

SENTRY

DPV Dashboard Installation and Operator's Manual



LOGIC
DIVE GEAR
Nellis Engineering, Inc.

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Warnings & Cautions

WARNING

A warning means that injury or death is possible if the instructions are not obeyed.

CAUTION

A caution means that damage to equipment is possible.

Note

A note is added to give more information, usually in a procedure.

WARNING: Never allow the batteries to charge unattended or attempt to charge damaged batteries. The Lithium Ion batteries have a high energy density and can catch fire or explode if abused or damaged. Only recharge in a safe location, free of flammable materials, under direct supervision and only using the supplied charger.

WARNING: Do not leave the batteries (alone or installed in DPV) in direct sunlight or a hot car. Temperatures of 160°F (70°C) or above can damage the batteries resulting in fire or explosion.

WARNING: Do not attempt to charge the batteries when they are at or below freezing (32°F/0°C). Permanent damage to the batteries will result, decreasing both battery safety and capacity. While the outside of the batteries may be above freezing, the centers may not. Ensure ample time is spent in a warm environment for thermal equilibrium across the pack before charging, following exposure to freezing temperatures.

CAUTION: Avoid running the DPV until battery cutout. Deeply discharging the battery shortens the battery life and can lead to over-discharge of the batteries. Should the DPV be run until cutout, remove the recharge plug cover on the nose of the DPV after exiting the water and recharge the batteries at your earliest opportunity.

Installation

The internal transmitter is held in place inside the DPV with adhesive hook and loop faster tabs stuck on the inside wall. There is an attachment placement on the top inside wall of the tube, for the transmitter antenna and an attachment placement on the bottom inside wall for the water detector and reed power switch. Clean the inner diameter with alcohol or acetone if necessary, so the adhesive will stick. The long Velcro strip containing the antenna of the transmitter should be positioned as shown, approximately 2-3 inches from the rear edge of the tube. Peel off the backing of the three short pieces of hook material, to expose the adhesive, and affix it to the upper inside wall of the tube in an arc as shown in (Fig. 1) Two outer pieces of hook strip attached to the inside wall to support the each end of the antenna will require removal if the batteries ever need to be removed from the body.

For the water detector, measure 1.3" into the tube at the bottom from the opening edge and place a temporary mark with a pencil or piece of tape. Ensure the two short hook tabs are attached to the water detector loop strip, peel off the backing of both hook sections to expose the adhesive and affix it to the bottom inside wall with the wire exiting to the left, so the hook tabs will not interfere with battery removal, (Fig. 2) The rear edge of the hook tab should be at the 1.3" mark and the water detector further inside. This will place the reed switch used to turn on the transmitter, 2.3" from the tube opening. The wires should exit to the left as shown.



Fig. 1

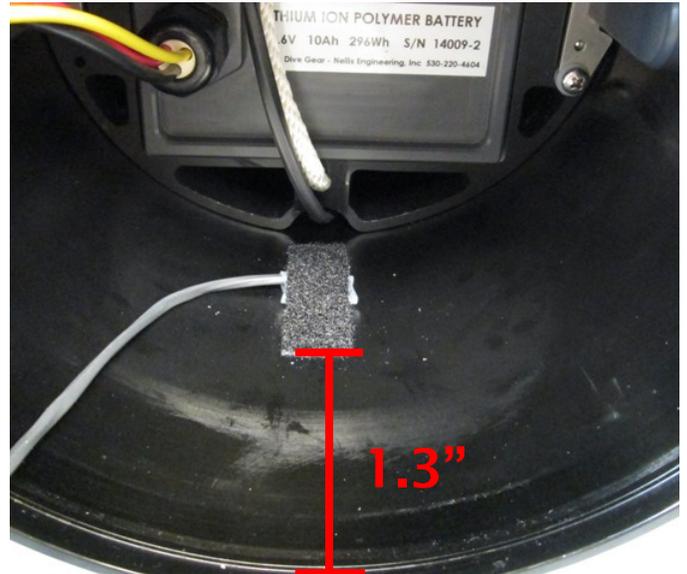


Fig. 2

Place a mark on the outside of the tube 2.3" from the end of the tube and directly outside the wall from the water detection board. (FIG. 3) Wrap the mounting strap for the Sentry external display around the tube. Pass the end of the strap through the bungee loop and pull it back, stretching the bungee and affixing the hook and loop faster together. Position the strap so that the gray block that slides on the bungee, stops against the strap and over the mark, which is directly outside the tube from the water detection board. The gray block contains a magnet to activate

the reed switch of the internal transmitter and is how you turn off the transmitter when not in use. This will position the display about 2.0" from the end of the tube as well. If reception is intermittent, position the display as far towards the rear as possible.



