ZERO FF



DPERATION MANUAL

CONTENTS

• Introduction	
Zero Off Interface	3
Powering up the system	4
Button Operations	4
• Screen Modes - Recreational	6
Jump	6
Slalom	8
Trick	10
Wake	12
Waypoint	14
Tournament	16
Jump	16
Slalom	18
Trick	20
Wake	21
• Timing Screens	22
Jump	22
Slalom	22
Main Menu	23
Мар	23



INTRODUCTION

ZeroOff is a new departure in boat speed control for watersports. It provides true closed loop control of boat speed which means that, as long as the boat motor has enough power, the boat will accurately track the speed desired by the driver without any need for complicated setup information to be entered into the system. Simply pick your desired speed, and shove the throttle handle wide open. ZeroOff will take care of the rest.

Closed loop speed feedback is based on signals received from the worldwide GPS satellite system put in place by the US government. For this reason, there is no need for maintenance intensive and unreliable pitot tubes or paddle wheels to provide a speed measurement. As long as the GPS antenna can see the sky, the ZeroOff is good to go with speeds controlled to within 0.1mph at all times... no calibration or setup procedures required. ZeroOff is NOT an engine RPM control system, although it can also be used in this mode. It is a true boat speed control system. It locks in on the target speed quickly and reliably with minimal overshoot, and handles turns without sagging or overshooting excessively. This makes it very well suited for use in sports such as Wakeboarding and Trick skiing. Wakeboarders will love how it handles double-ups. Drivers can quit worrying about what the speed is and focus completely on steering the boat.

For Slalom and Jump skiing, ZeroOff has been tailored to provide a similar feel to that provided by the expert hand drivers from the era before automatic speed control systems became available. Because it is a closed loop system, ZeroOff responds to how the skier pulls on the boat, and allows he or she to get free of the boat at appropriate times as they pass through the course. ZeroOff developers have worked closely with leading athletes from the world of three event skiing to ensure that not only is speed and course timing controlled accurately, but that the "feel" of the pull is outstanding and in synch with the skier's needs while passing down the course. Once again, all the driver has to focus on is maintaining his boat path.

Using GPS also allows ZeroOff to take advantage of position information provided by the satellite signals. ZeroOff can use GPS data to identify a boat's location on the surface of the earth with sufficient accuracy that courses for sports such as Slalom and Jump

competitions can be mapped and memorized. Once a course has been mapped into ZeroOff's permanent memory, it will always know when it is entering that course, and will provide all required speed control and timing measurements without the need for course magnets and magnet detector boxes. ZeroOff has been certified by the American Water Ski Association for use in all levels of Slalom, Jump and Trick competitions without the need for course magnets, and has shown itself to consistently control times in Slalom competitions to within +/- 1 hundredth of a second, regardless of adverse weather or course conditions, or skier variability. Competitive skiers like it because it levels the playing field and ensures consistent fair pulls through the course, while ski schools like it's ease of use in dealing with a wide range of skier styles and skill levels. No more entering skier and crew weights, or adjusting for head/tail winds or currents!!

ZERO OFF INTERFACE



- A 128 x 64 Back Lit Display Screen
- B. Select Button
- Scroll Down Button
- Scroll Up Button
- On/Off Menu

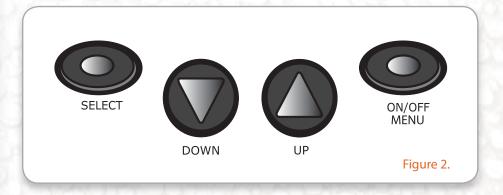
ZERO OFF FACEPLATE AND BUTTONS.

There are 4 user buttons for inputting commands, and a 128x64 pixel backlit LCD display showing operating parameters. General button usage involves tapping and holding the buttons to manipulate menus and parameter values.

POWERING THE SYSTEM UP

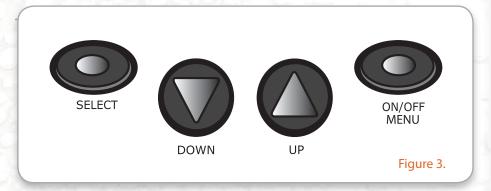
The system turns on automatically when the ignition switch is turned ON. It will power up in the same configuration in which it was turned OFF as long as the battery has not been disconnected. This means that any speed or setup selections that existed when the ignition is turned off will be retained for the next operating session. The system will not function in speed control mode until a satisfactory GPS fix has been achieved, usually within 5-10 seconds of ignition ON. If the battery has been disconnected, the system will power up in a default mode.

