. Once you have found the metric you want for the top display press the GUN Button to save it and move on to selecting the bottom metric.

You will now see the bottom display scrolling across the screen. Select the bottom metric just as you did for the top metric. Once you have selected your desired metric for the bottom display and pressed GUN button to save it you will be taken to the 'Selecting Bonus Screen Bar Graph Metric,' menu.

In order to return to setting the top metric once again you will need to exit the Config Menu and re-enter it, scrolling through all the option until you return to this menu item.

Selecting Bonus Screen Bar Graph Metric

Options: [Heel | Shift | Off]   Default: Heel

The fourteenth config menu is only accessible if 'On' was selected on the 'Enabling Bonus Screen,' menu. This config menu will let you select which metric you want displayed on the bonus screen. Bar graph. The default is Heel angle.

Bonus Mode Bar Graph setting page where again you can scroll through your options with the PIN or RC Buttons.

Zeroing Pitch and Heel Angles

In order to zero Pitch and Heel angles for your mounted ProStart you must first ensure that HEEL (not shift) is being displayed while in RACE mode. (see Setting Race Bar Graph section to switch between shift and heel). Now, while in Race Mode a single short press of the reset button will zero both the heel and pitch angles to the exact orientation of the ProStart unit in that moment.

Understanding 'Distance to Line'

Once you have set (pinged) both ends of the starting line the ProStart connects these two points in a straight line of infinite length. The ProStart calculates distance to line as its perpendicular distance to the infinite start line.

The ends of the line should be set when the bow of your boat is on the line. When you set the ends of the line, approach each ping in the same direction you would if you were approaching the line to start the race.

Pinging without the bow offset

Pinging without the bow offset, the ProStart calculates distance to line as the perpendicular distance from its current position to the straight line between its positions at the time of your line set pings.

The illustration below provides a graphical definition of distance to the start line and how you can set it when you are not using the bow offset.
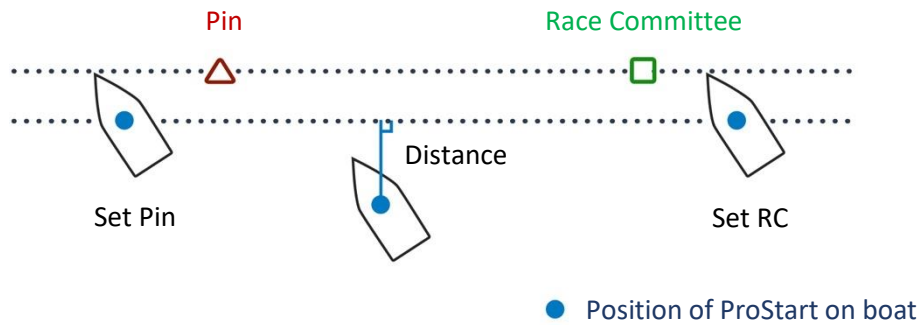
Pinging with the bow offset

Pinging with the bow offset, the ProStart calculates distance to line as the perpendicular distance between the bow of your boat and the start line.

The illustration below provides a graphical definition of distance to the start line and how you can set it when you are using the bow offset.
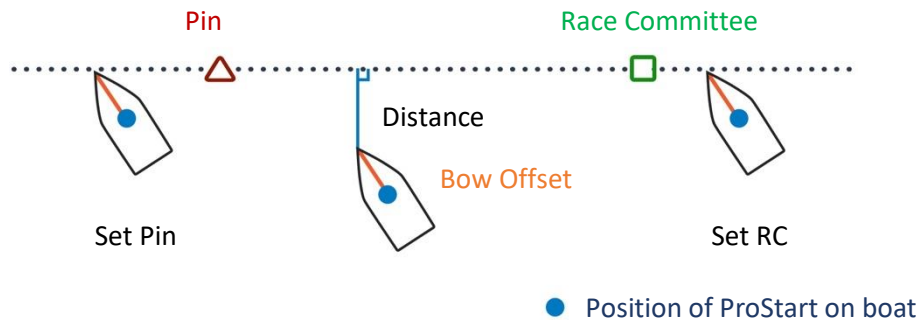
Setting the Ends

The start line ends can be set anywhere along the start line. We recommend sighting both the pin and the race committee ends from outside the line. Another method is to get close to the ends just inside the line and set them. The ends can be set at any time and in any order.

1. Approach the line slowly from below with a consistent speed and heading.

2. Press the PIN / RC button when your bow is on the line.

   - Press the RC button to set the right end of the line

   - Press the PIN button to set the left end of the line

We recommend setting the ends of the line for the start of each race, regardless of whether the line has moved.