Fig. 3

Label the connectors on the tail of the Genesis with self adhesive labels as shown in Fig. 4

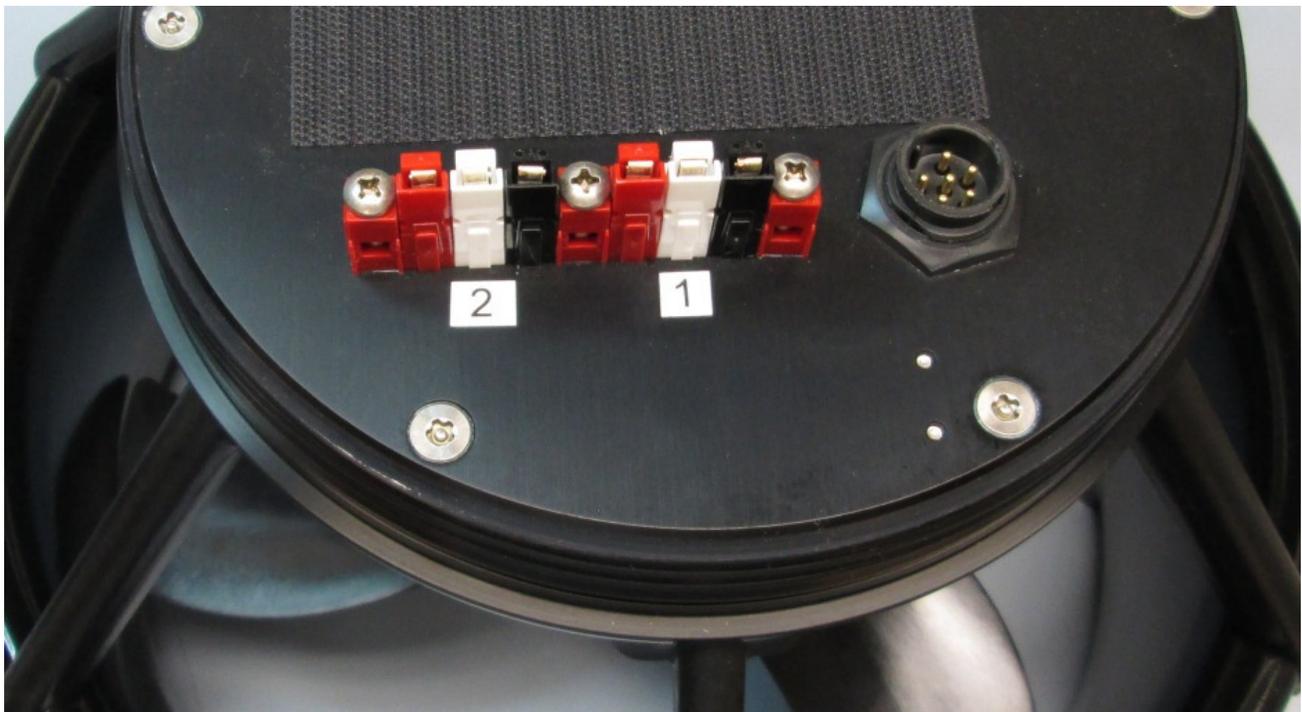


Fig. 4



Fig. 5

The loop fastener strip on the transmitter (Fig. 5) covers the antenna. **DO NOT CUT IT!**

Label the connectors on the batteries with self adhesive labels as shown in Fig. 6 & 7. Your battery with serial number ending in -1 will have a small connector coming out of the larger connectors for the transmitter power. (If it does not have this small power connector, you will need to attach one by soldering the leads to the respective larger battery connectors.) Wrap the label with the “1” on each end around the yellow wire of this battery as shown in Fig. 6.

On battery ending in serial number -2, slide the red connector housing off of the white connector housing and wrap the label with the “2” on each end around the yellow wire of this battery as shown in Fig. 7. Connect the red wire from Battery -2 to the short lead coming from the transmitter and connect the long lead from the transmitter to the white and black connector housings of battery -2 as shown in Fig. 8. Finally, connect the small two wire connector from the #1 battery to the transmitter. This can be done without removing the batteries from the tube as shown, which was done for clarity. Clean and grease the seals on the DPV as usual before closing. Affix the transmitter to the inside top of the tube and the water detector to the inside bottom of the tube, then connect the battery connectors to the tail followed by the 6 pin circular connector and close the DPV as normal, being careful not to pinch any wires.