BUTTON OPERATIONS



GENERAL BUTTON USE

A button "HOLD" usually requires keeping the button pressed for about 2 seconds, while a button "TAP" requires pressing and releasing the button in less than 1 second. Button actions are accompanied by screen responses and beeps from the display unit buzzer.

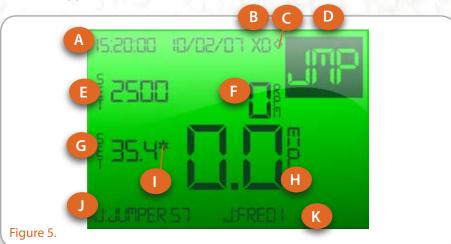


Tap <SELECT> to high-light variables
Tap <UP> or < DOWN> to modify selected parameter values.
Tap <ON/OFF> to turn unit on or off.
Hold <MENU> to invoke main menu system



SCREEN MODES -Recreational

Event Type - JUMP



A Time and date Indicator Time is shown XX:XX:XX

Date is shown MM/DD/YY

B Number of satellites

X = No Satellite fix

1-12= Number of satellites

D = Differential if present

Page Icon

Tap <SELECT> as required to highlight.

Tap<UP & DOWN> arrows to page up or down through the Screens (Recreational, Tournament & Timing Recap).

D Event Type Selection/Directional Arrow

Event Type Selection: Highlight & Tap<UP & DOWN> arrows to change the event type (jump, slalom, trick, waypoint).

Directional Arrow: Reverts to this when Event Type is not active.

Directional arrow will show what direction the boat is moving in.

Arrow freezes when boat velocity is less than 1kph.

RPM set speed

Tap MENU while speed setpoint is highlighted to turn system on in RPM mode. RPM mode only available from Recreational screen

- Actual RPM
- G Boat Set Speed (MPH or KPH)

Fine Tuning: Highlight & tap <UP & DOWN> arrows to increase or decrease the set speed by 0.1 MPH or KPH increments.

Fast Tuning: Highlight & hold < UP & DOWN > arrows to accelerate the rate of change of set speed.

- Actual Boat Speed (MPH)
- Official Tournament Set Speed
 System will pause briefly at official tournament speeds while modifying set speed
- Skier Selection
 If a skier is selected then the skier stored name will be shown in place of Latitude
 (Lifer lumpers only see main menu)
- (J for Jumpers only, see main menu).

 Course Selection
 - Only applies to Slalom, Jump and Waypoint.

 If a course is selected then the stored course map name will be shown in place of Longitude (see main menu).

SCREEN MODES -Recreational

Event Type - Slalom



A Time and date Indicator

Time is shown XX:XX:XX
Date is shown MM/DD/YY

B Number of satellites

X = No Satellite fix

1-12= Number of satellites

D = Differential if present

Page Icon

Tap <SELECT> as required to highlight.

Tap < UP & DOWN> arrows to page up or down through the Screens (Recreational, Tournament & Timing Recap).

D Event Type Selection/Directional Arrow

Event Type Selection: Highlight and Tap < UP & DOWN> arrows to change the event type (Jump, Slalom, Trick, Wake, and Waypoint).

Directional Arrow: Reverts to this when Event Type is not active.

Directional arrow will show what direction the boat is moving in.

Arrow freezes when boat velocity is less than 1kph

RPM set speed

Fine Tuning: Highlight and Tap <UP & DOWN> arrows to increase or decrease the set speed by 10RPM increments.

Fast Tuning: Highlight and hold <UP& DOWN> arrows to accelerate the rate of change of set speed.

Actual RPM

G Boat Set Speed (MPH or KPH)

Fine Tuning: Highlight and tap <UP & DOWN> arrows to increase or decrease the set speed by 0.1 MPH or KPH increments.

Fast Tuning: Highlight and hold < UP & DOWN > arrows to accelerate the rate of change of set speed.

Actual Boat Speed (MPH)

Official Tournament Set Speed

An asterisk is shown if the set speed (RPM or Boat) is an official tournament speed (Jump or slalom only).

Pull Type/Skier Selection

A, B, or C

If a skier is selected then the skier stored name will be shown in place of Latitude (J for Jumpers only, see main menu).

Course Selection

Only applies to Slalom, Jump and Waypoint.