How to use Time and Distance

Balancing time and distance to hit the line at the gun, close hauled and at full speed is the stuff good starts are made of.

To accomplish this goal, many top sailors establish a ratio of time to distance or distance to time. Conveniently in boats in the 20-25 foot range, the ratio is often 1:1. Your ratio(s) may vary.

A timed run at the line is a good way to figure out your time and distance ratio.

Understanding 'Line Square To'

To display 'Line Square To' bearing, press the MODE and MAX buttons at the same time. 'Line Square To' will appear on screen for 5 seconds. You can exit 'Line Square To' before the 5 seconds is up by pressing the RESET button.

'Line Square To' is calculated as the magnetic bearing from the right end of the line to the left end of the line plus 90°. See image below for an illustration of how this figure is calculated:
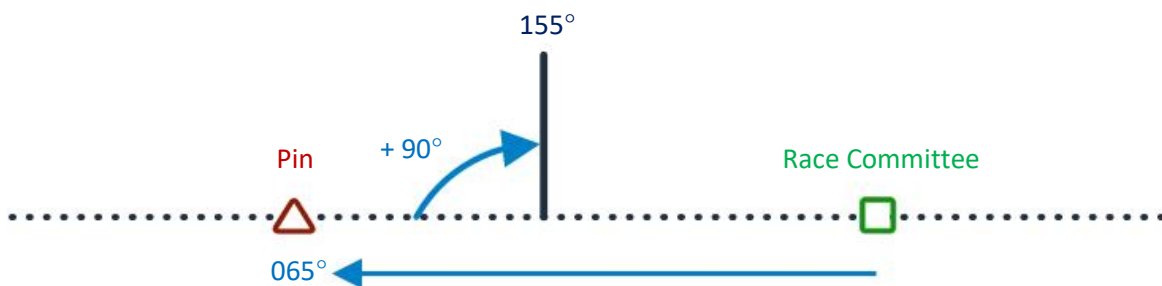
IMPORTANT - In order for the 'Line Square To' output to work with your magnetic compass, you need to ensure your magnetic declination is set to automatic (default), or the accurate magnetic declination for your sailing venue. See the Configuration section on page 29 for instructions on setting magnetic declination for the ProStart.

How to use 'Line Square To'

For a standard upwind start where the line is set perpendicular to the wind direction 'Line Square To' is a tactical aid which gives you information about which end of the line is favored. If the start line is set perfectly the 'Line Square To' angle should match the wind direction. Inevitably, this is not the case so shoot head to wind, check the bearing on a magnetic compass and compare this measurement with 'Line Square To.'

The right side of the line is favored when the Wind Direction is to the right of 'Line Square To.'

The left side of the line is favored when Wind Direction is to the left of 'Line Square To.'

How much does 'Line Square To' matter? Ten degrees of line bias favors one end over the other by approximately 20% of the length of the line.
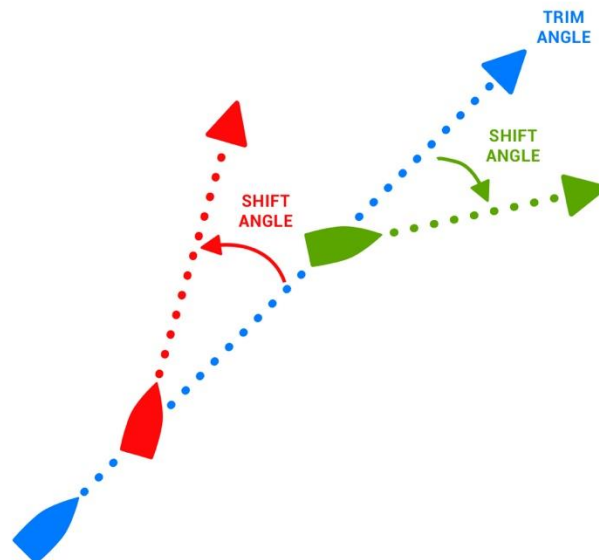
Understanding Shift Tracking

