

# **StarGazer Systems**

## **2009 - 2011**

### **BASIC TROUBLE SHOOTING** **(PERFECTPASS FOR MECHANICAL ENGINES)**

#### **How PerfectPass Works**

Through the in-dash display the driver sets the desired boat speed or engine RPM depending upon which mode of operation the driver has selected. The master module computer calculates the speed of the boat from the GPS signal and the engine RPM from the engine tachometer signal. The servo motor control cable is connected to the throttle arm of the engine, which allows the servo motor to control the engine's power. This control cable operates the throttle in cooperation with the manual throttle cable so that both the driver and the servo motor are able to change the engine output.

As the driver advances the throttle handle to bring the boat up to speed, the servo motor prepares to take control, at the point where the boat speed or engine RPM has reached the desired level, the system beeps to indicate it is beginning to control and the driver stops moving the throttle handle. The servo motor adjusts the engine throttle as required to continuously maintain the set speed or RPM. The driver is able to change the set speed or RPM while the system is engaged by simply pressing the up or down keys for each ¼ mph change in speed or 25 RPM change desired. At any time the driver may pull back on the manual throttle to slow the boat down, the PerfectPass system immediately stops controlling the engine and the driver once again has full control.

#### **Start Up Procedure**

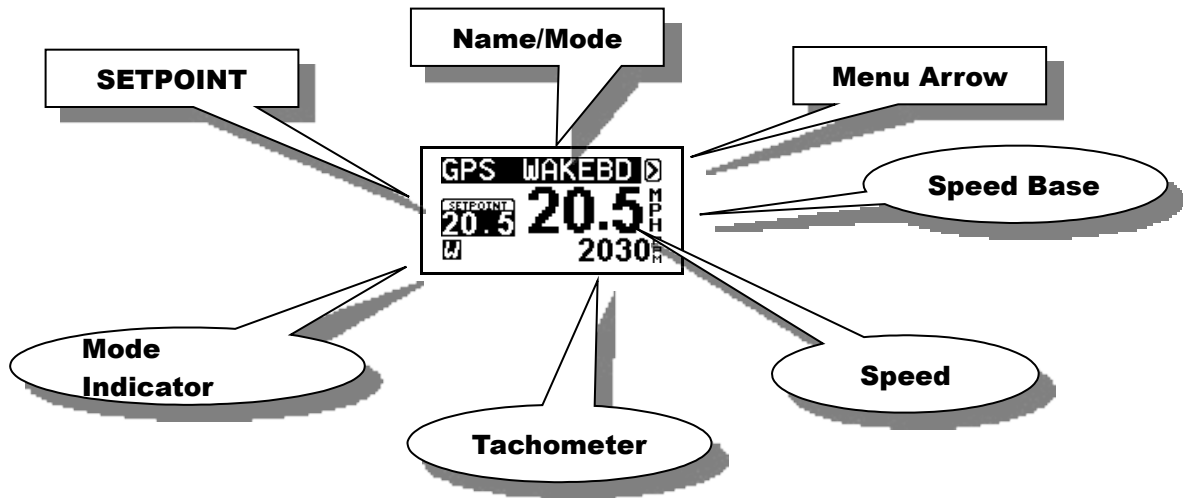
The Master Module is the heart of the system and requires a solid and continuous 12 volts before the "relay" will allow the Processor to start. Upon proper start up, the Dash Display will become active and the servo motor will power up and perform an "auto-tighten" rotation check.

A great deal can be confirmed from visually watching this routine start up. If the key is moved to the on position, the PerfectPass Display should become active & beep and servo motor is powered.

