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3-Event Mechanical
V 9.2s

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USER'S GUIDE

Section 1. GETTING STARTED

INITIAL SETUP - The display will guide you through this set up. Read slowly and carefully.

Your new PerfectPass system must now complete a short set up procedure to familiarize itself with your particular boat and engine. *(This may have been performed by your dealer if dealer installed)*

Step (1) INITIAL HRS 000 You can enter the number of hours on your boat using the UP Key if you wish to use the PerfectPass hour meter. Press Menu to proceed.

Step (2) The display will now show [read in MPH ^ = Yes]. It is asking you if you would like the display to operate in mph. If you do, confirm by pressing the **UP** key. If you want kph press the **DOWN** key. (We have selected mph for illustration purposes)

Step (3) [WAKE Edition ^ = Y/ **v = 3-Event**] The display will now ask if want the system to be a WakeEdition or a 3-event Edition: For WakeEdition Press UP, **for Three Event press DOWN**.

Step (4) The display will now move into the AUTO CALIBRATE Slalom mode, described in the next section.

GENERAL SYSTEM INTERFACE

- The System will always be powered & screen active, even when in the OFF Mode.
- Turn Control ON or OFF while boat is in neutral or at idle is recommended.
- Engaging System- Once you select speed, simply throttle up smoothly and when the actual speed reaches the set speed, PerfectPass will take over automatically and you will hear an audible beep. **(Do not over throttle)**
- Disengage System – Simply pull back on the throttle.

BUTTON USE

- ON/Off is used to turn control ON or OFF while boat is at idle or in neutral.
- The Menu Button is similar to a mouse, the Menu button moves the cursor around the PerfectPass screen.
- UP & DOWN buttons are used to change speeds, settings, etc.
- Anytime you see the "^" used in a question such as "Read in MPH ^ = Yes" means press the UP Button "^" to confirm. The UP Key means Yes.

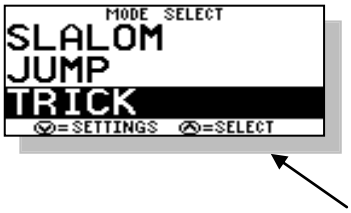
<u>CHANGING SCREENS / MODES</u> (Ex. Slalom to Trick)

To change to a different mode, simply press the Menu Button until the Menu Arrow Icon in the upper right hand corner is highlighted. When the Menu Arrow in upper right corner is dark, press the UP Key.

Menu Arrow
(Highlight and Press Up to Change Modes)

Once you press the UP Key and move from the Slalom Screen, the following screen will appear:

To change modes press the **MENU** key until the desired mode is highlighted. Press the **UP** key to go into the highlighted mode. In this example, you would press Up Key to enter Trick Mode.



UP key to Select Highlighted Mode (Trick)

The Menu Key moves the highlighted screen to the next Mode on the list, when highlighted press the UP Key to select.

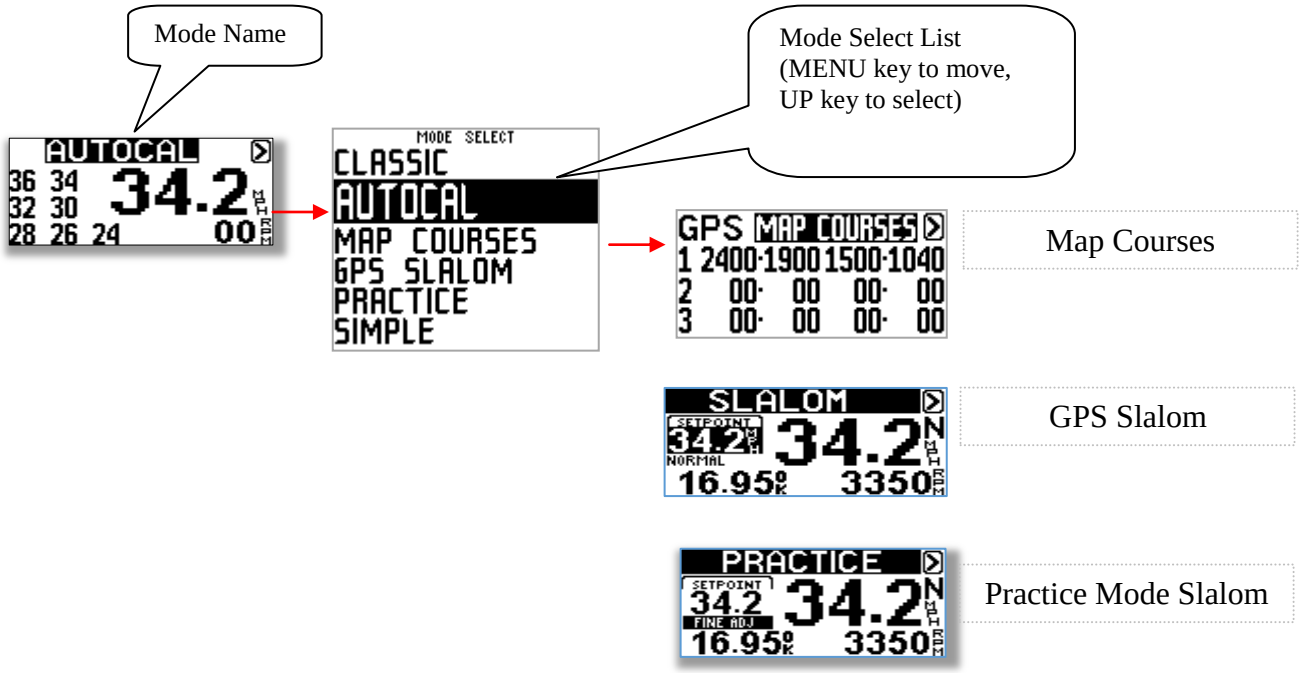
Section 2. SLALOM MODE

SELECTING SLALOM MODE

There are several slalom modes to choose from:

- **AUTOCAL – Slalom RPM Baselines MUST be calibrated for accuracy in this mode before skiing**
- **GPS Slalom** (Official Slalom Speeds)
- **Practice Slalom** (Same as above but in between speeds available)
- **Classic Slalom** (Same as 2007 version, RPM Control only)
- **Simple Slalom** (A new simple to use GPS Slalom Mode for up to 28 off). No "AutoCal" calibration required.

Following calibration, to select the Slalom Mode of your choice (GPS Slalom for most users), simply highlight the word SLALOM or AUTOCAL at the top of the page using the Menu Key, then press the UP Key.



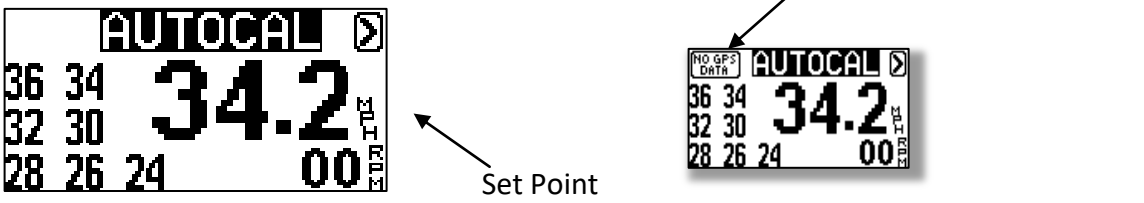
Each individual Slalom Speed MUST BE CALIBRATED for accuracy in the AUTOCAL MODE. (The correct RPM must be set for each speed) Once calibrated, the calibration settings are transferred automatically to the other slalom modes. Therefore you must CALIBRATE your system at each speed in this mode before moving to GPS Slalom or Practice Slalom. See Page 4.