There are three ways to view the shift tracking feature: it can be displayed on the bar graph in Race Mode, the bar graph in Bonus Mode, or numerically in Bonus Mode.
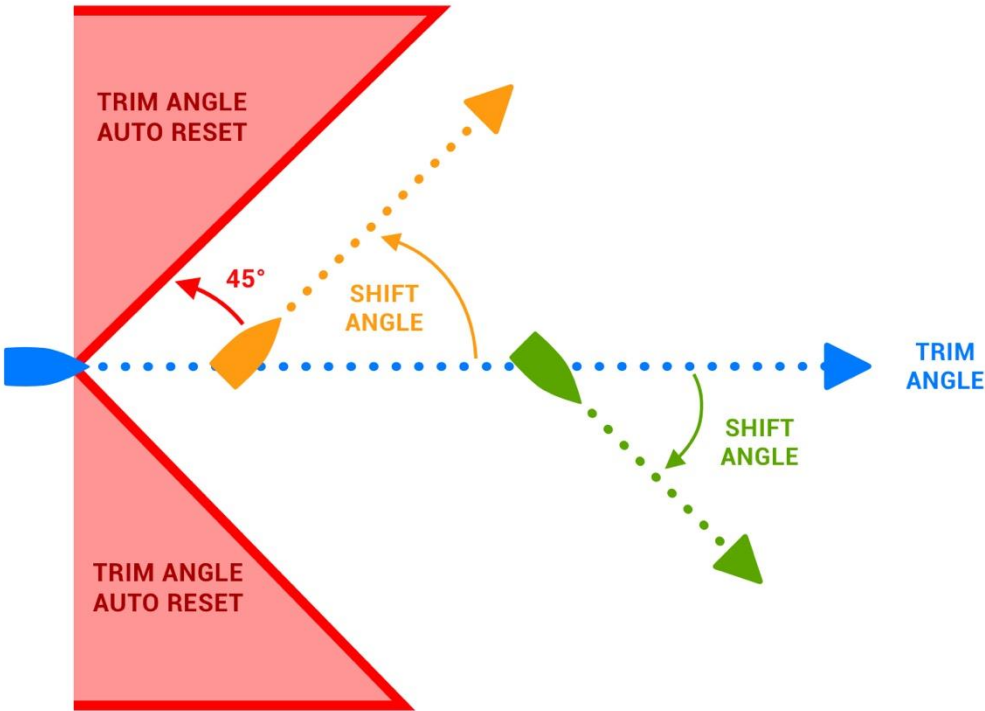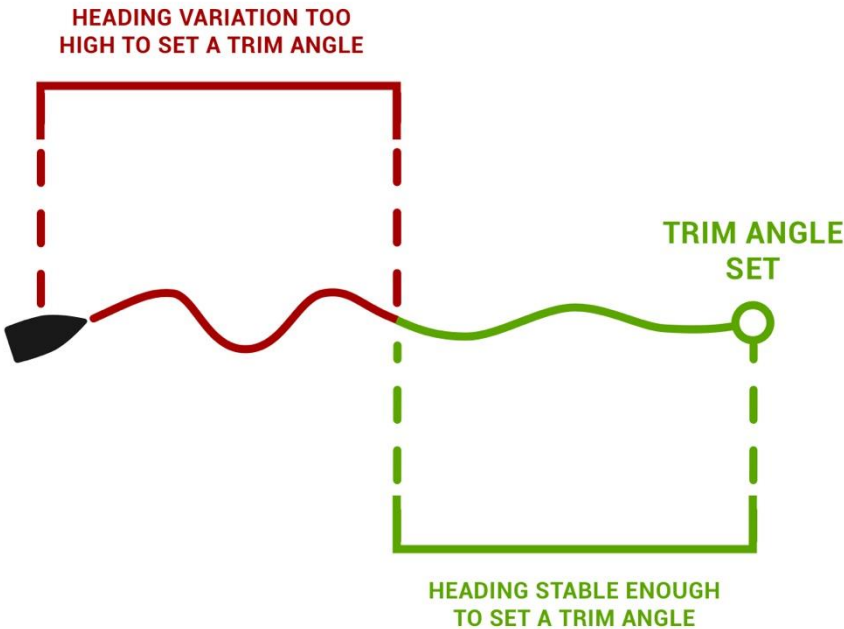
See the Configuration section on page 25 to see how to change how you view shift tracking.

The shift tracking algorithm starts by detecting when the boat is sailing a steady course. This is accomplished by comparing the current heading to a rolling average of previous heading measurements. Once the current heading falls within a specified bound of this rolling average the boat is determined to be sailing a steady course and a "trim angle" is set to the current heading.

When a trim angle is set the shift measurement will display the damped difference between the current heading and this trim angle. The damping reduces the algorithm's sensitivity so as to only capture larger variations in heading angle, ideally from wind angle changes, and not any smaller heading variations due to wave action or other noise effects.