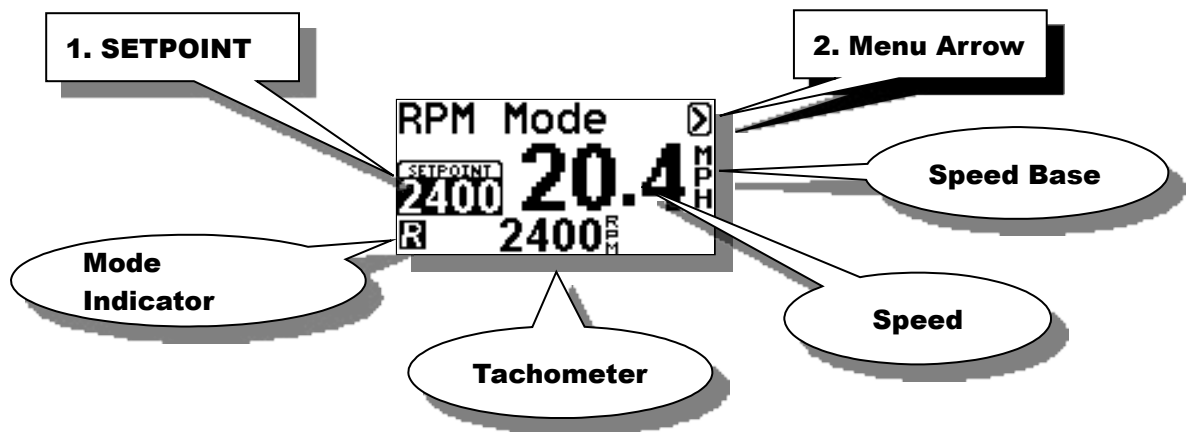


The StarGazer Wake has two main operating modes:

1. Speed Based Wakeboard designed primarily for surfing/wakeboarding in the 10 – 28 mph range. User sets a speed on the main screen.



2. RPM Mode where the user sets an rpm value. Designed for higher speed use such as open water skiing or cruising.



## GPS Receiver

The high speed Garmin weather proof receiver is very accurate and updates 5 times per second.

On the top left side of the screen the following messages for the GPS may be displayed:

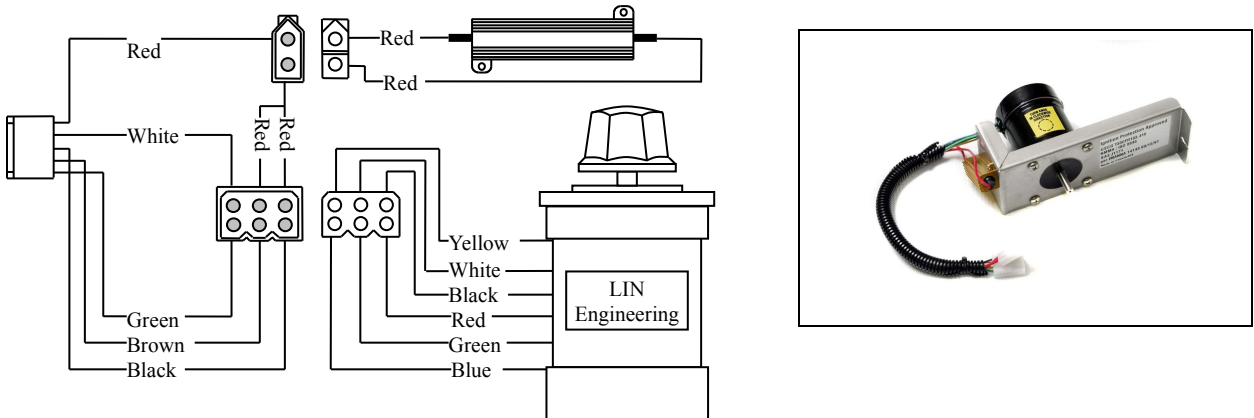
**GPS** – Once the receiver has a lock, GPS will be displayed which means a digital speed will be shown.

**NO GPS DATA** – This means the GPS Receiver is not seen by the Module. Check the connection of the GPS at the Master Module. If properly connected in the right location, the GPS Receiver may require replacement.

**NO GPS LOCK** – This means the system is searching for a satellite fix. Expect to see this upon start up each time key is turned on for a few seconds. Upon initial start up on a new system or after battery has been disconnected, GPS Lock may take 5 – 7 minutes.



## Servo Motor



The 4 – Phase servo motor can make hundreds of adjustments per second to maintain the correct speed. It is vitally important that the throttle cable has free movement and the brass L Adapter (Volvo only) connecting the PerfectPass throttle cable to throttle arm can swivel and rotate smoothly.

If a servo motor is not installed in the correct location, the throttle cable may have too much of a bend or may jam against the engine cover which will cause improper operation.

Anytime you suspect the system is not controlling properly, A Servomotor Test should be performed as follows. If servo motor test is successful, perform a linkage test on page 10.

### Servo Motor Test / Auto Tighten Test

Every time you return the boat to neutral when PerfectPass is on, the servo will wind in the cable until snug in a clockwise direct. This is the normal starting point for the servo.

