



Spectra Vista Corporation

# ***SVC i-SERIES UNDERWATER HOUSING USER MANUAL***

**Revision 2.3.1**

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## **Overview**

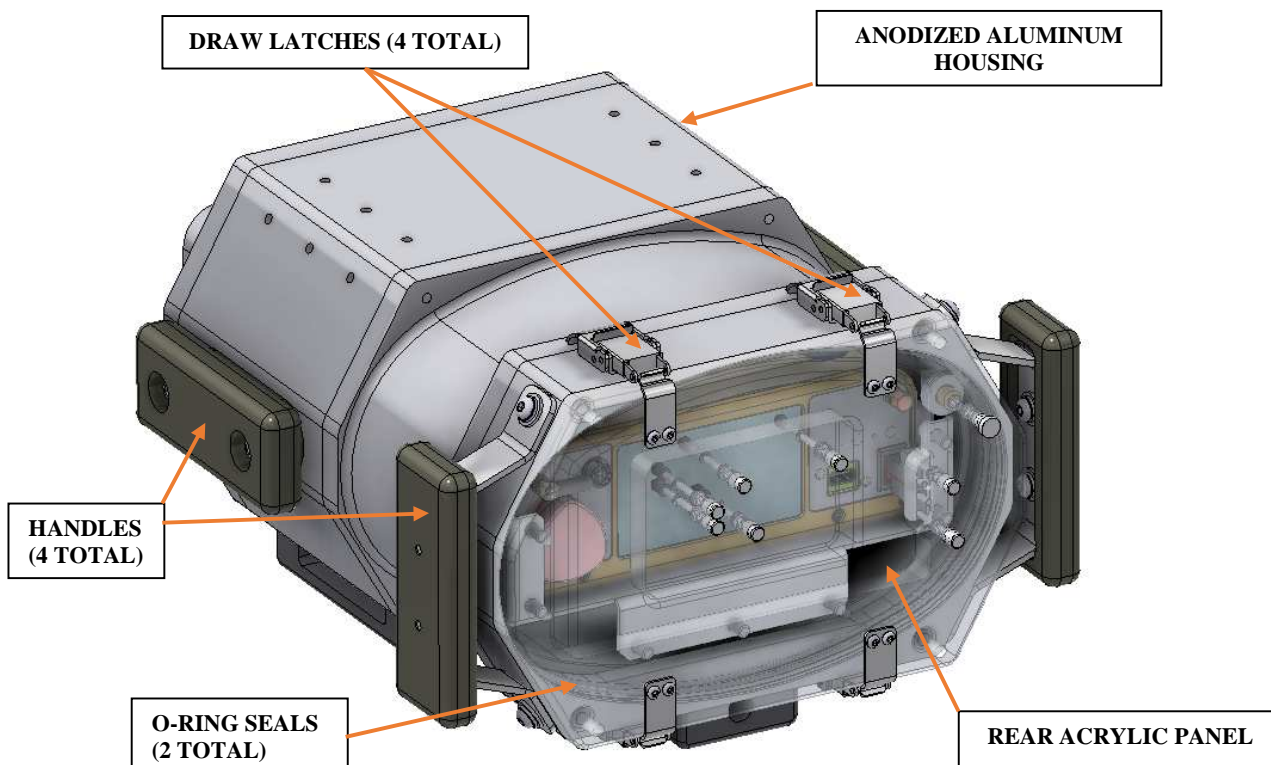
This User Manual applies to the following SVC products:

ASM512-500	Underwater Housing for SVC HR-512i Spectroradiometers
ASM1024-500	Underwater Housing for SVC i-Series full-range Spectroradiometers

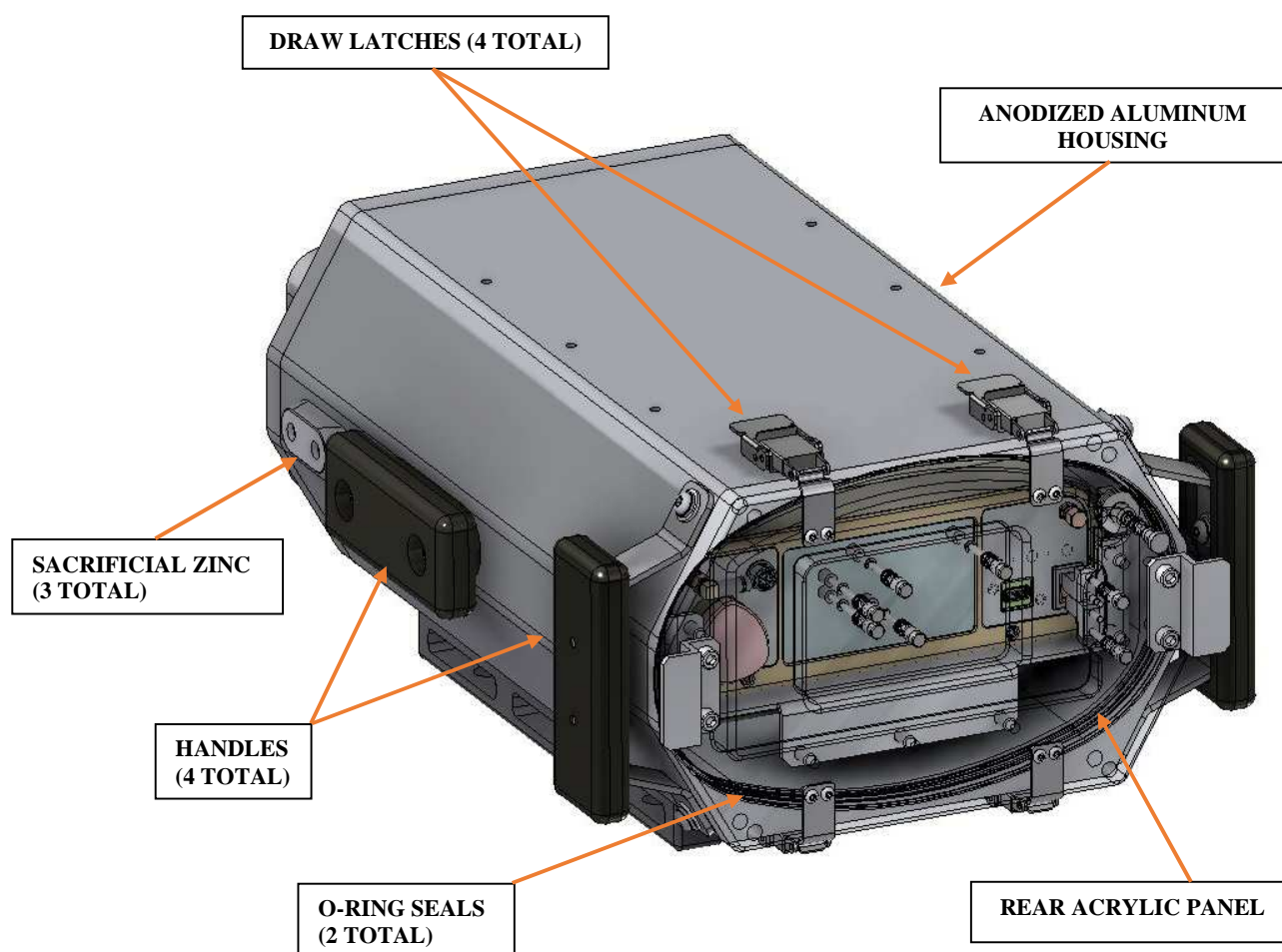
The Underwater Housing provides a secure and convenient means to conduct submerged data collections at depths of up 40 meters (130 feet) in either salt or fresh water.