Crew Weight

Most users do not need to worry about using the Crew Weight feature. If you calibrate with a crew of 2 people, then you should be fine leaving it at 0. If you wish to use Crew Weight, enter the weight of the full crew before calibrating baselines. To access, highlight the word Slalom and press the DOWN KEY.

Calibrating Baselines (AUTOCAL)

See AUTOCAL Video at www.perfectpass.com "Support"



In this screen, you can calibrate the RPM Baselines for all of the official Slalom speeds.
It automatically selects 34.2 mph to start (Although you can change it to 36 mph)

Step 1. In calm open water and ideally with two people on board, throttle up smoothly until system beeps to engage. After a few seconds you will notice the digital speed settling towards the 34.2 mph set point. Once locked at 34.2 it will "beep once" confirming the speed was successfully Calibrated.

Step 2. Once the first speed is calibrated, the set point automatically drops down to 32.3 mph. Once again it will settle and "beep once" when Calibrated. It will then drop the speed and repeat.

If you allow the AUTO CAL to calibrate all speeds down to 24 mph, once complete it will switch over to GPS Slalom from AUTO CAL Mode. Or you can stop anytime and switch to MAP COURSE or another Mode.

In a longer lake you may be able to Calibrate all speeds in one pass. On shorter lakes simply stop at the end and throttle back up and the AUTOCAL process will continue.
Once all speeds that you wish to Calibrate are complete, you are ready to **MAP** your Slalom Course so timing will occur. Then select GPS Slalom, enter the Skier Size Letter and go skiing.

The system will permanently store these baseline settings, even when battery is turned off. The AUTOCAL procedure should be repeated if the propeller is changed.

IMPORTANT:

1. After AUTOCAL is complete, you will need to "Map" your course so timing will occur. See Page 7.

2. After "Mapping" is complete, switch to GPS Slalom Mode (O – No Skier Setting) and run a few timing passes to ensure timing is active, control is smooth and times are near perfect. (See course mapping video under "Support" at www.perfectpass.com).

3. Before skiing, enter a skier size letter (F, L, N, X).

You need to have "Mapped" the slalom course prior to using GPS Slalom in a course or timing will not occur.

GPS SLALOM MODE

GPS Slalom Mode or Practice Mode are the most commonly used.

Step.1 Select GPS SLALOM.
Step.2 Select Speed (Use Menu Key to highlight set point).
Step.3 Set Skier Size (ex: N) (Use Menu Key to highlight skier size).
Step 4 Tow Skier. (Pull skier up smoothly until engagement beep, do not over throttle in a short set up).

TIMES - At the end of the course the full segment time will be on the screen. For mid course or "all buoy" times, use Menu Key to highlight the time and press Down Key. (See Page 8).

SKIER SIZE –Remember in GPS Slalom or Practice Slalom, you must have a Skier Size Letter selected (F,L,N,X) when towing a skier. To change letters, simply highlight the letter (Ex; N) and press the up or down keys to make a change.

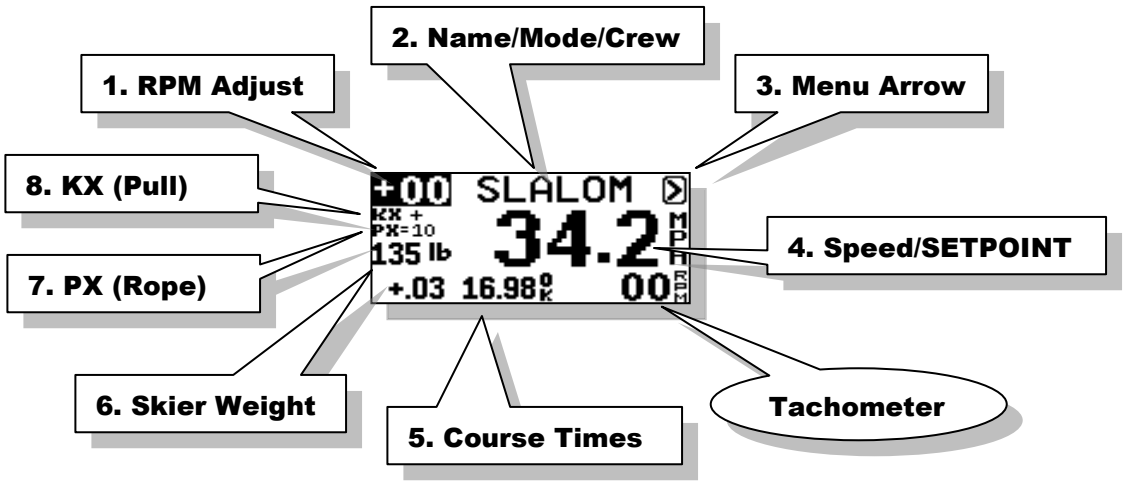
F FEATHER – For very small skiers.
L LIGHT – For skiers 120 – 160 pounds
N NORMAL – 160 – 200 Pounds
X XLARGE – For 200 + pounds.
O No Skier timing check – For system testing, timing checks only.

Use Menu Key to highlight the skier size setting, press UP or DOWN to change.

PRACTICE MODE

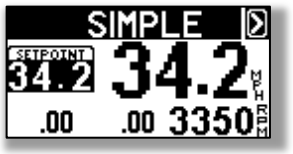
In this mode, you can tweak the set speed so you can train at in-between speeds. (The pull and system control is identical to GPS Slalom).

USING CLASSIC MODE - RPM Based (Non GPS Enhanced)



Step.1 Select speed and enter weight of crew. (Highlight slalom heading & press DOWN key).
Step.2 Enter the Skiers Weight on screen.
Step.3 Tow skier through course.
Step.4 At the end of course, review times and if slow or fast, use the RPM Adjust in upper left hand corner to tweak speed. (ie: More rpm if slow, less if fast)

SIMPLE SLALOM



Slalom Mode

1. Select Simple Slalom Mode. Simply set your speed and go.

2. If you wish to time your passes in a slalom course, you must "MAP" the course.

3. You can select speeds in .6 mph (1.0 kph) increments. The official speeds in MPH are: 24.9, 26.7, 28.6, 30.4, 32.3, 34.2, 36.0

4. The only adjustment to the pull is a value called "Pull Factor" found by highlighting the Menu Arrow > in upper right corner, then press UP KEY. The word SLALOM is now highlighted, press DOWN KEY for "Pull Factor". Standard is 50, a higher value is more aggressive. (Range is 25–100). We do not expect that you will need to adjust this.

5. Timing – If you "MAP" your course, the screen will show your Ball 3 and full course times as you exit the course.

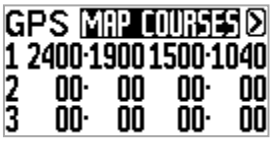
Section 3. COURSE MAPPING – NO MAGNET TIMING

Watch this on video under "Support" at www.perfectpass.com

Step. 1 Locate "Map Courses" on your screen, highlight and press UP Key.

Highlight "Map Courses" and press Up to Enter.