The trim angle remains constant until the current heading differs from the trim angle by more than 45 degrees. Once the trim angle is reset the shift angle will no longer display and the algorithm will again start measuring for when the boat has reached a new steady course.

**HEADING VARIATION TOO
HIGH TO SET A TRIM ANGLE**

**TRIM ANGLE
SET**

**HEADING STABLE ENOUGH
TO SET A TRIM ANGLE**

**TRIM ANGLE
AUTO RESET**

45°

**SHIFT
ANGLE**

**TRIM
ANGLE**

**SHIFT
ANGLE**

**TRIM ANGLE
AUTO RESET**

How to use Shift Tracking

While sailing a close-hauled course upwind the shift tracking feature will give a measure of how much you are being lifted (wind is shifting towards the stern of the boat), knocked (wind is shifting towards the bow of the boat), or sailing a straight course. This assumes that you are sailing your boat at a consistent angle to wind, i.e. the wind is dictating your heading.

The trim angle will automatically reset every time you tack. If you sail a relatively steady course after you tack, you'll see a new trim angle is set when the arrow appears at the top of your display. From this point on - until you deviate from this course by more than 45°) the bar graph will show segments to the right of the arrow if your heading is deviating to starboard of the 'trim angle' and to the left if your heading is deviating to port.

Now let's say you just tacked onto port tack, once your new heading angle is stable the trim angle will be set to your new heading and you'll see the arrow display. From this point on - assuming you are steering your boat to maintain a constant angle to the wind - any heading deviations displayed on the bar graph can be assumed to be wind shifts. So, if you notice one bar segment displayed to the right of the arrow, then 2, and eventually 3, you can assume that you are now getting knocked between 9°-12° (3 segments at 3°/segment), and you may want to consider tacking to take advantage of the lift on starboard if your position on the course allows. Conversely, if you see 3 segments showing up to the left of the arrow while on port tack you can assume you are being lifted between 9°-12°

Understanding GPS Off / SHIFT Mode

GPS Off or SHIFT Mode, allows the user to hide all of the GPS features and use the ProStart as a tactical compass. In SHIFT Mode, the ProStart will function nearly identically to the Velocitek SHIFT, a tactical compass dedicated to tracking wind shifts.

To learn how to turn on SHIFT Mode see 'Disabling GPS / Enabling SHIFT Mode' on page 31 in the configuration section.

In Start Mode, with SHIFT mode is enabled, the ProStart will display a countdown timer on the top data field and a magnetic compass on the bottom data field.

In Race Mode, with SHIFT mode is enabled, magnetic heading is displayed on top. When reference angles are set, shift angle is displayed on the bottom and shift magnitude and direction are displayed on the bar graph with each segment representing 3°.

Heading in SHIFT Mode

Heading is the magnetic heading of the device expressed in degrees with 360˚ being north. Heading is displayed on the top line of data in Race Mode. In Start Mode heading is on the bottom line and countdown timer is on top.

Setting Reference Angles in SHIFT Mode

There are two reference angles, starboard reference angle and port reference angle. The reference angle is a user input heading that is the optimal heading on a given tack. The reference angle for the starboard and port tack can be set by pressing the ∆ (port) or □ (starboard) buttons.

The shift angle and shift indicator are displayed when the heading is within 25° of the reference angle. The reference angle is not displayed on screen.

When both the starboard and port reference angles are set and are both within 25˚ of the heading, the closest reference angle will be displayed.

Clearing the Reference Angles

You can clear the reference angles by pressing the square and triangle buttons at the same time.

SHIFT Indicators

The shift indicators are only displayed when the heading is within 25˚ of a reference angle.

Bar Graph

Right segments on the bar graph at the top of the screen represent clockwise rotation or a right shift. Clockwise rotation or a right shift is a lift on starboard and a header on port.

Left segments on the bar graph at the top of the screen represent counter-clockwise rotation or a left shift. Counter-clockwise rotation or a left shift is a header on starboard and a lift on port.

Numerical Display

The shift angle (difference between set reference angle and heading) is displayed numerically on the bottom line of data.

Lifts are always a positive number and headers always a negative number.

Start Mode with SHIFT Mode enabled

Timer

The countdown timer is displayed on the top line of data.

The count-down timer displayed as mm:ss. The time can be set from 1:00 to 15:00.

+1 button adds a minute to the timer

The GUN button starts the timer. While the timer is running GUN syncs down to the nearest whole minute.