If a course is selected then the stored course map name will be shown in place of Longitude (see main menu).

SCREEN MODES -Recreational

Event Type - TRICK



- A Time and date Indicator
 Time is shown XX:XX:XX
 Date is shown MM/DD/YY
- B Number of satellites
 X = No Satellite fix
 1-12= Number of satellites
 D = Differential if present
- Page Icon

Tap <SELECT> as required to highlight.

Tap <UP & DOWN> arrows to page up or down through the screens (Recreational, Tournament & Timing Recap).

D Event Type Selection/Directional Arrow

Event Type Selection: Highlight & Tap < UP & DOWN> arrows to change the event type (Jump, Slalom, Trick, Wake and waypoint).

Directional Arrow: Reverts to this when Event Type is not active. Directional arrow will show what direction the boat is moving in. Arrow freezes when boat velocity is less than 1kph.

RPM set speed

Fine Tuning: Highlight & tap <UP & DOWN> arrows to increase or decrease the set speed by 10RPM increments.

Fast Tuning: Hi light and hold < UP & DOWN > arrows to accelerate the rate of change of set speed.

Actual RPM

G Boat Set Speed (MPH or KPH)

Fine Tuning: Highlight and tap <UP & DOWN> arrows to increase or decrease the set speed by 0.1 MPH or KPH increments.

Fast Tuning: Hi light and hold < UP & DOWN > arrows to accelerate the rate of change of set speed.

Actual Boat Speed (MPH)

Pull Type/Skier Selection

A, B, or C

If a skier is selected then the skier stored name will be shown in place of Latitude (J for Jumpers only, See main menu).

Course Selection

Only applies to Slalom, Jump and Waypoint.

If a course is selected then the stored course map name will be shown in place of Longitude (see main menu).

SCREEN MODES -Recreational

Event Type - WAKE



A Time and date Indicator Time is shown XX:XX:XX

B Number of satellites

X = No Satellite fix

1-12= Number of satellites

Date is shown MM/DD/YY

D = Differential if present

Page Icon

Tap <SELECT> as required to highlight.

Tap <UP & DOWN> arrows to page up or down through the screens (Recreational, Tournament & Timing Recap).

D Event Type Selection/Directional Arrow

Event Type Selection: Highlight & Tap < UP & DOWN> arrows to change the event type (Jump, Slalom, Trick, Wake and Waypoint).

Directional Arrow: Reverts to this when Event Type is not active.

Directional arrow will show what direction the boat is moving in.

Arrow freezes when boat velocity is less than 1kph.

RPM set speed

Fine Tuning: Highlight and tap <UP & DOWN> arrows to increase or decrease the set speed by 10RPM increments.

Fast Tuning: Highlight and hold <UP & DOWN> arrows to accelerate the rate of change of set speed.

Actual RPM

G Boat Set Speed (MPH or KPH)

Fine Tuning: Hi light and tap <UP & DOWN> arrows to increase or decrease the set speed by 0.1 MPH or KPH increments.

Fast Tuning: Highlight and hold <UP & DOWN> arrows to accelerate the rate of change of set speed.

Actual Boat Speed (MPH)

Pull Type/Skier Selection

A, B or C

If a skier is selected then the skier stored name will be shown in place of Latitude. (J for Jumpers only, see main menu).

Course Selection

Only applies to Slalom, Jump and Waypoint.

If a course is selected then the stored course map name will be shown in place of Longitude (see main menu).

SCREEN MODES -Recreational

Event Type - WAYPOINT



Waypoint is used in recreational mode for locating a point that has been previously mapped. To map a waypoint see the Mapping section of the operational

- A Time and date Indicator
 Time is shown XX:XX:XX
 Date is shown MM/DD/YY
- B Number of satellites

 X = No Satellite fix

 1-12= Number of satellites

 D = Differential if present
- Page Icon
 Tap <SELECT> as required to highlight.
 Tap <UP & DOWN> arrows to page up or down through the screens (Recreational, Tournament & Timing Recap).
- Event Type Selection/Waypoint Arrow
 Event Type Selection: Highlight and tap <UP & DOWN> arrows to change the event type (Jump, Slalom, Trick, Wake and Waypoint).
 Waypoint Arrow: Is pointing in the direction of the way point.

E RPM set speed

Fine Tuning: Highlight and tap <UP & DOWN> arrows to increase or decrease the set speed by 10RPM increments.