Step. 2 You will see where you have the ability to Map Three (3) Courses. To enter the coordinates for the first course highlight line 1. Press the UP Key to select Course 1.



Highlight the course you wish to map & press UP to select.

UP Key at (Entry 1)

DOWN Key at Entrance in opposite direction Entrance (Entry 2)

Note: Only the entrance gates from each direction will be "mapped".

Step. 3 Starting at one end of the course, idle the boat towards and through the entrance gates. As you pass through the gates and the gate buoys are parallel to the rear of the boat, press the **UP KEY**. (Entry 1) The display will beep to confirm coordinates are locked. (See Figure A).

Drive to the other end of the course, turn boat around and idle back through the entrance gates into the course and press the **DOWN KEY** (Entry 2) as the gate buoys pass parallel to the rear of the boat. The display will beep.

(If you made an error you can simply repeat the procedure, press the **UP** or **DOWN KEY** again and it will overwrite the original coordinates).

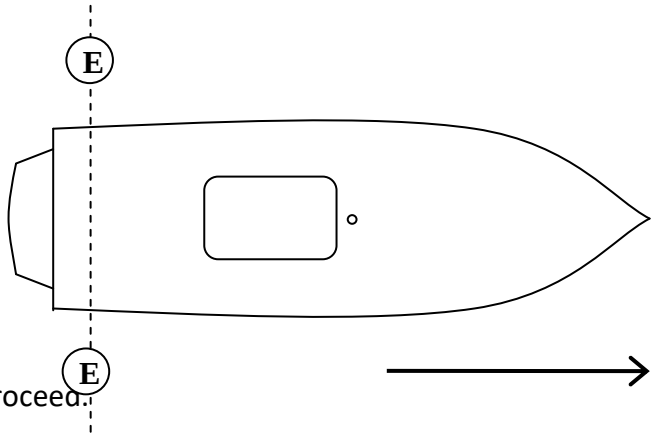
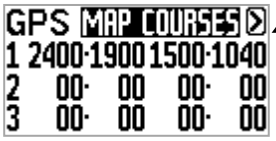


Figure A

Course #1 is now mapped and you are finished.

Use MENU Key to proceed.



MENU Arrow

To leave this screen, use MENU Key to highlight MENU ▷ arrow and press UP Key.

If you wish to Map another course, highlight course #2 and press UP. Repeat procedure.

To clear any course you have mapped, select the course # (ie. Course 1) and press the <u>OFF KEY</u> to clear the screen or simply "re-map" that course.

Press OFF Key to clear coordinates

After "Mapping" return to GPS Slalom mode and run a pass to confirm timing operation. Timing will trigger automatically any time you enter any mapped course.

Jump Course – If you are going to "Map" a jump course, select Course #3. When mapping a jump course, you only map the "Entrance" location.

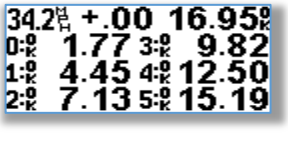
<u>TIMING</u>

At the end of any timed pass, the full course time will appear at the bottom left of the screen.

Full Course Time

Use MENU Key to highlight the Full Course Time and press UP or DOWN Key to see the "All Ball Times".

Ball One Time



All Ball Times

Mid Course Time

Section 4. JUMP MODE

For details on running the system for competitive style Jumping, see Manuals under “Support” at www.perfectpass.com

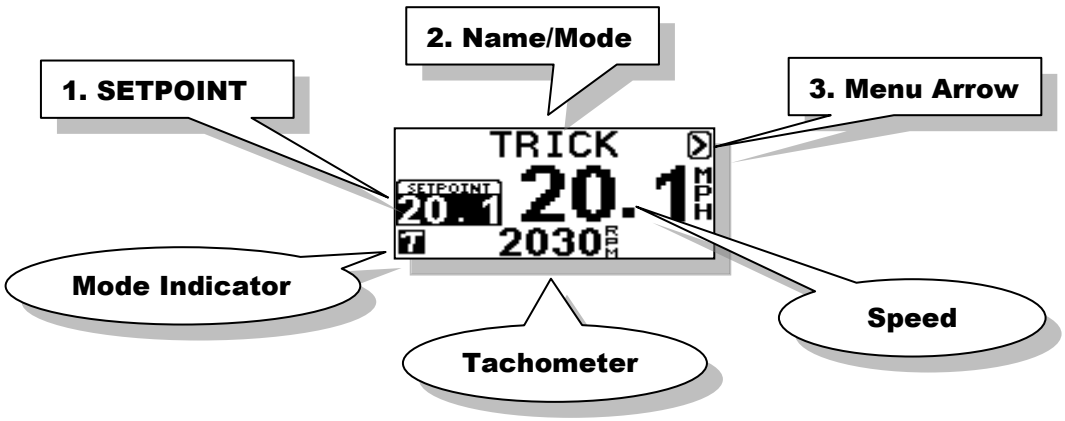
WARNING – Jump Skiing is inherently dangerous. If you are going to use PerfectPass for Jumping you will need to ensure the following:

A. The course is accurate and is Mapped so Timing works properly.
B. The RPM Baselines for each jump speed must be calibrated accurately.
C. A Jump Switch is required.
D. The driver/operator is experienced in driving this event and with using PerfectPass.

Section 5. TRICK MODE

USING TRICK MODE

The trick mode is controlled via the speed signal from the GPS Receiver. (You simply select the desired speed and go.
The main Trick screen will appear as:

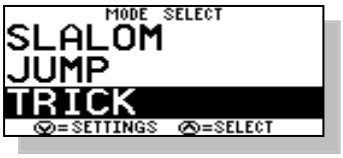


1. SETPOINT

The speed at which would like the boat to engage and control. This number is adjusted in 0.1 mph (0.2 kph) increments. It can be adjusted while engaged ("on the fly"), or before it is engaged.

2. Menu Arrow

Highlight Menu Arrow in upper right corner. Press **UP** key to change modes (Back to Slalom) or to access KD settings:



As mentioned above this allows you to change modes and mode settings.

TRICK DRIVING

Using Trick mode is relatively easy. Turn control ON, select the desired speed and drive smoothly to the **SETPOINT** so PerfectPass can seamlessly take over. *If you accelerate aggressively past the **SETPOINT**, it will take the system several seconds to lock in the speed.*

You should keep your hand on the throttle to ensure it does not pull back and disengage the system. If you see the "More Throttle" on the screen, this indicates the system needs a little more manual throttle.

If the skier falls, pull back on the throttle to disengage system. Slowly return to skier and pull them back up again. System will take over automatically once **SETPOINT** is reached. Speed changes can be made “on the fly”.

When you are finished with the speed control, go to neutral and press the **ON/OFF** key.

TRICK SETTINGS

Trick Setting (KD) is accessed by pressing the **Down Key** when the word “TRICK” is highlighted. See above illustration.
Kd – This adjustable parameter controls the “firmness of the Pull”. The higher the number, = more aggressive pull. Normal range 14 – 28.