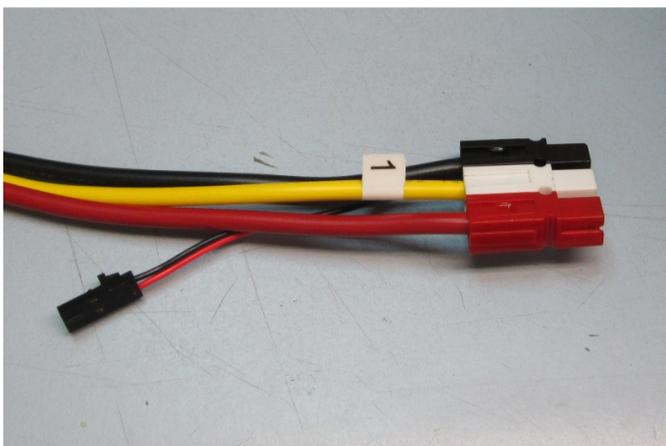


Fig. 6

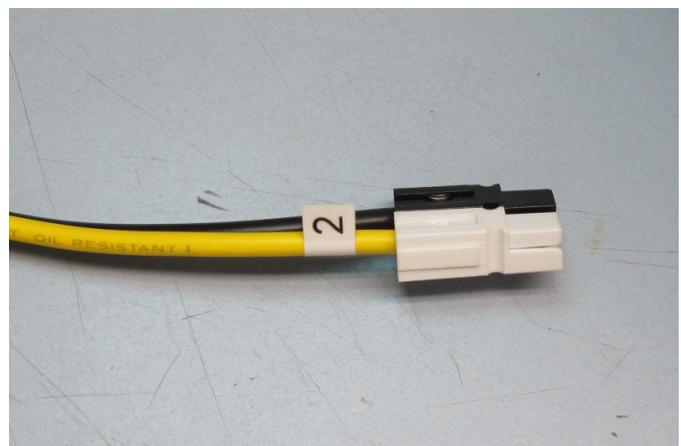


Fig. 7

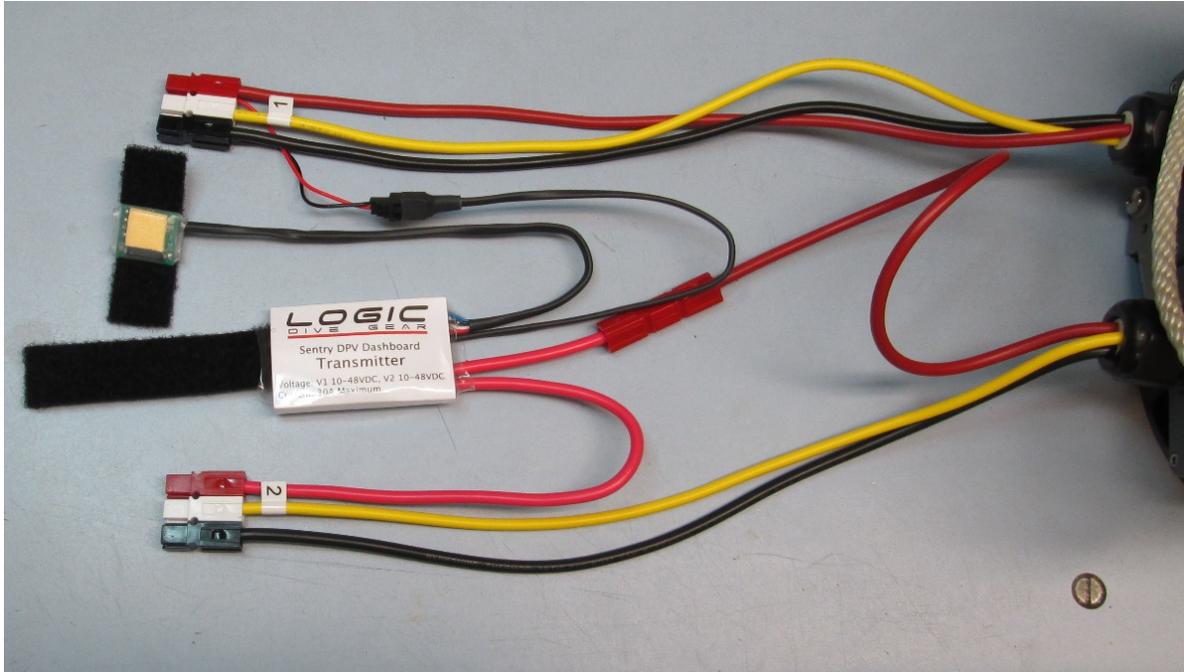


Fig. 8

Operation

To wake the display, tap the left or right side of the display housing three times slowly. Tapping too fast will not be recognized, to discriminate from vibration. In the bottom right corner of the display (Fig. 9), it will display “**UNITS**” for 10 seconds. To change the depth reading between Feet and Meters, you must tap the side of the display 5 times within this 10 second window. Each registered tap will be show on the display by a small dot near the center of the screen. The setting will be saved for all further dives, unless changed again at start up.

At the bottom of the display, next to the display’s battery gauge, a series of vertical bars will appear, indicating the signal strength from the internal transmitter. More bars equal better signal strength, which can be used for positioning the display. In air and fresh water, the display should have 10 bar most of the time, but in salt water, the RF signal is attenuated and fewer bars may be displayed. If the bars are blinking, that indicates that the display is not linked up to the internal transmitter. 3-4 bars are normally the minimum for establishing a link to the internal transmitter. It may take 10-20 seconds once you have 4 or more bars, for the display to establish a link. Moving the display slightly towards the rear of the DPV should increase signal strength. Ensure the gray block sliding on the bungee is positioned so that it is directly outside of the water detector on the inside of the DPV tube. Sliding the gray block up will disable the transmitter when not in use and this must be done when removing the nose plug from the Genesis to disable the motor controller during storage.

CAUTION

Leaving the transmitter powered while in storage will slowly discharge the #1 DPV battery, leading to permanent damage of the #1 DPV battery, if allowed to over discharge.

To turn the display off, tap the side of the housing 3 time. In the lower left corner “OFF?” will appear to confirm that you want to turn it off. (Fig. 10) Tap the side 3 more times within 5 seconds to turn off the display.



Fig. 9



Fig. 10