Each time you turn the key on or start the boat, PerfectPass becomes powered and the servo will perform an “auto tighten” function and will attempt to wind in the cable to confirm it is in normal position. (If in proper position, it will appear simply as a “click”, “click”, “click”).

To check servo & servo power wire, with key off turn black knob on servo motor counter clockwise  $\frac{3}{4}$  of a turn. Now turn key on and black knob should turn clockwise about  $\frac{3}{4}$  of a turn as part of auto tighten. If it does, repeat procedure, except this time hold black knob gently to apply some resistance to auto tighten. If it rotates with good strength then it would appear servo & servo power cable are fine.

If it does not rotate or just vibrates, then a wiring phase coming to the servo may be loose or broken. Inspect all wiring around servo. Pull both white plugs apart at servo & inspect pins to ensure they are in place. Gently tug on each wire to ensure they are securely in crimp. Check at Master Module where cable is connected.

If you cannot locate problem, contact PerfectPass.

### **Important Notes:**

1. The gold resistor will run extremely hot. This is normal.
2. If system is new, make sure servo power cable is plugged into Master Module correctly and not upside down. Tips on plug should point up towards label on Module.



# Quick Reference Trouble Shooting Guide

## Problem

## Possible Cause (Action)

Display does not power up/ Servo  
Motor does not Auto Tighten.

Check fuse. Check 12-volt power  
source, ground to PerfectPass. It  
takes almost 12v to power system.

No speed reading.

Does GPS have a lock.

Not controlling well.  
Not controlling at all.

Perform servo motor test, perform  
linkage test. (Page 4 & 10)

System beeps to confirm  
engagement, but continues past set  
speed and does not control.

Perform servo motor test, linkage  
test and return spring test.

Button on keypad does not work.

Unplug display connector at master  
module and check pins.  
Replace display.

System disengages on its own and  
boat slows.

Is manual throttle handle pulling  
back on its own, if not perform servo  
motor test.

Blowing 5 amp fuse.

Inspect red wiring around servo  
motor for a ground or short.

## Troubleshooting Q & A.

**1. Condition:**

In both Speed & RPM Mode the system beeps to engage, but speed never settles in and hunts beyond & below target speed.

**Solution:**

*It appears that the PerfectPass throttle cable does not have free movement and is rubbing against engine cover or some other obstacle. A **Linkage Test** should be performed.*

**2. Condition:**

System beeps to confirm engagement, but boat continues past set speed and never locks in.

**Solution:**

*Computer is attempting to control, but servo not responding. Perform **Servo Motor Test**. (Servomotor could be seized). Page 4 and **Linkage Test** Page 9.*

**3. Condition:**

PerfectPass green light in display is on, but no data on screen.

**Solution:**

*Check to see if servo motor is powered, if not then the system does not have adequate voltage or is poorly grounded and will not start. (Measure voltage on PerfectPass power cable, which should be in excess of 12v). Note: When key is off, the black knob on servo turns very easily. When powered, knob is stiff and is difficult to turn. If servo is powered and performs auto tighten rotation but Display has no data, then Display should be changed.*

**4. Condition:**

PerfectPass has no digital speed reading

**Solution:**

Does screen show "No GPS Data"? Check GPS connection.

**5. Condition:**

Up key on Display does not respond.

**Solution:**

*Make sure all 10 pins on Master Module are in-line where display connects. If connection is OK, key pad switch is faulty, return to PerfectPass for repair.*

## Troubleshooting Q & A. (Continued)

6. **Condition:**  
Boat speed drops and throttle handle must be pushed far down to get acceleration.

**Solution:**

*Servo Motor is not holding and rotating properly usually due to a bad connection at servo. See Servo Motor Test, page 4.*

7. **Condition:**  
System is blowing the 5 amp fuse on 12v power cable.

**Solution:**

*Generally caused by a short or “grounding” problem with the red 12v power cable on servo motor. Closely inspect wiring particularly around gold resistor. (Remember, resistor & servo will run very hot which is normal).*

8. **Condition**  
Speed control sometimes disengages on its own.

**Solution:**

*Is manual handle pulling back on it's own. Does “#” sign appear on screen?*

9. **Condition**  
Customer ordered a WakeEdition, but on start up it says Three Event.

**Solution:**

*Switch software by performing a System Reset, Page 10.*



## LINKAGE TEST

This test should confirm whether the PerfectPass throttle cable & linkage connection is properly working.