Heading

Heading is displayed on the bottom line of data.

Heading is the magnetic heading of the device expressed in degrees with 360˚ being north.

Data Storage

The ProStart records data at 4 Hz (four times per second).

The ProStart records compass, heel, pitch and rate of turn (yaw rate) data whenever the device is powered on. The ProStart records GPS data whenever the device is on and GPS signal is detected.

The ProStart can store up to 1000 hours of data.

Download data

The ProStart works like a USB thumb drive. Plug your ProStart into a Mac, Windows or Linux computer to see your tracks organized by date. Go to chartedsails.com to replay and share your tracks.

Software

The ProStart works like a USB thumb drive and does not require any software to communicate with your computer.

Velocitek Control Center

The ProStart no longer requires you to use Velocitek Control Center in order for the ProStart to communicate with your computer.

Replays

To replay the data downloaded from a Velocitek device we recommend www.chartedsails.com and www.sailnjord.com

Firmware

Firmware is the software that runs on the ProStart. Periodically firmware updates will be available with bug fixes and enhanced features. To update the firmware, you must connect your ProStart to a Mac, Windows or Linux computer. ProStart firmware are .hex files. **You do not need to open a .hex file or assign a default program to open a .hex file to change the firmware on your ProStart.**

New versions of firmware can be found on the Velocitek website here:

https://www.velocitek.com/pages/prostart-firmware

Instructions for changing ProStart firmware:

1. Connect the ProStart to a computer.

2. It will behave like a thumb drive (or any other USB mass storage device).

3. Open the ProStart, and then open the Firmware folder.

4. Remove the existing .hex from the Firmware folder.

5. Drag and drop the new .hex firmware file into the folder.

6. Unplug your ProStart from the computer.

7. Turn your ProStart off and then back on again.

8. Wait for a moment for the firmware update to begin.

9. You will know the firmware is updating when the ProStart counts from 0 to 100 on screen.

10. When it hits 100, the update is complete and the ProStart will begin operating normally, using

    the new firmware.

Contact Velocitek technical support (support@velocitek.com) if you have questions about the firmware on your ProStart.

Maintenance

To ensure your ProStart's enclosure remains watertight and the electronics are not destroyed by corrosion, please take the following precautions:

- Always replace the USB port cap securely before exposing the ProStart to the marine environment.

- Dry case with a towel before opening the USB port cap.

- Wipe away sand or debris on the gasket before closing the USB port cap.

- Once the cap is open wipe away any loose water droplets.

- If you ever see signs that water is leaking inside the enclosure, please contact Velocitek Support immediately at (866)-498-6737 or support@velocitek.com to arrange to have your device repaired and made watertight again.

Warranty

Velocitek products are intended for use exclusively as tactical aids for inshore sailboat and SUP racing. Velocitek products should never be used for navigation.

Velocitek products and accessories are guaranteed against manufacturing defects for two years from the original date of purchase. This warranty is non-transferable and only applies to the original purchaser for new devices purchased from Velocitek or an authorized Velocitek reseller. Velocitek's sole obligation in the event of such defects during this period is to repair or replace the defective part or product with a comparable part or product at Velocitek's sole discretion. Except for such repair or replacement, the sale, processing or other handling of this product is without warranty, condition or other liability even though the defect or loss is caused by negligence or other fault. Velocitek is not responsible for shipping costs associated with warranty returns. Velocitek assumes no liability for any accident, injury, death, loss, or other claim related to or resulting from the use of this product. In no event shall Velocitek be liable for incidental or consequential damages relating to or resulting from the use of this product or any of its parts.

Damage resulting from abuse, misuse, accident, or normal wear and tear is not covered by this or any warranty. The types of damage not covered by this warranty include, without limitation:

- Smashed LCD screen(s).

- Damage caused by a product being struck by a person or object.

- Damage caused by a product being dropped onto any surface from any height.

- Damage caused by line rubbing across the surface of a product.

- Damage caused by a product being incorrectly mounted in or removed from its cradle.

- Water damage to electronics that occurs as a result of any of the above types of damage having compromised a product's waterproofness.

Contact

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Email: support@velocitek.com

Website: http://www.velocitek.com

Support: http://www.velocitek.com/support

Compliance

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna

- Increase the separation between the equipment and receiver

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

- Consult the dealer or an experienced radio/TV technician for help

Canadian Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

European Community Compliance Statement

The equipment complies with The EMC Directive 2004/108/EC.

Index