Depth (top left corner): Displays the depth in feet or meters with 0.1 unit precision. The depth is compensated for altitude, provided the display is turned on before entering the water. If the display is turned on while under water, it will revert to standard sea level calibration. The depth is accurate to 425ft (130m) and accuracy may decrease slightly when below that. The Sentry housing is rated for 660ft (200m),

Timer (top right corner): When the display exceeds 3ft (1m) depth, the timer in the top right corner will start running and continue to run, until the depth reads less than 3ft (1m). The timer will reset if the depth reads less than 3ft (1m) for 3 minutes.

Watts (center left) Displays the power that the motor is currently using in real time. The diver can control the DPV to limit the power to that is required by the dive plan. By referencing a known distance over a time period, the diver can estimate their speed based on the DPV power level for their equipment configuration. More drag (i.e. drysuit, more tanks or towing articles) will require more power to obtain a known speed and less drag (wet suit, single tank) will require less power to achieve the same speed.

Watt-Hours (center right) Displays the quantity of energy consumed from the battery(s). It will begin counting up from zero and the closer it gets to your known battery capacity, the closer you are to swimming your DPV back to the boat or shore, and no one wants that. **Do not turn off the display until you are done diving for the day.** When the Sentry is powered off, the Watt-hours used are reset to zero on restart.

It is initially recommended to fully charge your DPV battery and dive the DPV with the Sentry until your battery cuts out, to know the true capacity for future dives. Do this in good conditions and near your exit point or boat, when you get close to what you believe your battery capacity is.

As an example, if you DPV has a 600Wh battery when new, and it is now 3 years old, you should be near your exit at by around 450-500Wh consumed for this test and finish off the battery within a short swimming distance of your exit.

Voltage V1 & V2 (lower left & right) Displays the voltage of each battery in a Genesis or other DPV with 2 batteries in series or a single battery at V1 for DPVs with a single battery or two or more batteries in parallel. This can be used to identify if battery voltage is dropping unexpectedly and adjust your dive accordingly. You should have a rough idea of the normal voltage range of your DPV batteries to determine if they are not performing normally.