Fast Tuning: Highlight and hold <UP & DOWN> arrows to accelerate the rate of change of the set speed

- Actual RPM
- G Boat Set Speed (MPH or KPH)

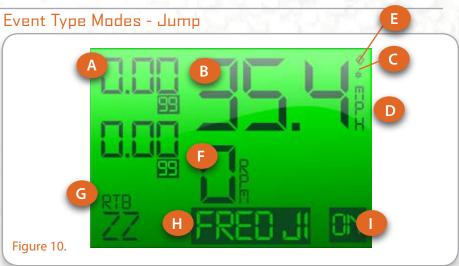
Fine Tuning: Highlight and tap the <UP & DOWN> arrows to increase or decrease the set speed by 0.1 MPH or KPH increments.

Fast Tuning: Highlight and hold the <UP & DOWN > arrows to accelerate the rate of change of the set speed.

- Actual Boat Speed (MPH)
- Distance to waypoint

 If a way point is selected, DIST will equal the distance to the waypoint in miles.
- Waypoint Name

TOURNAMENTS



Timing Display

Positioned on left side of screen. Shows the most recent run timing.

1st number is the 1st segment. Smaller number under it is the deviation from the ideal time (shown in hundredths of a second).

Highlighted: Time was Fast Un-highlighted: Time was Slow

2nd number is the 2nd segment. Smaller number under it is the deviation for the ideal time (shown in hundredths of a second).

Highlighted: Fast Un-highlighted: Slow

B Boat Speed

Stationary: When the boat is stationary the gauge will show the boat set speed. Tap <SELECT> as required to highlight set speed.

Tapping UP/DOWN jumps the speed to the next official tournament speed. Holding will result in rapidly jumping through the official setspeeds

Moving (over approx. 2 MPH): When the boat is moving over approx. 2 MPH the gauge will switch to showing the actual boat speed.

Moving & Highlighted: (over approx. 2 MPH) When the boat is moving over approx. 2 MPH the gauge will show the actual boat speed.

To modify the set speed while moving tap <SELECT> to highlight the speed.

Tapping UP/DOWN jumps the speed to the next official tournament speed. Holding will result in rapidly jumping through the official setspeeds

Official Tournament Set Speed

An asterisk is shown if the set speed (RPM or Boat) is an official tournament speed (Jump or slalom only).

On tournament page, the set speed is always an official speed unless it has been modified to some intermediate value by switching over to the recreational screen to make the modification.

MPH icon target speed notification

When the boat is locked on it's target speed the MPH icon highlights and the unit will beep.

Page Icon

Tap <SELECT> as required to highlight, Tap <UP & DOWN> arrows to page up or down through the screens (Recreational, Tournament & Timing Recap available).

Actual engine RPM

G Pull Type

A-ZZ with or without RTB

RTB – Return to base: Slows the boat in the second segment for less aggressive jumpers.

Operating mode/Course

Shows JUMP until a course has been detected or selected. The nearest Jump course within 1km radius will

automatically be selected. To disable and force use of an arbitrary course manually, see MAIN MENU > MAP > ACTIVATE MAPPED COURSE.

ON/OFF button

Tap <MENU> button to turn the cruise control on and off.

TOURNAMENTS



A Timing Display

Shows the most recent run.

Buoys 1-6 with actual times and deviations from ideal time for the current set speed (shown in hundredths of a second).

1st underline = Mid Course Time

2nd underline = Exit Time

Timing deviation

Highlighted = Fast

Un-highlighted = Slow

Boat Speed

Stationary: When the boat is stationary the gauge will show the boat set speed. Tap <SELECT> as required to highlight set speed.

Tapping UP/DOWN jumps the speed to the next official tournament speed. Holding will result in rapidly jumping through the official set speeds

Moving: (over approx. 2 MPH) When the boat is moving over approx. 2 MPH the gauge will switch to showing the actual boat speed.

Moving & Highlighted: (over approx. 2 MPH) When the boat is moving over approx. 2 MPH the gauge will show the actual boat speed.

To modify the set speed while moving tap <SELECT> to highlight the speed.

Tapping UP/DOWN jumps the speed to the next official tournament speed. Holding will result in rapidly jumping through the official setspeeds

MPH icon target speed notification

When the boat is locked on it's target speed the MPH icon highlights and the unit will beep.

Official Tournament Set Speed

An asterisk is shown if the set speed chosen is an official tournament speed (Jump or slalom only).

Page Icon

Tap <SELECT> as required to highlight.