The standard 4° foreoptic and the standard battery are used for operations with the instrument installed in the Underwater Housing. One battery should supply sufficient power for a full day's data collection (SVC HR-512i instrument) or 3 hours of data collection (SVC i-Series full-range instruments).

Data collected during each dive may be downloaded via Bluetooth without opening the housing, thus minimizing the risk of getting moisture into the housing or onto the instrument. The removable rear panel, which is constructed of robust clear acrylic, is quickly detachable. Four stainless steel draw latches are used to compress a pair of O-rings, affecting a secure, watertight seal between the rear panel and the main housing (shown in **Figures 1 and 2**).



**Figure 1 ASM512-500 Housing, Rear View**



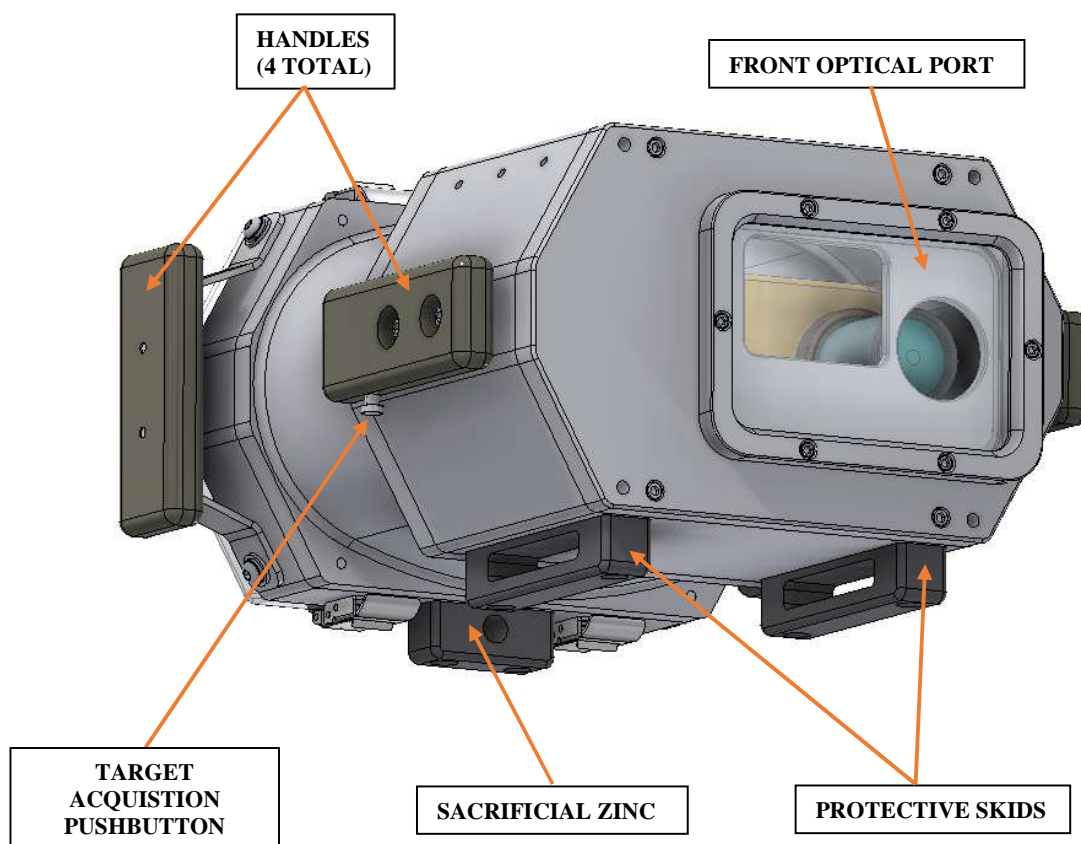
**Figure 2 ASM1024-500 Housing, Rear View**

The front optical glass port is also sealed with an O-ring, and is semi-permanently installed (shown in **Figures 3 and 4**).

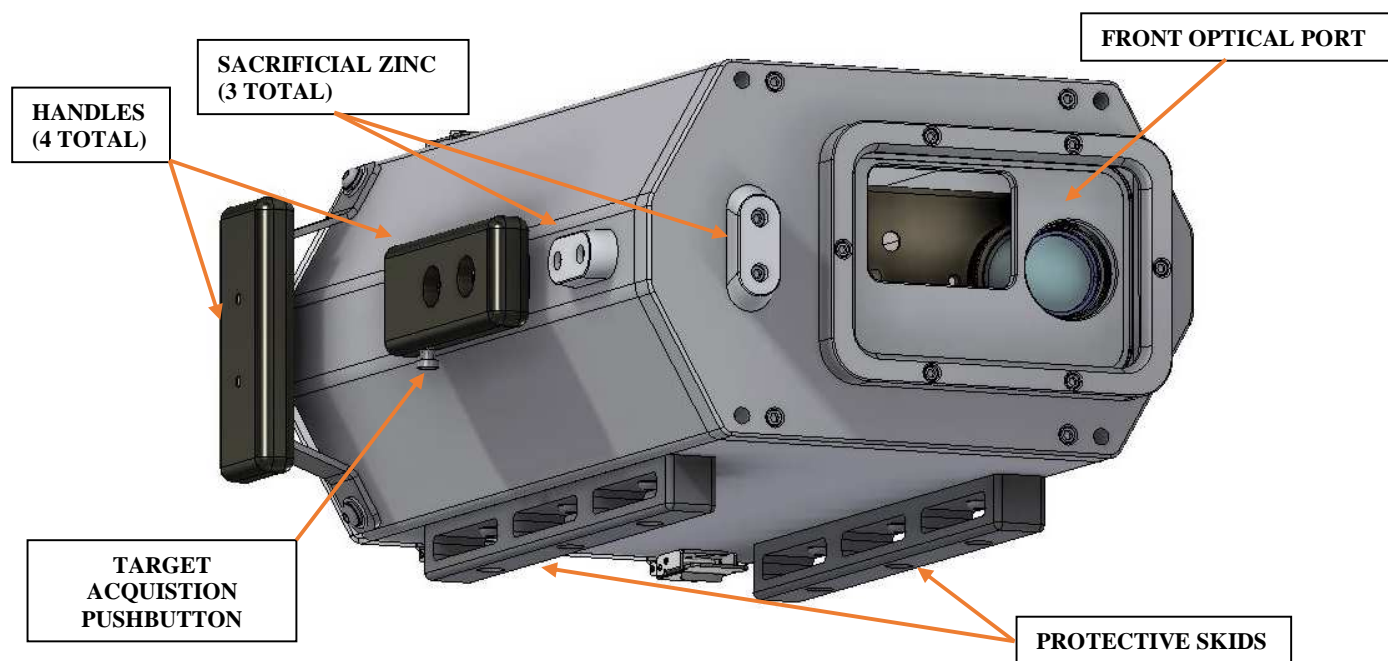
The main body of the housing is made of clear anodized aluminum alloy and is rated for operations to a water depth of forty meters. The enclosure is designed for appropriately displaced water volume, resulting in neutral to slightly positive buoyancy.