With key OFF, push the manual throttle to 1/2 open position. Now take black knob on servo and slowly turn the knob in a counterclockwise direction, and then in a clockwise direction.

As you rotate the knob back & forth, you should see the throttle lever on engine opening & closing very smoothly with each step of the motor. As you turn the knob counterclockwise, which lets out cable, the throttle will close back towards neutral. When you rotate it clockwise the throttle will open.

As you rotate the knob back and forth (slowly and quickly), the throttle should open & close very smoothly and the brass L Adapter at linkage should be rotating as well to follow cable. At no point should the throttle cable catch, hook or come into interference with any part that could disrupt the cable movement.

If the cable is rubbing against a decorative engine cover, fuel rail, motor box etc, adjust servomotor and cable to improve alignment. Many plastic decorative engine shrouds can cause this problem. Remove temporarily and run boat if you suspect this could be a problem.

Final Test: With key OFF, push manual throttle to full open position. Watch PerfectPass throttle cable to ensure it can move freely without binding or interference.

## Boat Speeds Past Set Speed

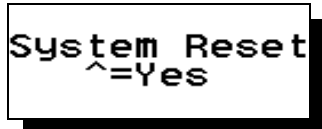
If the system beeps to confirm engagement, but continues past set speed, perform a Servo Motor Test and Linkage Test. If these tests indicate all is well, it could be a Throttle Return Spring problem.

**Throttle Return Spring:** PerfectPass can open the throttle (by turning clockwise), but relies on the engine return spring to close the throttle when the servo turns counterclockwise. (The return spring is always applying pressure against the throttle back towards the neutral position). If the servo turns counterclockwise to slow the boat, but the throttle lever on engine does not move or moves very slowly, the return spring could be weak, broken, etc.

If you feel the spring is weak or damaged, an external return spring can be added.

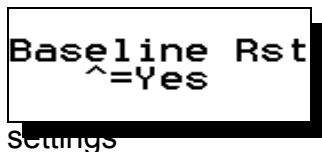
## Resetting a PerfectPass StarGazer System

You can do a System Reset by pressing and holding the **ON/OFF & MENU** keys together as you **power-up** the system (turning ignition ON or to ACC). Continue holding keys as the skier moves across the screen and system information is displayed. The following screen should now appear. **NOTE if this screen does not appear turn off the ignition and try again, making sure to hold ON/OFF and MENU keys.**



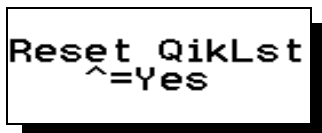
```
System Reset
^=Yes
```

Press the **UP** key to continue the reset



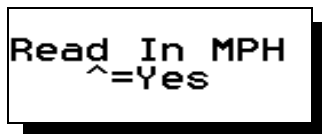
```
Baseline Rst
^=Yes
```

Press the **UP** key to reset RPM Baselines and speedometer calibrations to factory



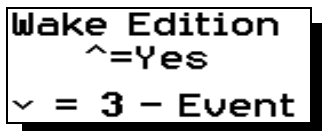
```
Reset QikLst
^=Yes
```

Press the **UP** key to delete saved skier names in the Quicklist.



```
Read In MPH
^=Yes
```

Press the **UP** key to display the speed in MPH or the **DOWN** key to display speed in KPH



```
Wake Edition
^=Yes
v = 3 - Event
```

Press the **UP** key to reset as a Stargazer Wake Edition or the **DOWN** key to reset as a Stargazer 3-Event

## Switching from WakeEdition <> Three Event

The Master Module for both systems is identical and the software for both is stored inside. If a system was set up incorrectly (ie: customer ordered a WakeEdition but when he turns it on it says Three Event) this can be easily changed.

Simply press & hold the Menu & Down Keys together as you turn the key on to power system. Keep holding for a few seconds until you see "Servo Test ^ = Yes". Press no or down key to move into sub menu. When you see [ WakeEdition ^ = Yes ] press up for WakeEdition or down for Three Event.

## Adjusting KDW

### KDW

If you wish to change this control parameter, highlight Menu Arrow and press Up Key. Wakeboard will now be on screen, press Down Key to enter KDW. You can then change the KDW using the up or down keys. Higher values = more aggressive control response. Factory setting is 90. (Example: Heavily loaded boats may need a higher value to maintain a steady, crisp pull. Try 100 – 120). After adjustment, press MENU to process.