Tap < UP & DOWN> arrows to page up or down through the Screens (Recreational, Tournament & Timing Recap available).

Last Buoy Timing Display

This display will update to the most recent buoy timing as the boat travels thru the course. B1-B6 = Buoy 1 – Buoy 6 times EX: = Exit time

G Pull Type

A-C

A is a more aggressive pull, C is least.

(1) Operating mode/Course

Shows SLALOM until a course has been detected or selected.

Automatic course detection: The nearest slalom course within 1km radius will automatically be selected. To disable and force use of an arbitrary course manually, see MAIN MENU > MAP.

ON/OFF button

Tap <MENU> button to turn the cruise control on and off.

TOURNAMENTS

Event Type Modes - Trick



- A Boat Set Speed
- B Actual Boat Speed
- Page Icon
 Tap <SELECT> as required to highlight.

Tap <UP & DOWN> arrows to page up or down through the Screens (Recreational, Tournament available).

- Pull Type
 A-C
- Operating mode
 Shows TRICK always
- ON/OFF button
 Tap <MENU> button to turn the cruise control on and off.

TOURNAMENTS

Event Type Modes - Wake



- A Logo Box
- B Actual Boat Speed
- C Set Speed
 Tap or hold <UP & DOWN> arrow to change the set speed.
- Page Icon
 Tap <SELECT> to page back to recreation.
- **E ON/OFF button**Tap <MENU> button to turn the cruise control on and off.

SCREENS - TIMING



Jump

Latest & Last: Shows history of the 2 most recent SEG 1 & 2 times.



Slalom

Latest & Last: Shows history of the 2 most recent sets of buoy timings, with mid course and exit timing highlighted.

MAIN MENU

Мар

Function

Tap <SELECT> to invoke highlighted menu item





Creating new course maps - Store up to 10 maps.

Tap the <UP & DOWN> arrow keys to highlight the default course.

Name "Spare 0-9"

Tap <SELECT> to map/set-up course

Tap <MENU> to return to the previous screen

Activate a mapped course

Tap the <UP & DOWN> arrow keys to highlight the pre-mapped courses you want to activate.

Tap <SELECT> to activate the highlighted course map.

Tap <MENU> to return to the previous screen.

Remap a pre-mapped course

Tap the <UP & DOWN> arrow keys highlight pre-mapped courses you want to modify.

Hold <SELECT> (2 seconds or until you hear 2 beeps) to modify course map variables.



Figure 19.

Change Course Name

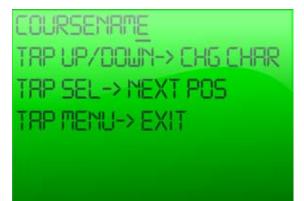


Figure 20.

Course Mapping



Figure 21.

The head unit instructs the driver to tap the SEL button while idling through the entry and exit gates. This button tap should occur at the instant when the GPS antennas cross the plane of the gate (not the pylon). This will ensure more consistent entry gate triggering when going through the Slalom course in opposite directions.

It is not necessary to map more than the entry and exit gates since two points define a straight line, and the location of all gates in a properly surveyed Slalom or Jump course should be completely defined by the two gates mapped. Once the ZeroOff unit knows the location of these two gates, it simply calculates where all the remaining gates should be.

For timing purposes, ZeroOff uses the location of the entry gate as a trigger, and then calculates buoy times based on tracking how far it has travelled down the course. Distance down the course is calculated using knowledge of how fast the boat is travelling rather than triggering on the individual gate GPS coordinates. Since speed is know with very high accuracy, these distances are calculated with high accuracy, and are not subject to the slow +/- 1-2 meter drift inherent in the GPS position estimates. Thus, buoy time measurements are not subject to errors caused by normal GPS position estimate drift. GPS based velocity measurements are inherently more accurate than position estimates since they are based on a different physical measurement technique.

Status bar

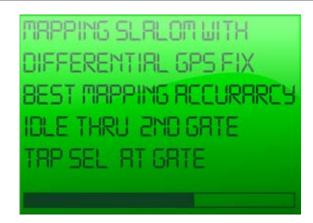


Figure 22.

Progress bar shows how far boat has progressed toward the 2nd gate to be mapped.

Will also sound a series of beeps as the boat nears the 2nd gate whose intensity increases to a solid beep at the gate.