A pair of protective, black anodized skids are attached to the bottom of the housing. The skids also double as locations for adding diving weights, to counteract any excess buoyancy of the submerged enclosure with the instrument installed (shown in **Figures 3 and 4**).

Although all hardware used is top-quality stainless steel alloy, it is recommended that the housing be rinsed off with fresh water after each diving session, prior to drying and opening. Sacrificial zinc weights attached to the surface of the housing helps to safeguard against corrosion (also shown in **Figures 3 and 4**).



**Figure 3 ASM512-500 Housing, Front View**



**Figure 4 ASM1024-500 Housing, Front View**

## **Handles**

Two sets of handles are provided to facilitate operation of the submerged unit in either a horizontal or a vertical orientation. The handles are held in place with stainless socket head cap screws. On the right-hand side handle, a waterproof pushbutton switch, operated by the diver's thumb, has been incorporated to acquire spectral scans when the instrument is located vertically, with the optical port at the bottom.

## **Clear Panels**

The rear panel or endplate of the enclosure is constructed of transparent acrylic. This ensures easy viewing of the instrument's rear touchscreen LCD and controls. It is secured with four over-center latches, used to provide the necessary seal squeeze, and sealed with a pair of AS568-266 oil-resistant Buna-N O-rings.

The seal lines between the rear acrylic panel and main housing are visible, so as to provide a convenient means of visually checking the sealing integrity of the Buna-N O-rings.

**Caution: Always verify that the thin, black seal lines from the O-rings' squeeze can be seen through the rear panel. If not, determine the cause of the problem and correct it before submerging the housing.**

The front viewing port is constructed of 0.75-inch thick optical glass, sealed with one oil-resistant Buna-N O-ring. It is **not recommended** that this seal be removed and reinstalled unless unit is to be placed in storage for an extended period of time.

Always use a **very light** coat of silicon grease, such as Dow Corning Molykote 111 compound when servicing the O-ring seals. Apply by hand, by wiping. Rubber gloves are recommended. A small supply of this lubricant, a set of replacement O-rings and a removal tool are shipped with the housing.

Both transparent panels are designed to withstand depths of up to forty meters (130 ft.).

**Caution: Exercise care when removing front window retainer or seal.  
The optical glass front viewing port is not fastened to the retaining ring.  
Do not allow it to fall out and become damaged.**



## **Controls**

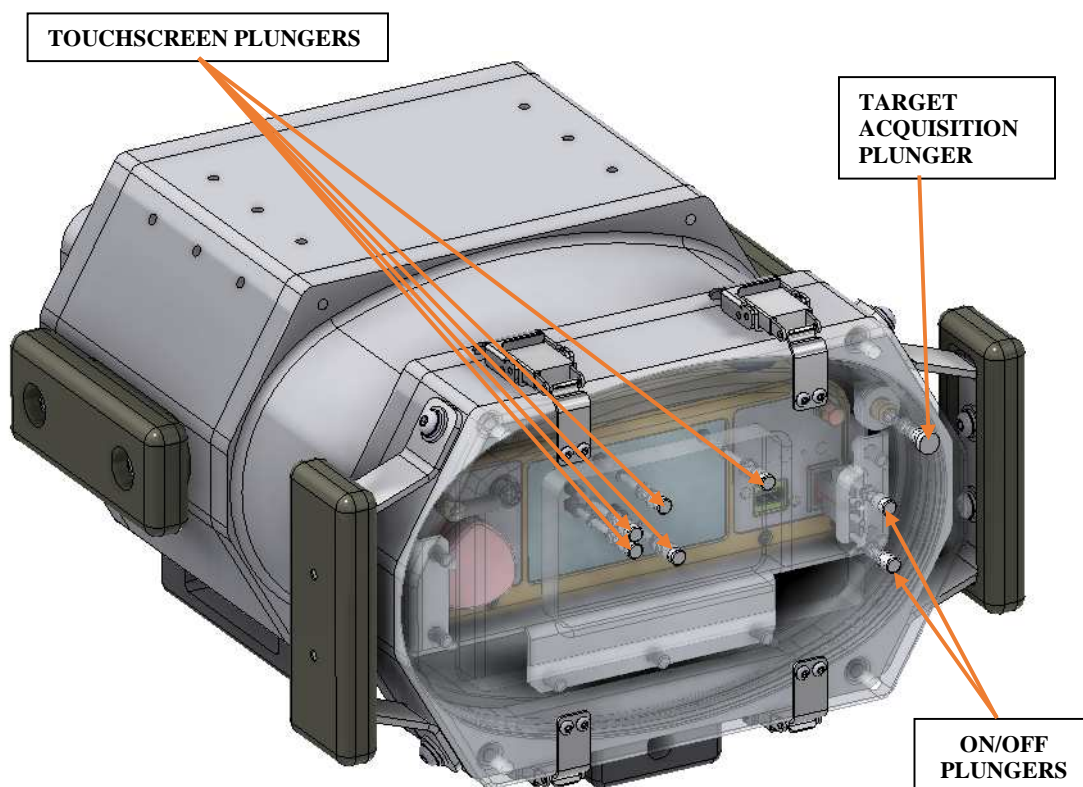
When the instrument is installed within the Underwater Housing, the touch-screen controls are accessed via a set of specially-designed, sealed actuator pins (aka plungers), using a design which has been well-proven in the field.

These plungers are incorporated into the rear acrylic panel (shown in **Figure 5**).

The plungers are used by the diver to operate the menus on the LCD panel on the rear of the instrument. This LCD panel incorporates a multi-position, resistive touchscreen. Five plungers have been provided for the touchscreen. Two additional plungers have been provided to operate the ON/OFF rocker switch, located on the right-hand side of the instrument rear panel.