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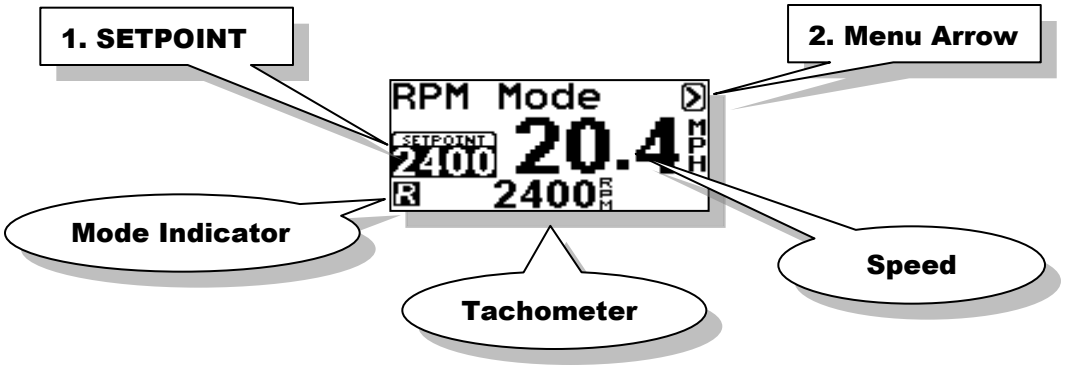
Section 6. RPM MODE

USING RPM MODE

In this mode, the screen will appear as follows:



Operating in this mode is very similar to using the Wakeboard or Trick modes, except the system is now controlling to an RPM **SETPOINT**.

RPM DRIVING

Prior to towing the rider / skier, select the RPM **SETPOINT** by using the **UP** or **DOWN** keys with the SETPOINT highlighted on the screen. Pull the rider up smoothly and continue to accelerate up to or beyond the RPM **SETPOINT** so the system can engage and take control.

Changes can be made to the RPM SETPOINT while the system in engaged ("on the fly") to fine-tune the RPM you desire.

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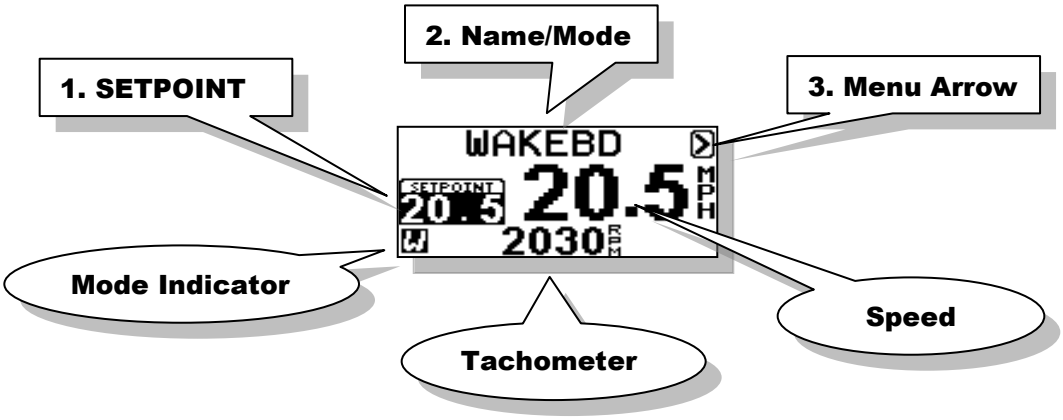
Section 7. WAKEBOARD MODE

USING WAKEBOARD MODE

This is a speed-based mode using the GPS Data to control similar to the TRICK mode. The Main Wakeboard Screen will appear as follows:



1. SETPOINT

The speed at which would like the boat to engage and control. This number is adjusted in 0.25 mph (0.5 kph) increments. It can be adjusted while engaged ("on the fly"), or before it is engaged.

2. Name/Mode/Crew

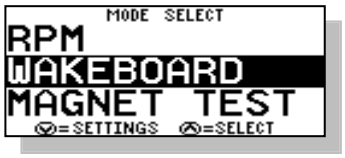
This section of the screen displays either the Mode Name or a Skier's Name pulled from the Name List.

Press **UP** key to access the Name List:

Name List is discussed on Page 15.

3. Menu Arrow

Press **UP** key to change modes or mode settings:



As mentioned above this allows you to change modes and mode settings.

DRIVING WAKEBOARD

Select the desired **SETPOINT** by pressing the **UP** or **DOWN** keys. Pull the rider up normally and accelerate smoothly up to or slightly beyond the target speed. Once PerfectPass sees the actual speed reach the **SETPOINT** it will automatically take control and will notify you of this with an audible beep. (Top line will become highlighted during engagement).

While in engaged the WakeboardPro should hold a smooth steady speed in a straight course down the lake. The driver should keep their hand on the throttle for safety, and to prevent it from pulling back on its own which will cause PerfectPass to disengage.

The key to driving is to smoothly drive to the SETPOINT so the system can seamlessly take control. If you accelerate aggressively past the **SETPOINT** it will hunt around for several seconds before settling in. You will hear an audible beep when the system automatically takes control. If the rider falls, simply pull back on the throttle and the system will disengage.

To Disengage System: If the rider falls simply slow the boat down. This will disengage speed control. Return to rider slowly and pull up again. System will once again take over when **SETPOINT** is reached.

Turns / Over-riding the system: As the boat enters a turn, the engine RPM may increase to keep the craft at the **SETPOINT**. If the driver would like less throttle (so the rider does not get whipped) then simply pull back some on the throttle and help the system maintain a safe speed. As you complete the turn, move the throttle gently forward and the system will re-take control. (The driver can override the system at any time by pulling back or advancing the throttle).

Wake Surfing in Wakeboard mode is excellent in the 9 – 11 mph range. Prior to using your boat for wake surfing, check with your boat builder or dealer to confirm it is safe for this sport.

WAKEBOARD SETTINGS

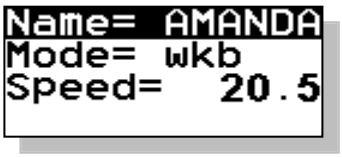
Wakeboard Settings are accessed by pressing the **UP** key on the Main Wakeboard Screen with the ⊡ highlighted. Then press the **DOWN** key when WAKEBOARD is highlighted on the Mode Select Screen.

KdW (Pull Characteristic) - KdW can be changed using the **UP** or **DOWN** keys with it highlighted on the screen. Higher values = more aggressive control response. Factory setting is 80-90. (Example: Heavily loaded boats may need a different value to maintain a steady, crisp pull. Try values from 40 to 100 **to see what is best**. After adjustment, press **MENU** to proceed.

QUICK LIST -NAME LIST

This version of PerfectPass allows you to store up to four names and their preferred speed. The Name List can be accessed by pressing the **UP** key when the NAME/MODE section is highlighted or by going into the SUBMENU and selecting the Name List. Once in the Name List press the **MENU** key to move through the list. With the desired name highlighted press the **UP** key to select the name from the list and load their settings or press the **DOWN** key to edit the name.

Creating Names – First enter the Name List. Press the **MENU** key until [**NEW ENTRY**] is highlighted. Then press the **UP** key to enter a new name. The following screen will then appear:



Scroll through the alphabet using **UP** & **DOWN** keys, and then press **MENU** to move to next position. Press the **MENU** key to move through the settings. If you are programming a JUMP or SLALOM name there will be another page of settings to enter.

Deleting/Editing Names – As you scroll through list of names, instead of pressing **UP** key to select that name, press the **DOWN** key to edit or delete.