While bringing the boat up to speed to the point where the ZeroOff speed control engages, the driver may manipulate the throttle as desired to pull the skier up and line the boat up for entry to the course. Once the boat has achieved the target speed, it is very important that the driver ensures the throttle handle is pushed all the way forward. Failure to advance the throttle to the full open setting while running the course may result in slow times since throttle handle position provides an upper limit on how much torque the engine is allowed to produce. A wide open throttle handle position frees up the engine to produce it's maximum torque output and allows the speed control to operate at it's optimum level.

Enter Course Coordinates



Figure 23.

Use of this option requires knowledge of the course coordinates with very high precision, down to the 5th decimal place of a minute of latitude and longitude.

Select Course Type

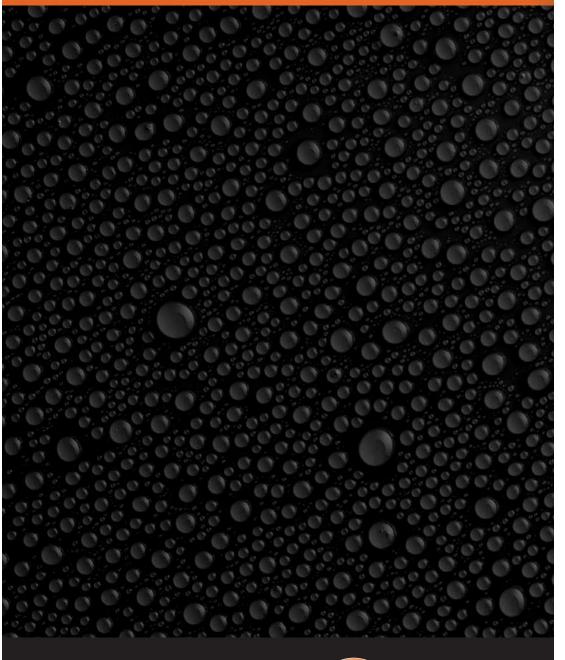


Figure 24.



WARNING; EXCLUSIVE REMEDY; LIMITATION OF LIABILITY; ASSUMPTION OF RISK.

- a. Warning. The Product is designed solely for use with competitive water ski and wake-board watercraft operating under ideal, calm conditions, utilizing a spotter and all other safety crew and requirements of tournament water skiing. The Product should not be used for any other purpose or under any other conditions.
- b. ASSUMPTION OF RISK. YOUR PURCHASE AND USE OF THE PRODUCT IS EXPRESSLY CONDITIONED UPON YOUR ASSUMPTION OF ALL RISKS, DANGERS, CLAIMS AND LOSSES RELATING TO THE USE OF THIS PRODUCT, WHETHER OCCURING PRIOR TO, DURING OR SUBSEQUENT TO OR DIRECTLY OR INDIRECTELY CONNECTION TO SUCH USE, AND WHETHER CAUSED BY ANY PERSONS NEGLIGENCE OR OTHERWISE.
- c. Sole Remedy. Purchaser's sole remedy for any claims, demands, losses or causes of action relating to any and all liability for damages for personal injury, property loss or economic loss arising from the purchase and use of this Product shall be limited to the replacement of the Product or a refund of all or a portion of the purchase price therefore, at the Purchaser's option, pursuant to Seller's Product warranty.
- d. Limitation of Liability. In no event shall seller, its directors, officers, agents, employees and/or dealers ("seller") be liable to purchaser, its customers, assigns, employees, agents or users (authorized or unauthorized) ("purchaser") for incidental, special or consequential damages or damages, losses or expenses for personal injury, property loss or economic loss, arising directly or indirectly from any alleged breach of warranty, breach of contract or any act, use or omission of any person, tortious or otherwise, including but not limited to negligence, strict liability and product liability, whether at equity or at law. Purchaser hereby releases and forever discharges seller under any circumstance and theory of law from any liability for the sale and use of the product in excess of the purchase price of the product. {1220171:}





ZERD FF



OPERATION MANUAL

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	3
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- c. Sole Remedy. Purchaser's sole remedy for any claims, demands, losses or causes of action relating to any and all liability for damages for personal injury, property loss or economic loss arising from the purchase and use of this Product shall be limited to the replacement of the Product or a refund of all or a portion of the purchase price therefore, at the Purchaser's option, pursuant to Seller's Product warranty.
- d. Limitation of Liability. In no event shall seller, its directors, officers, agents, employees and/or dealers ("seller") be liable to purchaser, its customers, assigns, employees, agents or users (authorized or unauthorized) ("purchaser") for incidental, special or consequential damages or damages, losses or expenses for personal injury, property loss or economic loss, arising directly or indirectly from any alleged breach of warranty, breach of contract or any act, use or omission of any person, tortious or otherwise, including but not limited to negligence, strict liability and product liability, whether at equity or at law. Purchaser hereby releases and forever discharges seller under any circumstance and theory of law from any liability for the sale and use of the product in excess of the purchase price of the product. {1220171:}