One additional plunger is found on the right-hand side of the transparent rear panel, a waterproof pushbutton switch. This plunger is operated by the diver's thumb, and has been incorporated to take spectral scans when the instrument is oriented horizontally.

This brings the total number of plungers to eight. Each plunger head retracts into a counter-bore on the exterior of the acrylic panel, which serves as a means of limiting the plunger's travel. The plungers also have soft tips which contact the screen. Both features have been incorporated to avoid any damage to the touchscreen. Note that when installed in the provided tray, the instrument's LCD touchscreen is always correctly located, so as to accurately align the plungers with their corresponding LCD touchscreen button locations.

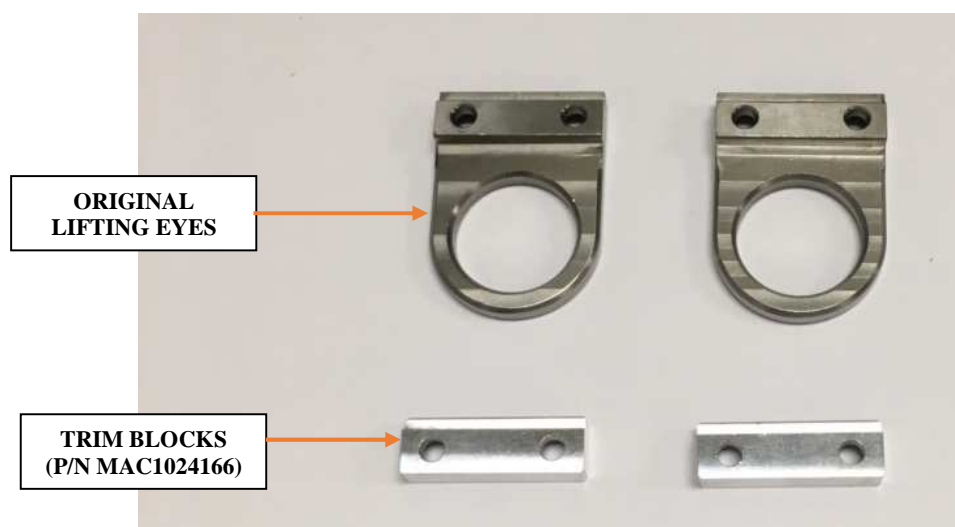


**Figure 5 Rear Controls (ASM512-500 and ASM1024-500)**

### **Installation – Instrument Into Enclosure ASM512-500 / ASM1024-500**

Confirm that the two P/N MAC1024157 stainless steel lifting eyes (shown in **Figure 6**) have been removed from the instrument prior to installing it in the Underwater Housing.

The lifting eyes are replaced by two aluminum trim blocks (P/N MAC1024166). (See **Figure 7**), secured with the original lifting eyes' #6-32 x 3/8" (P/N HDW001033) stainless steel machine screws.



**Figure 6 Instrument Lifting Eye Replacement**

The lifting eyes are removed in order to permit the installation of the instrument in a position as close as possible to the rear acrylic panel of the Underwater Housing.

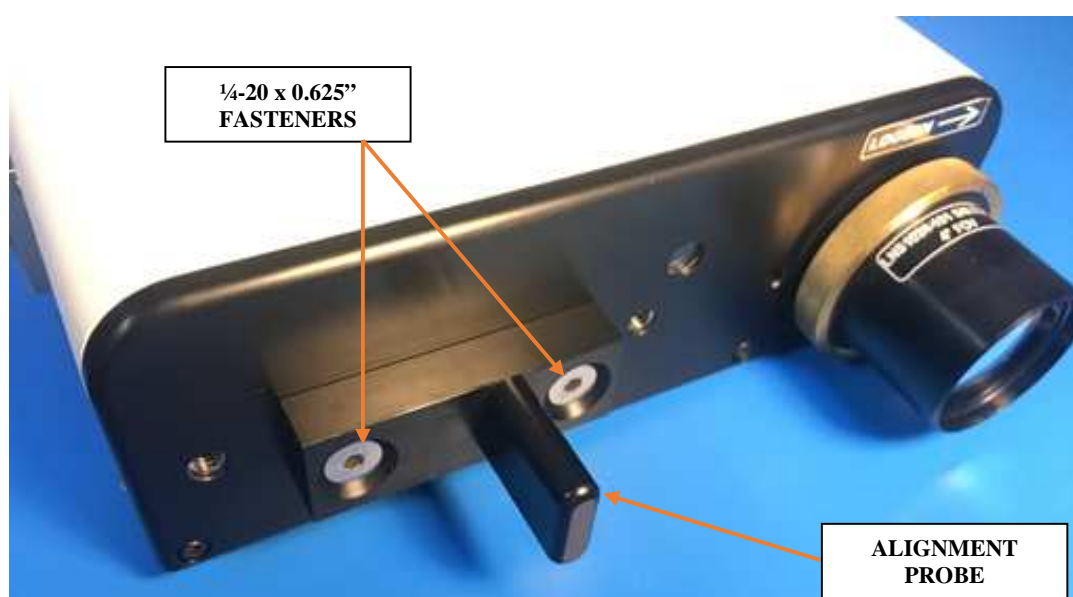


**Figure 7 Trim Blocks (Right Side Shown) Installed**

Install the instrument Alignment Probe onto the instrument base plate using two of 1/4-20 x 0.625" Hex Socket Head Flat Countersunk screws as shown below (See **Figure 8**). The alignment probe mates with the Alignment Fixture that is mounted within the Underwater Housing. This fixture holds the instrument's front plate rigidly in place within the Underwater Housing.

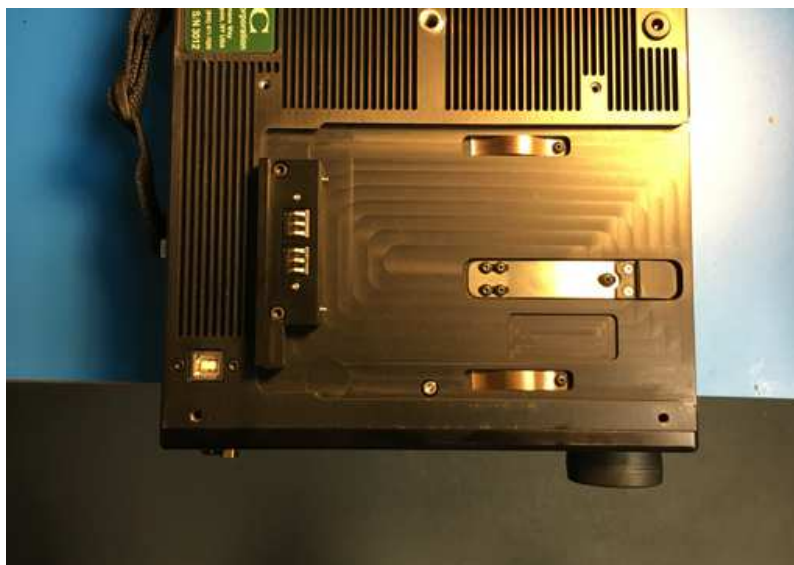
When installing the Alignment Probe, **carefully note its orientation and placement; it must be placed exactly as shown in order to mate correctly with the Alignment Fixture mounted within the enclosure.**

Make sure that the lens cover has been removed from the instrument's foreoptic.