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Section 8. ADDITIONAL FEATURES/BACKGROUND SETTINGS (Menu & UP Keys together)

User Settings – Switch to MPH <>KPH, Set Clock, Water Temp Calibration (if available), Turn Compass ON/OFF

System Info – Battery Voltage, System Hours, Software/ Hardware Version

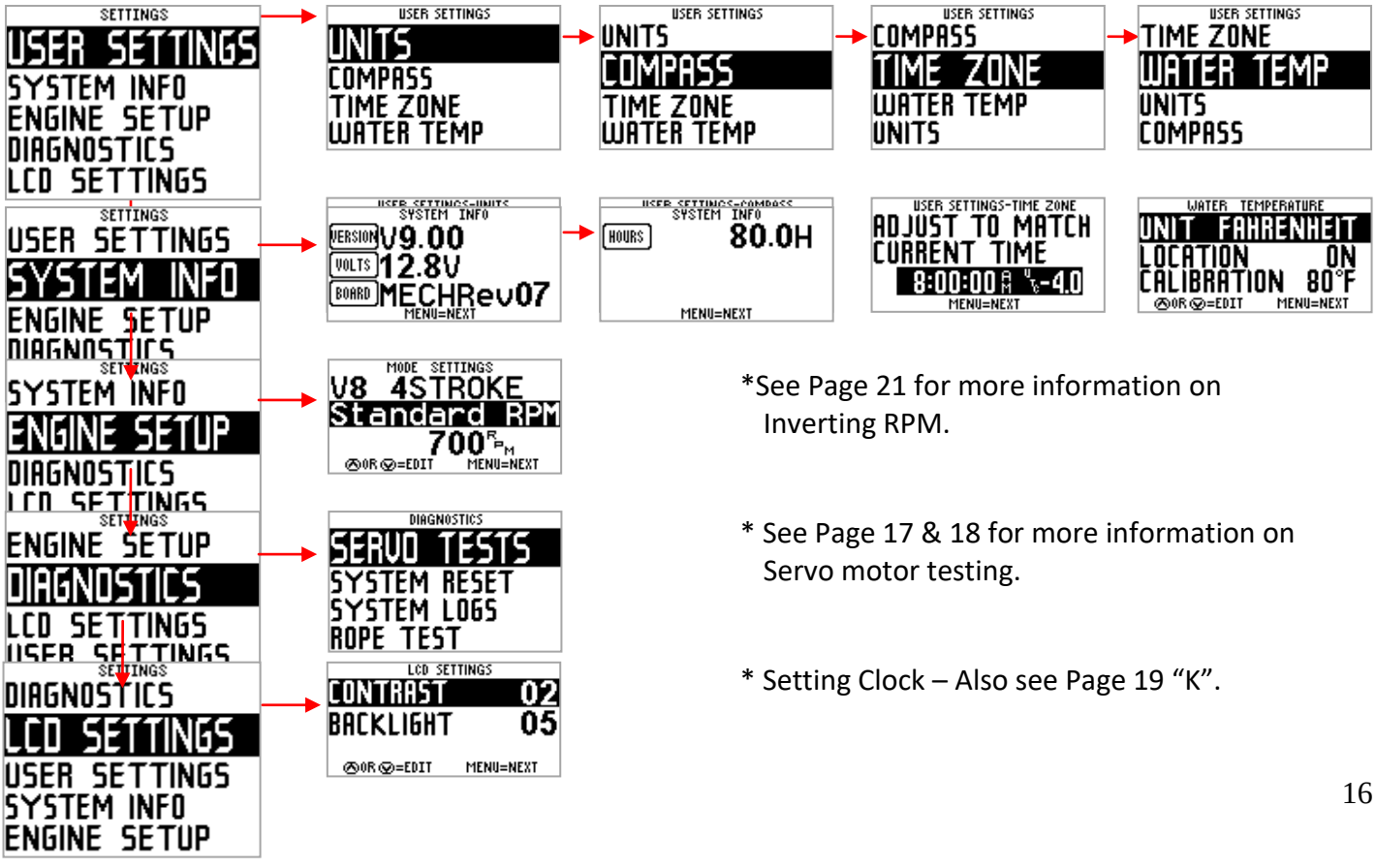
Engine Set Up – To switch from V8 <>V6, Invert RPM Signal (Consult with PerfectPass Tech Support)

Diagnostics – For Servo Motor Testing, Rope Switch Test/GPS Testing, etc. (See Trouble shooting for Servo Testing)

LCD Settings – For Screen Contrast / Backlighting adjustment

Settings Screen Map

Press the **MENU** and **UP** keys together from the main screen to access the Settings list. Pressing the **MENU** key will move your curser through the list, highlighting the different options. Pressing the **UP** key will select the highlighted list item. Some of the screens have multiple pages of information, press the **MENU** key to navigate to the next page(s). The **ON/OFF** key can be pressed to quickly exit settings and return to the main cruise control screen.



*See Page 21 for more information on Inverting RPM.

* See Page 17 & 18 for more information on Servo motor testing.

* Setting Clock – Also see Page 19 “K”.

Section 9. TROUBLE SHOOTING / GENERAL INFORMATION

Detailed Trouble Shooting documents and videos can be found on line at www.perfectpass.com . See Support, "Trouble shooting".

You can learn a lot from just turning on key and watching system start up. Every time PerfectPass is powered you will see the back light in display turn on followed by a beep as the screen becomes active. When the Master Module sees a solid 12 volts +, the Intel processor starts which puts the data on screen and the servo motor will perform its "auto tighten" check.

A. NOT CONTROLLING

Servo Motor "Auto tighten" Test (See video under Support)

Check: To confirm proper operation of the 4 phase servo motor, perform the following test. With key OFF, check to see if servo motor can be easily turned and that set screw in knob is snug. (It should turn freely, if not the motor may be seized) Turn knob in clockwise direction until snug, and then turn it back counter clockwise one full turn.
Now turn key ON and servo should perform its "auto tighten" function and wind in the cable (approximately ¾ of a turn). (Every time system is powered, it will do an "auto tighten" which confirms all electrical phases are OK). Ideally, you should hold knob gently during "auto tighten" test to put a little extra load on the motor to check the connections.

Remember the servo motor will run very hot, particularly the gold resistor.

If motor does not wind in or just vibrates, then an electrical connection is likely bad. Unplug both connectors at servomotor and closely inspect the crimps and wiring. Gently pull on each wire to make sure the wire is securely crimped. Also check the connectors on the gray servo power cable at both ends (See servo testing in Section C for detailed testing).

If this test is OK, do a "Linkage Test" as described in Section B.

B. Linkage Test - With key OFF, push the manual throttle open to ¾ position. Then take the black knob on servo motor and slowly wind the knob in a counter clockwise direction, then in a clockwise direction. As you do this, the throttle will slowly open and close with each step of the motor. In no place should the cable catch or hook as this will cause the system to surge. If the cable comes into contact with any part, fuel rail, cross over pipe or decorative engine cover, adjust cable and servo as required. (The cable should have a nice smooth bend and be in good alignment with the throttle connection. If you feel the cable is too long, contact PerfectPass)

The brass L adapter should freely swivel as the throttle opens & closes.
(If your boat has a plastic decorative engine shroud, you may wish to remove it temporarily and see if the problem disappears).

With key OFF, push manual throttle to full open and back to neutral. Does PerfectPass throttle cable move forward and back freely without jamming or rubbing against cover, fuel rails, etc?