INTRODUCTION

ZeroOff is a new departure in boat speed control for watersports. It provides true closed loop control of boat speed which means that, as long as the boat motor has enough power, the boat will accurately track the speed desired by the driver without any need for complicated setup information to be entered into the system. Simply pick your desired speed, and shove the throttle handle wide open. ZeroOff will take care of the rest.

Closed loop speed feedback is based on signals received from the worldwide GPS satellite system put in place by the US government. For this reason, there is no need for maintenance intensive and unreliable pitot tubes or paddle wheels to provide a speed measurement. As long as the GPS antenna can see the sky, the ZeroOff is good to go with speeds controlled to within 0.1mph at all times... no calibration or setup procedures required. ZeroOff is NOT an engine RPM control system, although it can also be used in this mode. It is a true boat speed control system. It locks in on the target speed quickly and reliably with minimal overshoot, and handles turns without sagging or overshooting excessively. This makes it very well suited for use in sports such as Wakeboarding and Trick skiing. Wakeboarders will love how it handles double-ups. Drivers can quit worrying about what the speed is and focus completely on steering the boat.

For Slalom and Jump skiing, ZeroOff has been tailored to provide a similar feel to that provided by the expert hand drivers from the era before automatic speed control systems became available. Because it is a closed loop system, ZeroOff responds to how the skier pulls on the boat, and allows he or she to get free of the boat at appropriate times as they pass through the course. ZeroOff developers have worked closely with leading athletes from the world of three event skiing to ensure that not only is speed and course timing controlled accurately, but that the "feel" of the pull is outstanding and in synch with the skier's needs while passing down the course. Once again, all the driver has to focus on is maintaining his boat path.

Using GPS also allows ZeroOff to take advantage of position information provided by the satellite signals. ZeroOff can use GPS data to identify a boat's location on the surface of the earth with sufficient accuracy that courses for sports such as Slalom and Jump competitions can be mapped and memorized. Once a course has been mapped into ZeroOff's permanent memory, it will always know when it is entering that course, and will provide all required speed control and timing measurements without the need for course magnets and magnet detector boxes. ZeroOff has been certified by the American Water Ski Association for use in all levels of Slalom, Jump and Trick competitions without the need for course magnets, and has shown itself to consistently control times in Slalom competitions to within +/- 1 hundredth of a second, regardless of adverse weather or course conditions, or skier variability. Competitive skiers like it because it levels the playing field and ensures consistent fair pulls through the course, while ski schools like it's ease of use in dealing with a wide range of skier styles and skill levels. No more entering skier and crew weights, or adjusting for head/tail winds or currents!!

ZERO OFF GPS SPEED CONTROL INSTRUCTION MANUAL	

ZERO OFF INTERFACE



- 128 x 64 Back Lit Display Screen
- B. Select Button
- Scroll Down Button
- Scroll Up Button
- On/Off Menu

ZERO OFF FACEPLATE AND BUTTONS.

There are 4 user buttons for inputting commands, and a 128x64 pixel backlit LCD display showing operating parameters. General button usage involves tapping and holding the buttons to manipulate menus and parameter values.

POWERING THE SYSTEM UP

The system turns on automatically when the ignition switch is turned ON. It will power up in the same configuration in which it was turned OFF as long as the battery has not been disconnected. This means that any speed or setup selections that existed when the ignition is turned off will be retained for the next operating session. The system will not function in speed control mode until a satisfactory GPS fix has been achieved, usually within 5-10 seconds of ignition ON. If the battery has been disconnected, the system will power up in a default mode.

BUTTON OPERATIONS



GENERAL BUTTON USE

A button "HOLD" usually requires keeping the button pressed for about 2 seconds, while a button "TAP" requires pressing and releasing the button in less than 1 second. Button actions are accompanied by screen responses and beeps from the display unit buzzer.

SELECT BUTTON



Main Menu Function - Tap select to drill down into the menu options.