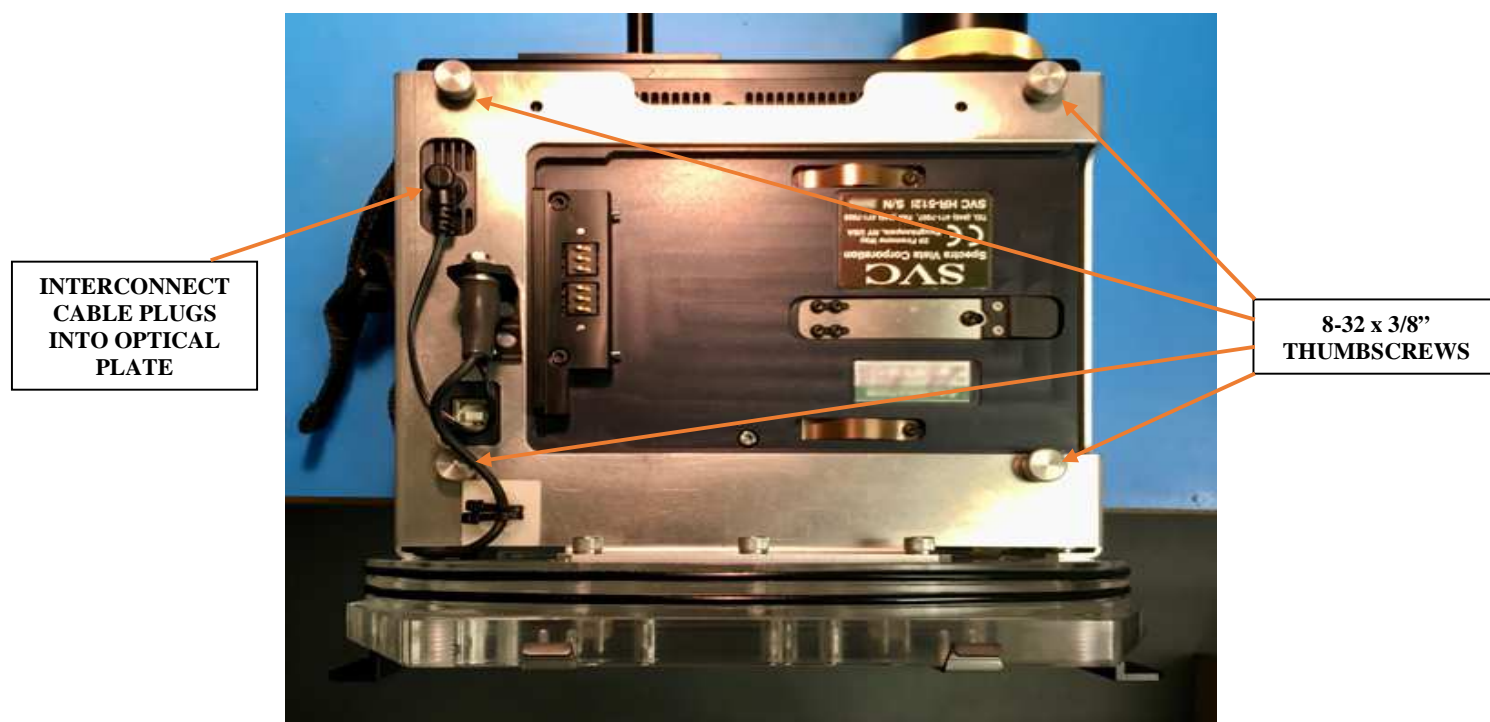
**Figure 8 Alignment Probe Installed On Instrument Base Plate**

Turn the instrument upside down, and gently place it on a table near an edge (See **Figure 9**) in order to install the Enclosure Rear Panel. Hang about 1 inch of the instrument over the edge.

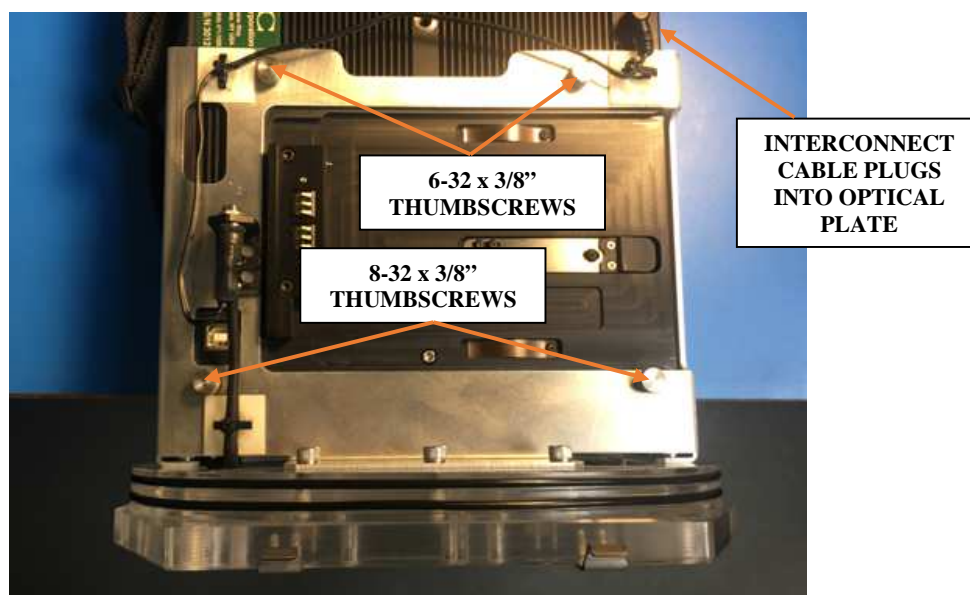


**Figure 9 Instrument Prior To Rear Panel Installation**

Place the Rear Panel over the bottom of the instrument, and fasten it to the instrument using four thumbscrews (See **Figure 10 – HR-512i** or **Figure 11 – HR-1024i**). Also connect the Interconnect Cable to the mate on the instrument's Optical Plate.