## Investigating Blown Fuse

### Fuse - 1.25" 5 AMP

Typically, a fuse will only blow if there is a short in the red wire found within the gray servo power cable, which carries 12 volts from the Master Module to the servo motor.

Closely inspect the servo motor power cable connector both at the Master Module end and at the servo motor and gold resistor end located at the engine. If the red wire is split, frayed, etc, it could be the cause of the "grounding out" of this 12 volt supply causing the fuse to blow.

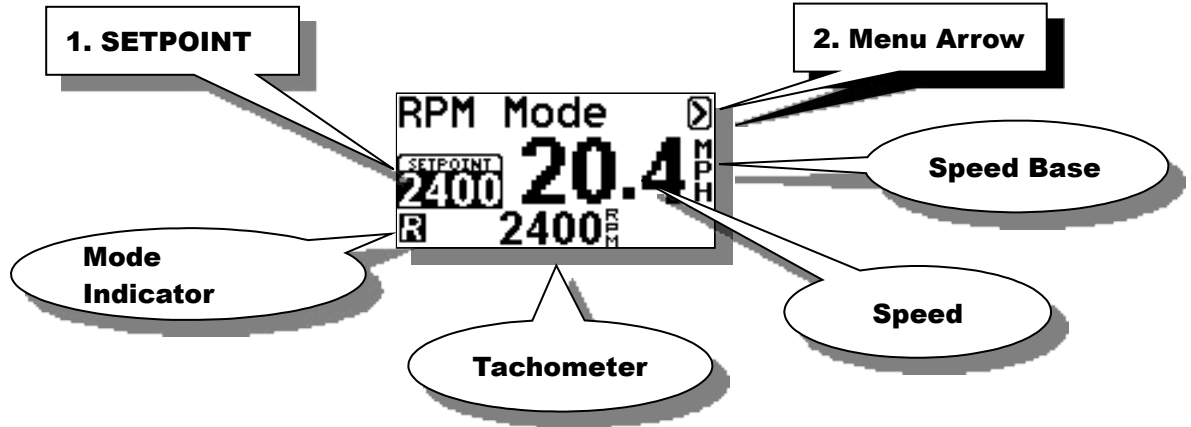
Pinching or crushing of this cable could also cause a "ground out" of the 12 volt supply and blow the fuse.

If after careful inspection of this cable, the problem has not been found then the following procedure can be followed to help identify the source of the blown fuse:

- Step.1 With the key off, unplug all plugs from the Master Module, except the Display.
- Step.2 Turn key on and go to the Battery Voltage reading on the PerfectPass Display. (Press Menu & Up Keys together, then press the Menu key. Make a note of the battery voltage displayed).
- Step.3 Now plug in the paddle wheel plug. The displayed voltage should not change.
- Step.4 Now plug in servo power cable with the servo motor connections intact. The voltage reading with a good cable should drop about 0.3 volts. [A significant voltage drop (1 volt or more) would confirm a problem with the servo motor or cable].
- Step.5 You can also perform this test with the servo motor and resistor unplugged. This would test the servo power cable independently, if no problem is found with the cable alone, then plugging in the servo motor will help identify the location of the problem.

## PerfectPass Tank Testing/RPM Mode on Water Test

1. Move screen function to RPM Mode. Highlight menu arrow at top right and press UP Key. Menu to RPM Mode and press UP Key.



2. With throttle locked in neutral, aggressively accelerate engine up and well beyond 2800. You will see the digital tachometer in center of screen. (You will feel a soft spot in throttle as you accelerate...continue pushing throttle up and past 2800.) When 2800 is reached you will hear a beep to confirm engagement and system should start controlling. The digital tach should settle in and hold steady at about 2800.
3. As system is controlling at 2800, you can press throttle handle forward which will cause engine to speed up briefly...it will then settle back at lock in again at 2800.
4. If you then bring throttle to neutral, servo motor will wind in cable clockwise to its normal starting position.
5. Throttle on boat should feel the same as a boat without PerfectPass, it should smoothly go into and out of gear.

The key to a good installation is to ensure the PerfectPass throttle cable has a smooth alignment to where it attaches to boat throttle cable. There should be no excessive bends where cable could bind. Perform a Linkage Test if necessary.