C. **Servo Motor Testing** – Press Menu & Up Keys together and use Menu Key to go to "Diagnostics". Up Key to enter.

Press Up Key to select.

The system will turn servo on and off to see voltage drop. Press Menu Key to proceed.

System will test continuity of wiring to servo. Press Menu Key to proceed.

If wiring is good, it will show as "Passed". Press Menu Key to proceed.

Servo will now rotate back and forth. Watch black knob rotating. Press Menu Key to proceed.

If the Servo Test shows "Failed" then it is likely a bad wire in one of the White Plugs at Servo. (Disconnect & pull gently on each wire to check integrity) If all looks OK then it may be a bad motor. The **Gold Resistor** on Servo Bracket should be VERY HOT to touch. If not, check RED Wire for integrity. If wiring good, Resistor may be bad.

D. **System surging in neutral** – Check gap between the PerfectPass cable & the Morse control / Teleflex cable. There should be No Gap. (See photo C in instruction manual).

E. **System accelerates past set point** – If the system accelerates past the set point and is very slow to work back to the set speed, the engine throttle return spring may be weak. PerfectPass can open the throttle, but depends on the engine return spring to bring it back towards neutral. A

spring can be easily added. It may also be a throttle cable / mechanical problem. See Linkage Test, Section B above.

On Water Test – To confirm this, drive the boat carefully with engine cover open in Wakeboard Mode. Set speed at a lower setting (i.e. 20 mph) and have driver engage system and press throttle up to 25 MPH. As boat speed exceeds 20 mph, the servo black knob should turn counter clockwise to let out cable and slow engine. If servo counter rotates, the return spring should pull throttle back towards neutral. If servo rotates but boat does not slow, the return spring is not pulling or something is preventing the throttle or cable from moving.

F. **No RPM tachometer reading** – If the display tachometer reading is 00, check to make sure rpm sensor is plugged into the correct port on Master Module. Check connections of rpm sensor. (Check installation as per instructions).

G. **Blown Fuse (5 amp, 1.25 inch fuse)**

The most common reason a fuse will blow is if the red wire in the servo power cable is grounded or shorted. Inspect the wire for any breaks, pinches or failure especially near the gold resistor on the servo motor.

H. **System Reset** – If you would like to reset the entire system to original factory specifications, you can do so by **pressing & holding the ON/OFF & MENU Keys together as you power up the system.** After about 5 seconds the display will show [System Reset ^ = Y]. Press the **UP** key to continue with a reset.
The next question will be whether you wish to reset all your baseline rpm values. [Reset RPM @ ^ = Y] If you are happy with your baseline values, press the **DOWN** key and your settings will be maintained. On some systems, you will be asked to select the engine in your boat. It will then ask if you wish to run in just wakeboard modes [WAKBD ONLY ^=Y]. **Press Down Key for Three Event.**

I. **Change Display from MPH to KPH/Wakeboard only –** See User Settings, Page 16.

J. **Display is Hard to Read** – Adjust contrast.

K. **Time on Display is Wrong** – Go to User Settings (Menu and UP Key together) See Page 16.
Press Menu & UP Keys together and USER SETTINGS will appear. Press UP Key and use Menu Key to move to "TIME ZONE". Press UP Key and following screen will appear.

Use up or down key to adjust time for your area. Press Menu Key when done. Time zone will now be stored in memory.

For more Trouble Shooting details, go to: www.perfectpass.com . Click on "Support" and then go to "Trouble Shooting". Once there you can choose your boat details and bring up the appropriate file containing the requested information to assist you.

Appendix 1

Control Issues – Star Gazer Three Event (Slalom)

If you are having inconsistent times, surging etc. with your Three Event System, please perform the following tests:

1. Set in RPM Mode at 3300 RPM and throttle up aggressively in open water. System should engage and quickly settle and control very smoothly at 3300-3310 RPM. If it is having difficulty holding 3300 then you may have a linkage / return spring issue. *(Refer to our Support Page at perfectpass.com for Linkage Test / Phase Test documents and videos)*
2. Some boats run smoother with the **RPM Setting set to Standard**. (See tests below)
3. Go to Wakeboard Mode and set at 20 mph. Does it engage & hold very smoothly? If not, linkage concern.
4. Driving Tip- In GPS Slalom Mode, you cannot have the system engaged as you make the turn at end of course. If so, the system will react coming out of the turn trying to make up speed and may well overshoot on a short set up. Disengage as you exit the course through the turn, then throttle up and re-engage as you head towards the course.
5. In calm weather, set system in GPS SLALOM Mode at 34.2 (0 Skier Setting) and run a timing pass without a skier through the course from both directions. If the system is properly calibrated you should see the digital speedometer showing about 34.2 as you enter the course. You should see 7.13 at ball 3 and a full course time of about 16.95 seconds +/-. If the times are not real close then either baselines not right or linkage issue. Contact PerfectPass.
6. If all of the tests above look good, back in GPS Slalom Mode (Skier letter N) **without** a skier in tow make two passes and note the times you are experiencing at ball one, ball three and full course. (At end of pass you can press Down Key to access times) Contact us with these times.
7. In most cases, users will not need to make adjustments to the background settings, these are for small tweaks only. The Z Box (if equipped) does not affect the basic control of the system.
8. On mechanical boats with servo motors, the key to driving is to throttle up to engagement and stop advancing the handle or feather it back on a short course**. If you are too aggressive the system may over speed and not have time to slow and settle prior to the course entrance.**

Please perform these tests and contact us for further assistance (902) 468-2150.

RPM INVERTED vs. STANDARD

The vast majority of boats with mechanical Star Gazer Systems operate with an "Inverted" V8 tachometer setting. The odd boat will run smoother and maintain a "tighter" control when the signal is set as **"Standard".**

To determine which is ideal for your boat, do the following:

> *Set the system in RPM Mode at 3400 RPM and run in open water. The system should engage and lock on 3400 very quickly and maintain a very steady RPM digital tachometer readout. (Should not move more than 10 rpm)*

If during this test your PerfectPass digital tachometer does not settle well, or you see spikes (particularly on the high side of 3400) you may wish to try the "standard" setting and perform this same test.

Go to USER SETTINGS (Menu & Up Keys together) and move to ENGINE SET UP.

Ultimately, you should set this at whatever setting gives the smoothest tach reading.

Press UP Key

Press the MENU key to highlight Engine Setup, UP Key to select

Press MENU to Return to Main Screen – In this example, it is now set as Inverted.

Press MENU Key to highlight Standard RPM, UP Key to Switch to Inverted/Standard V8

Background Adjustable Settings (ON/OFF & UP Keys together)

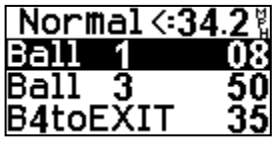
While most users will never need to make adjustments, PerfectPass has made some internal settings accessible in the event your boat's performance could benefit from a setting change. *(*Note: Before any adjustments are ever made you should confirm in GPS Slalom (Skier Size 0) and no skier in tow that your times are accurate.

Access these screens by pressing the ON/OFF & UP Keys together.

MENU Key to move down list
UP Key to make adjustments

These internal settings are related to the Star Gazer software, not the Z Box directly. If you find your times are consistently a little slow at ball one, ball 3 or vice versa, you may want to tweak these settings.