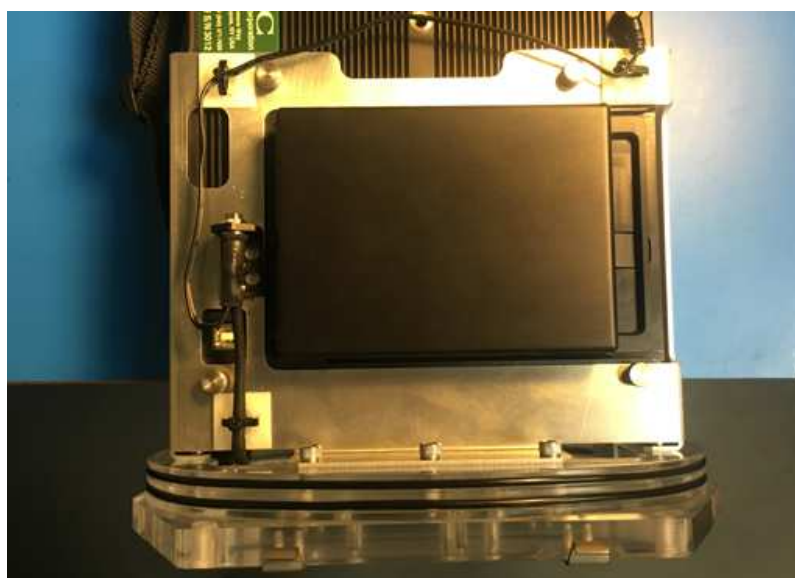


**Figure 10 HR-512i Instrument After Rear Panel Installation**



**Figure 11 HR-1024i Instrument After Rear Panel Installation**

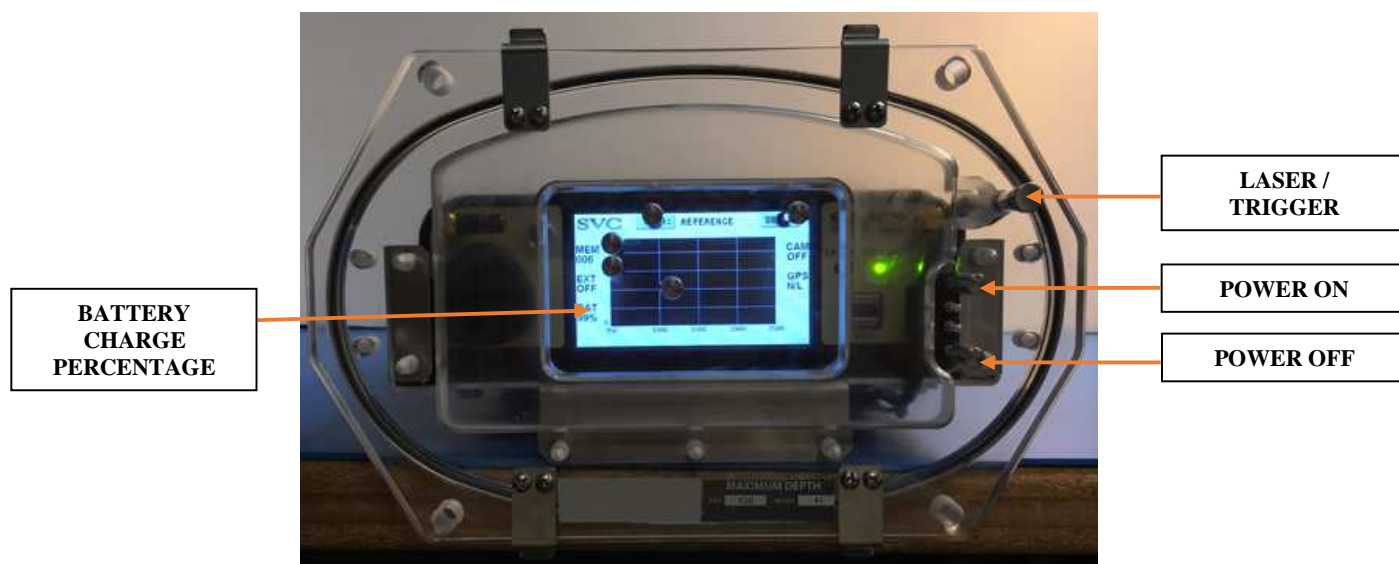
Slide a fully-charged battery into the assembly (See **Figure 12**). The Rear Panel assembly onto the instrument is now complete.



**Figure 12 Instrument Battery Installed**



Now turn the Rear Panel assembly over, so that the instrument is oriented as shown below (See **Figure 13**).

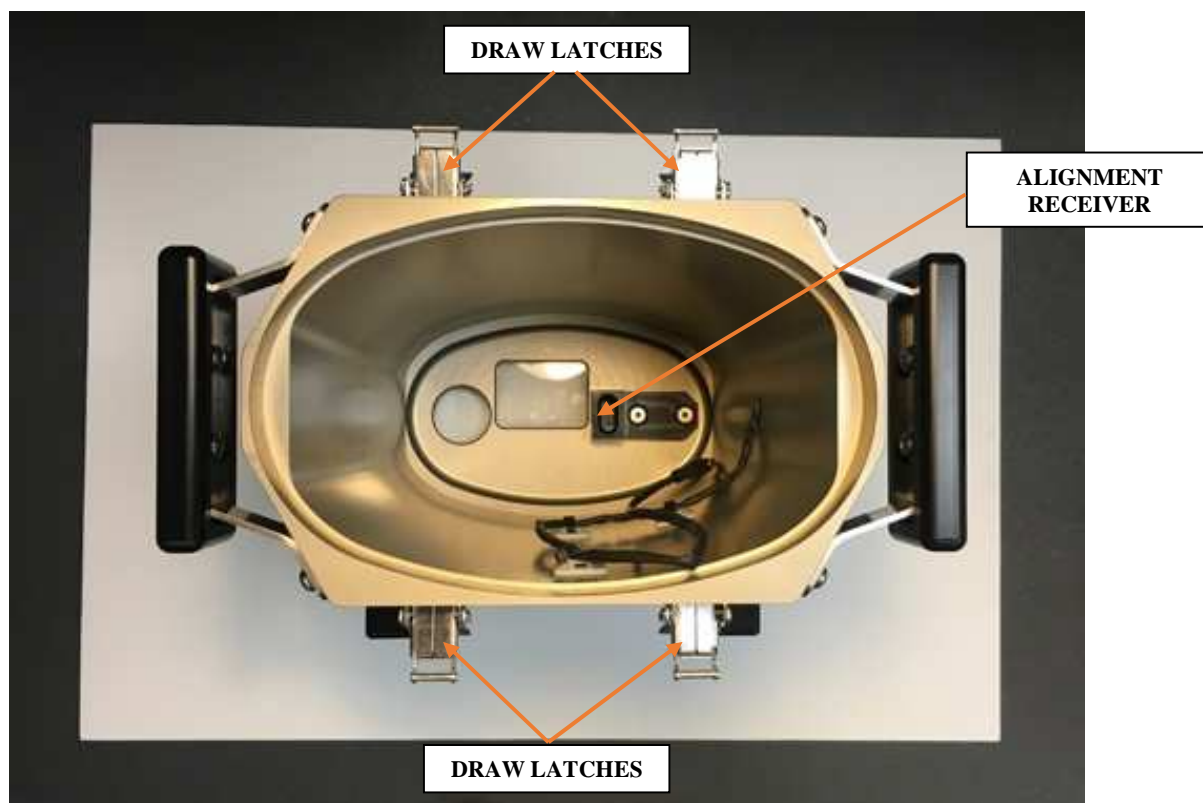


**Figure 13 Rear Panel Pre-Installation Test**

Turn on the instrument and operate all of the controls and LCD plungers in order to confirm that they all work properly. **Do this test prior to installing the Rear Panel assembly into the enclosure.**

Check that battery is fully charged by observing the LCD area below the “BAT” label; this area displays the remaining percentage battery charge and should read close to 100% at the start of a dive.