Screen Function - while on the recreational screen, hold select on either Recreational or Tournament screens to toggle back and forth between the two screens.

LP AND DOWN ARROWS



Main Menu

Tap up or down to select perimeter value.

Screen Function

Modify selected perimeter values on recreational screen.

On tournament screen, <UP/DOWN> only used to modify set speed.

DN/DFF MENU



Figure 5.

Invoke the Main Menu

Press and hold menu. this function available only on Recreational screen MENU subsystem cannot be accessed from the Tournament screen.

Toggle speed control ON and OFF

Tap Menu button.

Back out of menu sub systems by tapping MENU repeatedly



SCREEN MODES -Recreational



Figure 7.

When on the Recreational screen, the system automatically enables Waypoint mode. If a waypoint has been mapped and is within 1km, the system will display it's name, distance away and display a rounded arrow showing which direction to steer to reach it.

A Time and date Indicator Time is shown XX:XX:XX Date is shown MM/DD/YY

B Number of satellites X = No Satellite fix 1-12= Number of satellites

D = Differential if present

Page Icon

Tap <SELECT> to highlight.

Tap < UP & DOWN> arrows to page up or down through the screens (Recreational, Tournament & Timing Recap). Timing Recap not available in Wakeboard mode.

Directional Arrow/Waypoint Arrow

Directional Arrow: Active when no waypoint is selected Directional arrow will show what direction the boat is moving in. Arrow freezes when boat velocity is less than 1kph. Different rounded arrow is active when waypoint is selected and points in the direction of the waypoint.

E RPM set speed

Fine Tuning: Highlight and tap <UP & DOWN> arrows to increase or decrease the set speed by 10RPM increments.

Fast Tuning: Highlight and hold <UP & DOWN> arrows to accelerate the rate of change of the set speed

Actual RPM

G Boat Set Speed (MPH or KPH)

Fine Tuning: Highlight and tap the <UP & DOWN> arrows to increase or decrease the set speed by 0.1 MPH or KPH increments.

Fast Tuning: Highlight and hold the <UP & DOWN > arrows to accelerate the rate of change of the set speed.

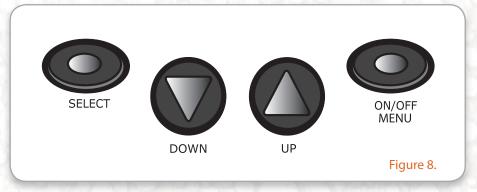
Actual Boat Speed (MPH)

Distance to waypoint

If a way point is selected, DIST will equal the distance to the waypoint in miles. If no waypoint is selected latitude and longitude will be shown

Waypoint Name

Will show the selected waypoint name



Tap <SELECT> to high-light variables

Hold <SELECT>to page between recreational tournament and timing screens Tap <UP> or < DOWN> to modify selected perimiter values.

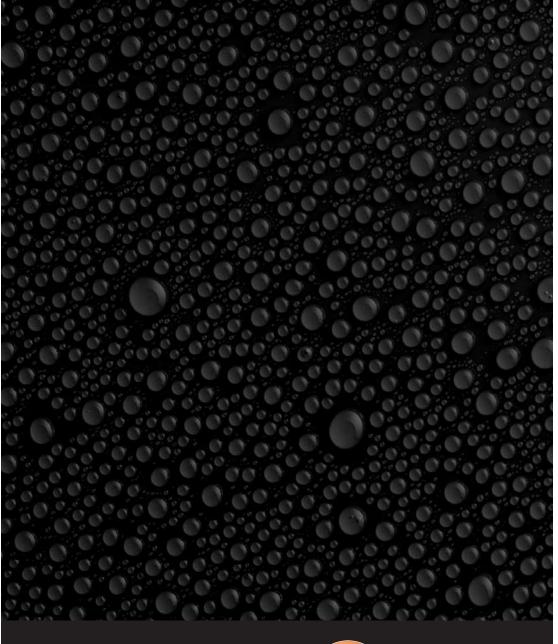
Tap <ON/OFF> to turn unit on or off.

Hold <MENU> to invoke main menu system

WAKE TOURNAMENT



- A Logo Box
- B Actual Boat Speed
- C Set Speed
 Tap or hold <UP & DOWN> arrow to change the set speed.
- Page Icon
 hold <SELECT> to page back to toggle page between Recreational and
 Tournament
- Tap <MENU> button to turn the cruise control on and off.



ZERO CONTROL