There are independent settings for each skier size (Feather, Light, Normal and X-Large). The table on the next page shows the internal chart for each factory setting:



This screen shows the chart for normal setting, 34.2 mph and less.

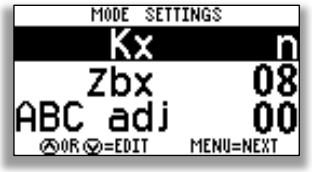
Ball One – This setting primarily controls the Ball One Time. In the event your ball one times are consistently on the slow side, try moving this value higher by about 5 points each time until your Ball One Times are nicely balanced. (The factory setting is about 8.)
Ball Three – This setting controls the speed from Ball One to Ball Three. In the event your Ball Three Times are consistently on the slow side, try adjusting higher or if fast set lower. (The factory setting ranges from 50-64)
Ball Four to Exit – This setting controls the speed to exit. Typically most boats can start to back off as less rpm is required in this section. The higher the value, the faster the time in the final section of course. (The factory value ranges from 23 to 35) Ex: If you see consistently fast times in the final part of the course, you can lower this value and more rpm will be taken away.

INTERNAL SETTINGS

	Ball 1	Ball3	Ball 4 to Exit
Feather	08	50	35
Light 34.2 & below	08	50	35
Light 36.0	10	64	23
Normal 34.2 & below	08	50	31
Normal 36.0	10	64	23
Xtra Large	08	64	35

Each skier size setting has its own values. If you primarily use Normal at 34.2 mph, simply adjust the values associated with this section.

Press Menu for additional screen settings.



Use MENU Key to move through screen.

KX – KX speeds up the boats general throttle response. It comes set at N for Normal. If you have an older carbureted boat and find you would like it more aggressive, you can set this to "+" or "++". (KX minus is not recommended).

Z Box Settings (If using optional Z Box)

ZBX – This value simply increases the intensity of the systems response to the skiers pull. It comes factory set at 8, a higher value will increase the response. (Adjust in small increments only) Ex: You feel the throttle response is too strong, you can lower the value by a point or two.
ABC adj – This defaults to 00 and is a value related directly to the response of the A,B,C (1,2,3) settings. Ex: If you require a B2 setting on your boat to make it feel like an A2 setting on newer boats, you can adjust this so the chart on your boat will match the newer boats. In this example, the "ABC adj" value can be adjusted up (to 03 or 3 positions) and now your boats B2 will feel like the B2 on a newer promo boat.
The idea here is that you can get the chart settings on your boat to align and feel like and match those newer boats you ski behind. This may be required if you have a 1:1 transmission or a smaller prop. Discuss with PerfectPass Tech Support if you feel a change is required.

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APPENDIX 2

PerfectPass All Buoy Timing Version 4 IWSF Approved 2001

In Tournament Use, after a skier falls or misses during a pass, the boat is timed to the next set of boat gates. Because the boat travels only a relatively short distance before the time is measured, the boat speed does not change significantly. Thus the time is an accurate measure of the speed of the boat while pulling the skier.

If the skier runs a full pass, the full course time is used to determine if the boat speed was within tolerance. For scores less than six, a chart showing the timing tolerances for each buoy score is used. This method uses the cumulative time from the gates up to the last ball scored. With this approach, only one segment time is required.

After each pass, the PerfectPass system briefly displays the Full Course Time. If the score was less than six, then the All Ball Times can be seen by highlighting the "Times" and press the Down Key.

PerfectPass All Buoy Timing
36mph/58kph IWSF approved method 4

score	score id.	fast in	actual	slow in
0 to 0.5	0:	1.64	1.68	1.71
1 to 1.5	1:	4.15	4.22	4.28
2 to 2.5	2:	6.67	6.77	6.84
3 to 3.5	3:	9.20	9.31	9.41
4 to 4.5	4:	11.73	11.86	11.97
5 to 5.5	5:	14.25	14.40	14.53
6		16.00	16.08	16.16

PerfectPass All Buoy Timing
34.2mph/55kph IWSF approved method 4

score	score id.	fast in	actual	slow in
0 to 0.5	0:	1.73	1.77	1.80
1 to 1.5	1:	4.37	4.45	4.51
2 to 2.5	2:	7.03	7.13	7.23
3 to 3.5	3:	9.69	9.82	9.93
4 to 4.5	4:	12.35	12.50	12.64
5 to 5.5	5:	15.02	15.19	15.34
6		16.86	16.95	17.04

Section 10. INSTALLATION INSTRUCTIONS

Step 1. Installation of Servo Motor

Using the two provided hose clamps, loosely mount the servo motor on top of the cooling water hose leading to drivers side exhaust manifold (starboard side on standard inboard engines). See Figure A. Tighten later after final positioning (or as specified in any Addendum photos).

Remove ball joint connector from throttle control lever and remove the coupling from end of Morse control / Teleflex cable. (See Figure B).

Position the servo motor throttle cable in line with the throttle control lever. Ensure the 10/32 locking nut is in place on Morse control / Teleflex throttle cable. Screw threaded brass hex connector on PerfectPass cable onto the end of the Morse control throttle cable. (Do **not** over tighten hex nut). Install L shaped brass throttle adapter to throttle control lever using identical hole as original ball joint. (L adapter must be able to swivel). Using an Allen key, tighten L shaped adapter-mounting bolt. (See Figure C). You may find it helps to move the Morse control lever into gear during installation to allow more clearance. Be sure the washer is next to the brass L-adapter and not under the nut.

Check and adjust position of servo motor ensuring the motor box cover closes properly and servo throttle cable is not in contact with any moving parts. Make sure the servo motor cable has 2 or 3 inches of free travel. Securely tighten hose clamps on servo motor. (Do not "tie wrap" the throttle cable as it must be able to move freely).

With the throttle in neutral position, adjust brass hex connector if necessary to ensure there is **no gap** between it and the end of the servo motor cable (any gap may cause engine to surge up and down in neutral). Adjust and snugly tighten all parts. (See photos, **DO NOT OVER TIGHTEN**).

Turn the black servo motor knob in a clockwise position until **snug**. With throttle in neutral, the linkage should appear as in Figure C.

Servo Motor / Cable Testing - It is vitally important that the stainless steel cable inside the plastic jacket has the ability to move freely or the system will not perform properly, may hunt and not settle down. The alignment of the PerfectPass cable and the boat's throttle cable should be straight.

Linkage Test - An easy way to confirm proper operation after installation is to perform the following quick linkage test. With key **OFF**, push the manual throttle lever to ¾ open position. Then take the black knob on servo motor and slowly wind the knob in a counter clockwise, then clockwise direction. As you do this, the engine throttle arm will slowly open and close. This should happen very smoothly and in no place shall the cable *"catch"* or *"hook"* which will cause the servo to hunt. If the cable does "catch", adjust servo & cable to eliminate this problem.

If the cable comes into any interference with the fuel rail, decorative engine cover or anything that causes this problem, adjust motor and cable accordingly.

The brass L bracket on the throttle linkage must be able to *swivel freely* for system to work smoothly.

IMPORTANT:

- Make sure all wires are tied away from hot or moving parts and there is adequate clearance.
- The manual throttle on your boat should operate and feel the same as before the PerfectPass was installed, or you may have to adjust hex nut.