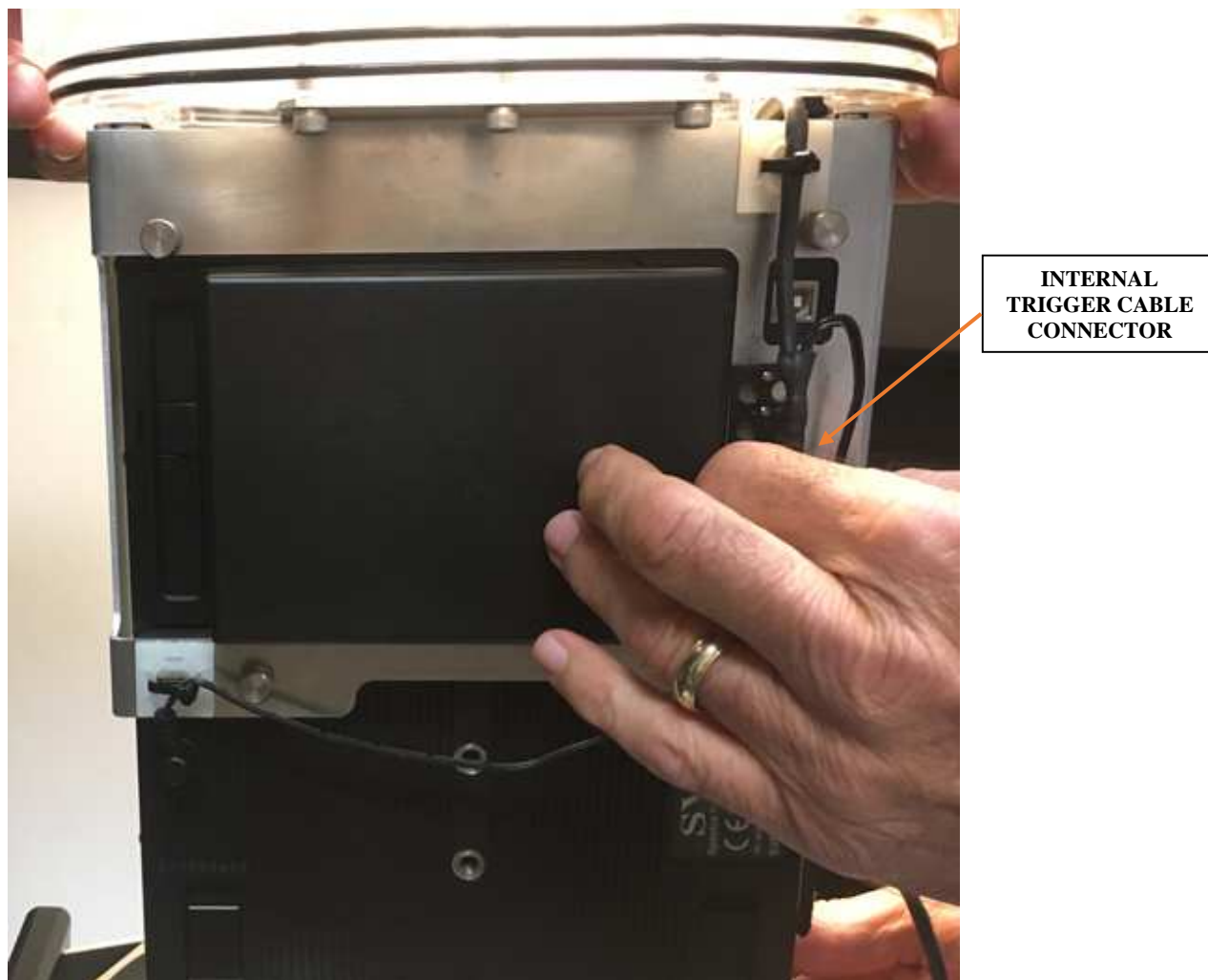
Place the enclosure on the floor facing upwards, as shown below (See **Figure 14**). The four draw latches should be wide open and the internal trigger cable should be pulled free and its connector made ready to attach to the mating connector on the bottom of the rear panel tray.



**Figure 14 View Down Into Enclosure**

Look down into the enclosure and note the position of the Alignment Receiver. This structure receives the corresponding Alignment Probe that is mounted to the instrument's base plate (as shown in **Figure 8**).

While one person holds the Rear Panel / Instrument assembly just above the enclosure opening, have a second person connect the internal trigger cable connector to its mate on the bottom of the Rear Panel. (See **Figure 15**).