Genesis DPV battery capacity based on *resting* voltage
(i.e. motor not running)

100%	33.6V	50%	30.5V
90%	32.7V	40%	30.2V
80%	32.0V	30%	30.0V
70%	31.4V	20%	29.6V
60%	30.9V	10%	29.0V

Battery icon (bottom center) The battery icon displays the charge level of the Sentry display. You should have approximately 18-24 hours of battery life. When the DPV is not being used, the OLED display will go into standby mode and flash “Standby” on the screen. When DPV power is increased above 10 watts, the display will wake up and operate normally. Tapping the side of the housing will also wake the display from standby.

Water intrusion When water is detected inside the DPV, the display screen, which is normally black background with yellow lettering will flash alternately to yellow background with black lettering and H2O display left and right of the tap indication dots. This will be very obvious and is not a good thing, but while your DPV is still running, your DPV should exit the water as soon as possible (deco obligations permitting). The water detector inside requires a very small amount of liquid water to activate and will remain activated until completely dried. If water reaches the transmitter, it will stop transmitting, at which point your DPV will likely also be very negatively buoyant.

Batteries and charging

The Genesis DPV batteries can be recharged normally through the connector on the nose of the DPV, no changes need to be made to that procedure. The Sentry transmitter and display can be operated while recharging the DPV to monitor the charge voltage. Additionally the Sentry Display can be recharged while on or off. The battery icon will change to show a small lightning bolt through it when connected to the charger and should take 90 minutes or less to fully charge. To install the charger on the display, line up the two screw heads on each end of the serial number with the contacts on the charger clip, and then press the clip onto the display so it reaches over the opposite side window. (Fig. 11)



Fig 11

Dive Planning

Dive planning using the Sentry requires a bit of math, just like breathing gas planning, but nothing serious. As an example, if your dive plan calls for 90 minutes (1.5hrs) of run time, and you have 600Wh of battery, you should first reserve one third for contingencies, similar to the rule of thirds for breathing gas. That leaves you 400Wh to use over 1.5 hours. 400 Watt-hours divided by 1.5 hours equals 266 Watts of power as the average power level for the entire dive. If you stay at or below 266 Watts on average during the dive, that is the fastest you can go on that 90 minute dive without cutting into your reserve. If by your previous dive experience you know that 260W results in roughly 180 ft/min, that gives you... 45 minutes outbound, multiplied by 180 ft/min equal 8100ft or 1.5 miles of range. (5280ft/mile)

Battery Life Calculation

As batteries age, they lose capacity and become less safe due chemical to changes inside the cells. The decrease in capacity should be monitored to know when it is time to replace a rechargeable lithium ion battery. When a rechargeable lithium battery has less than 70% of the original capacity, it should be replaced for safety reason. By using the watt hours consumed and battery voltage it is possible to estimate the decrease in capacity of the battery to determine when the DPV battery may be due for replacement. This can be done during normal operation of the DPV as follows, if you start with a fully charged battery.

At the end of your diving day, note the Watt-hours consumed and the voltage(s) of the battery(s). Calculate what percentage of the original capacity that you have used. Actual used capacity for the days diving (example 450Wh) divided by the original capacity of 600Wh when new...

$$450\text{Wh}/600\text{Wh} = 75\%$$

Using the chart of battery voltage vs. capacity for your battery, find your ending voltage (for this example we'll say the Sentry is reporting 29.2 volts) At 29.0V you should have a bit over 10% capacity remaining, plus the 75% you consumed during your dive, gives you an estimate that your battery now has a bit over 85% of the original battery capacity.

Warranty

The Sentry DPV Dashboard has a 1 year limited warranty on all materials and workmanship provided by Nellis Engineering Inc, when used for their intended purposes under normal conditions, with the following exceptions.

1. Water damage to the internal transmitter unit is not covered under this warranty.
3. The battery charger is not covered for water damage.
4. Structural or cosmetic damage from abuse or corrosion is not covered.
5. Nellis Engineering, Inc. will not be liable for any loss, damages or expenses, to include incidental, special, consequential or collateral damages, arising directly or indirectly from the sale or use of the equipment.

THIS WRITTEN WARRANTY IS THE SOLE WARRANTY AND SUPERSEDES ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING WARRANTY OF FITNESS OR MERCHANTABILITY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. SHOULD AN IMPLIED WARRANTY BE REQUIRED BY LAW, IT IS LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY.

To receive warranty repair, contact the factory for an RMA number prior to returning any equipment for repair. All shipping charges to and from the factory are the responsibility of the equipment owner.