If you have re-installed a decorative engine cover, with key "OFF" push the throttle down to full open and back to neutral. At no point should the PerfectPass cable "hook" or "jam". (Never tie wrap on restrict the PerfectPass cable from free movement).

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Step 2. Installation of Master Module

Mount the Master Module under the dash normally on the bulkhead accessible behind and right of the passenger seat in a dry location. It can also be installed on the left side of driver's bulkhead. The wires from under the dash pod can be easily fed across the bulkhead.

Route servo motor power cable from Master Module to servo motor and connect. A wire snake is helpful. (Use tie wraps to keep cable away from moving parts). Make sure the tips **on the plug are facing up** towards the top of the Master Module box.

Step 3. Mount Dash Display

Typically the boat speedometer is replaced. If you have twin speedometers, remove the right speedometer and install the **In Dash PerfectPass Display** and connect into Master Module. (If there is a speedo tube on back, it can be plugged using a clamp).

If you prefer, the tachometer can be replaced.

Step 4. Connect Power Wire

Depending on the boat and model, there are a number of ways to connect to a switched (12 volt) power source.

1. On boats with traditional analogue gauges and posts on back of tachometer, there is a 12 volt (+) post often marked (IGN) which is an easy connection to the purple wire. The black wire end can attach to the ground (-) post marked (GND).

2. On boats with Medallion gauges with no posts, attach the PerfectPass purple power wire to the purple wire leading to the ignition terminal. The black wire can be securely grounded to the grounding bar or other suitable ground location.

3. **2000 – 2005 Nautiques** – There is a main wiring harness and large white plug located behind the dash pod. Connected to this plug is a purple wire carrying the switched 12 volts and a black wire which is a suitable ground connection.

4. **2002 – 2005 MasterCraft** – Power, RPM and Paddle Wheel speed is all located in the special plug and play harness supplied with each system. The MasterCraft supplied white connector is on every boat specifically for PerfectPass. You may have to remove the driver's foot panel to locate this connector in the boat's wiring harness.

5. **2005 Malibu** – The plug & play harness will provide RPM, Power and Speed signal.

Step 5. RPM Cable Installation

This connection will depend on the brand and year of boat you own.

(1) **Standard Installation** (Older boats and boats with traditional Analogue gauges with Posts on back)

The **Gray wire** with ring terminal can be easily attached to the "SEND" post on back of tachometer. This Gray wires picks up the raw engine rpm from this post. The **Black wire** ring terminal can be attached to any suitable ground, including the ground post on the tachometer. (If there is not a post, connect to the solid gray wire coming from the tachometer).

(2) **2002 - 2005 MasterCraft** – The custom wiring harness supplied by PerfectPass allows for plug & play for RPM and Power.

(3) **1998- 2004 Malibu** (Medallion Gauge System)

In behind the dash pod on most models, Malibu has left a Gray (RPM) wire that terminates at a large female spade connector. If you can locate this, you can simply attach the Gray wire on the rpm sensor cable to this connector.
Alternatively, you can locate the solid gray wire in the main wiring harness that leads into the Borg Warner control box under the dash. Use a blue "Tee Tap" connector to connect to this gray wire. You can then attach the gray rpm sensor wire to this using a push on spade connector. The black wire can be securely connected to any suitable ground.

LS-1 On this engine (pre 2002 only), you only connect the Black wire on the RPM Sensor cable to the Gray wire leading to the Borg Warner control box. (Same as LT-R MasterCraft). The gray RPM sensor wire is left un-connected.

2005 Malibu - See Plug & Play Harness.

(4) **1999 – 2001 MasterCraft, 2000 Supra, 2000-2002 Infinity (All Other Brands Using Borg Warner Gauges)**

TBI & Multi Port Engines (except LT-R) – Locate the solid gray wire in the main wiring harness that leads from the engine into the Borg Warner control box under the dash. This solid gray wire carries the raw engine rpm. Use a blue "Tee Tap" connector to connect to this gray wire. You can then attach the gray wire on the rpm sensor to this using a push on spade connector. The black wire can be securely connected to any suitable ground.

LT-R / LT-1 - On this engine the Gray wire lead on the PerfectPass RPM Sensor cable is not used and can be taped off. The separate **Black wire** end must be connected to the Gray wire located in the main wiring harness leading into the Borg Warner MDC Control box. It is on the engine side of the box that the raw rpm is located. You can attach a blue "Tee Tap" connector to this Gray wire, and attach the RPM sensor cable end to this "Tee Tap" using a supplied spade connector.

(5) **2000 – 2002 Nautiques**

Same as standard #1 above, except the rpm signal can be picked from the Gray wire coming from the back of the tachometer.

(6) **2003 - 2005 Nautiques**

Located behind the dash pod is a large wiring harness with a large white plug. The Gray wire in this plug carries the raw rpm of the engine and has been brought to the pod solely for the PerfectPass system. This gray wire is not connected to any gauge. Use a blue "Tee Tap" connector or other splice method to attach the Gray wire on the PerfectPass rpm sensor cable to this Gray wire in the harness. The Black wire (ground) on the RPM Sensor cable can be attached to the black wire in this same boat harness.

Step 6. Mount GPS on dash. *(See Page 30).*

Step 7. Your manual throttle should act and feel just the same as before PerfectPass was installed. If it does not feel normal, inspect throttle and linkage connection, particularly the brass hex nut adjustment.

For assistance call (902) 468-2150.

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Section 10. GPS RECEIVER - INSTALLATION INSTRUCTIONS

Installation: The GPS Receiver can be installed on the dash board looking up through the wind screen. As long as the receiver has a clear unobstructed view of the sky, it will work properly, even if sitting at an angle to the sky.

(It can also be installed under the dash looking up through the fiberglass. In this case you will need to move the Velcro to the top of the GPS Puck or use a 2-sided industrial strength tape. The puck must be mounted with top looking up to the sky).

On a new system, after connection and initial power up it will take up to 5 minutes for the GPS Receiver to find its new location.

Until a fix is made, it will appear as "**No GPS Lock"**. If you see "**No GPS Data**" on screen, then the system does not see the Receiver connected. (Check plug in connection).

WARNING: <u>ONLY</u> connect into Master Module in port marked "GPS" or the Receiver will become damaged.

LIMITED WARRANTY

During the first 12 months from date of original retail purchase, any PerfectPass component that fails due to defects in materials or workmanship will be repaired or replaced at the option of PerfectPass at no charge.

All warranty claims must be authorized in advance and a Return Authorization (R/A #) issued. All packages, correspondence, documents and packing slips must reference this R/A #.

Warranty excludes components damaged my improper installation or improper use of boat. Servo Motors are water resistant, but not water proof. Servo motors may become damaged if excess water is run in a boats bilge and this may void warranty. Ensure your boat is properly "bilged" prior to operating.

Warranty Service:

1. If your PerfectPass was factory installed, any warranty issues should be directed to your authorized dealer. PerfectPass encourages all customers to contact us prior to visiting your dealer for "technical support" as many issues may be easily handled direct with customer.
2. If your PerfectPass was purchased and installed by a dealer you may contact your dealer direct or initiate a warranty claim with PerfectPass.
3. If your PerfectPass was purchased directly from the Company, contact us at the number below.

Warranty Service / Technical Support
PerfectPass Control Systems Inc.
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(Hours: Monday to Friday 8:00 am – 4:00 pm EST)

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