**Figure 15 Connecting Cabling**



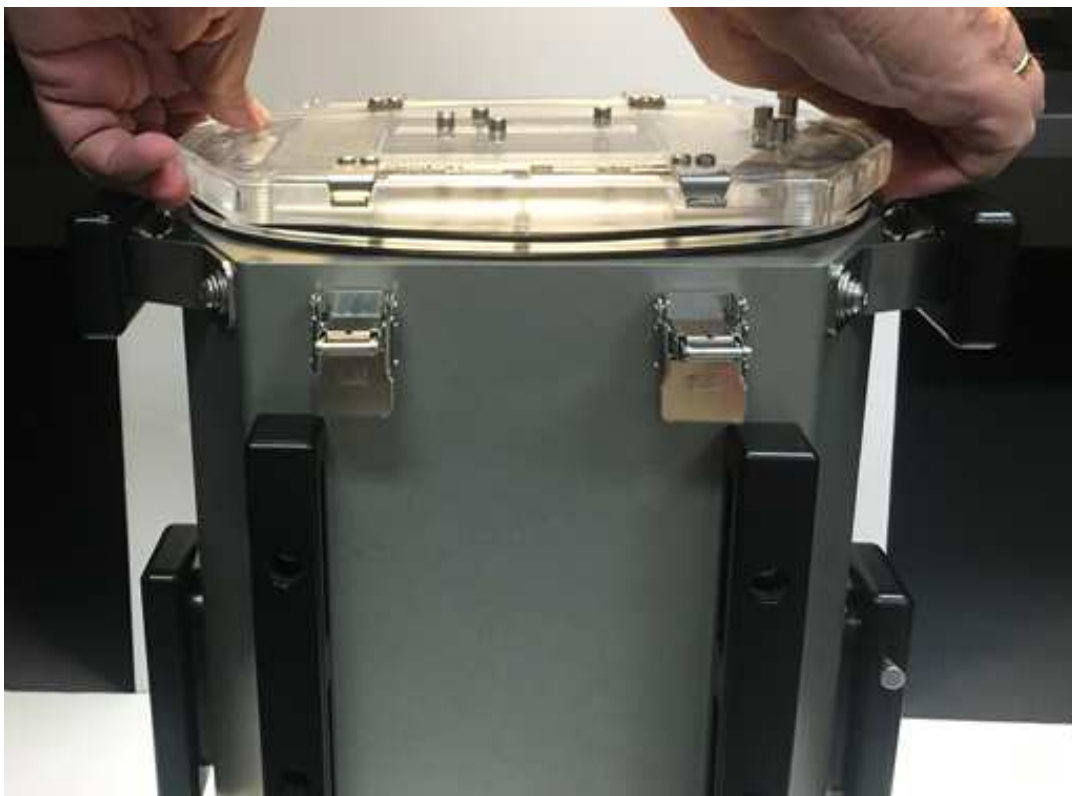
Continue lowering the Rear Panel / Instrument assembly down into the enclosure (See **Figure 16**). Take care that neither the cabling nor the instrument's cloth hand strap becomes pinched as the assembly is lowered down into the enclosure.



**Figure 16 Lowering Rear Panel Assembly Into Enclosure**

Note that in order for the Alignment Probe to settle into the Alignment Receiver, the assembly may have to be tilted back/forth during the last 2-3 centimeters until the two parts engage correctly.

When they have engaged, the assembly will come to rest on the first O-ring as shown below (See **Figure 17**).



**Figure 17 Rear Panel Inserted Into Enclosure**

The assembly is completed by firmly pressing down on the Rear Panel handles until it is fully inserted into the enclosure, and then engaging the four Draw Latches. **Be certain to keep the rear panel parallel to the rear surface of the enclosure as it is being inserted.**

**When installing the Rear Panel, check that no objects are lying across the seal area. Also verify that the seals are properly placed in the O-ring grooves, with nothing under them, and confirm that they are not pinched when pulling the latches down. Make certain that the seal lines, seen as two dark stripes where the O-rings contact the clear acrylic, are visible and continuous.**

### **SPECIAL NOTE – Enclosure Leak Check**

While each housing has been water tested for leaks prior to shipment, it is **strongly recommended** (owing to the cost of the Spectroradiometer) that the empty housing be “bounce dived” to the maximum expected working depth prior to the unit’s first use after shipping or after storage for any extended period. Simply roll up some loose paper towels, place them in the housing, add weight to compensate for the absent unit’s weight and take it down. Thin, absorbent paper is a great indicator, as water leaks can be quickly identified. **Always** be sure to rinse with clear water and remove any excess water from the exterior, prior to opening the housing.

**Note: If any leak is found, the cause must be identified and corrected prior to using the housing with the instrument.**

In the very unlikely event that a rear panel “O” Ring seal leak is noticed during use (by observing water droplets on the inside portion of the panel), **immediately** rotate the housing unit to a horizontal position and take it to the surface. Maintain this horizontal position even when lifting it from the water.

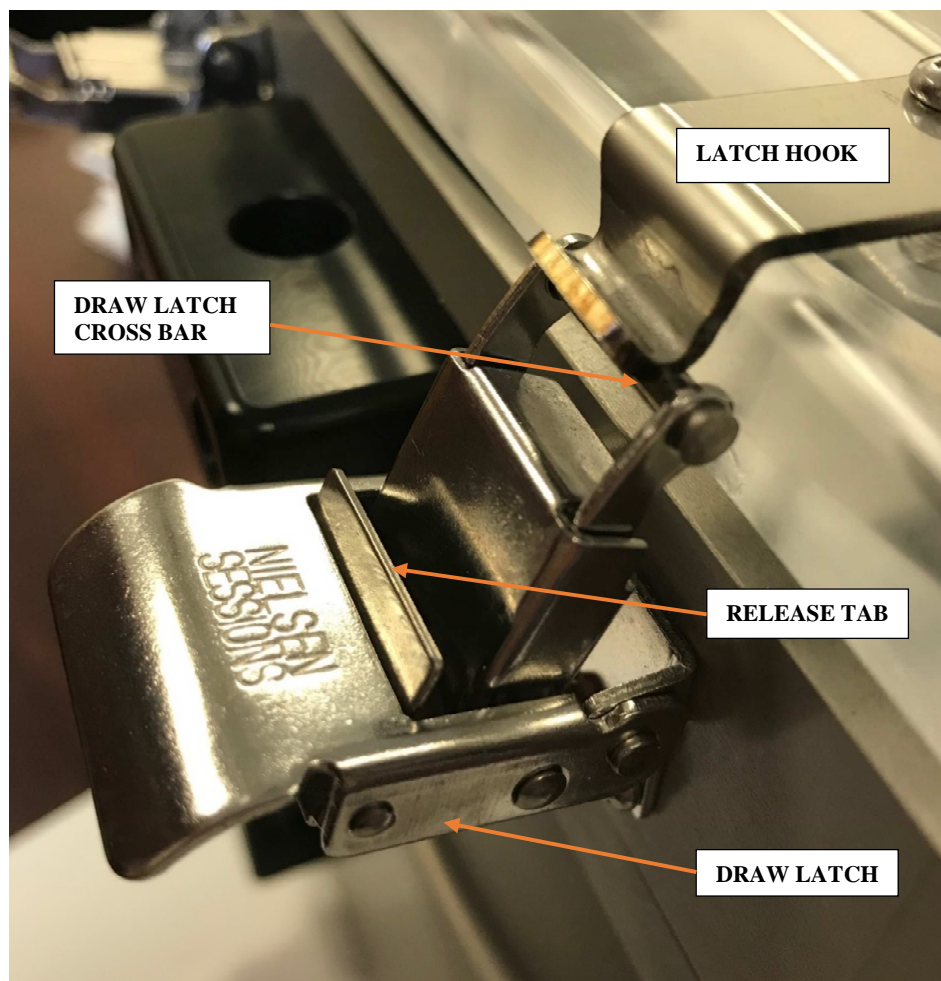
**Note: Always remove excess water from the housing prior to removing the rear endplate.**

### **Removal of the Instrument from the Housing**

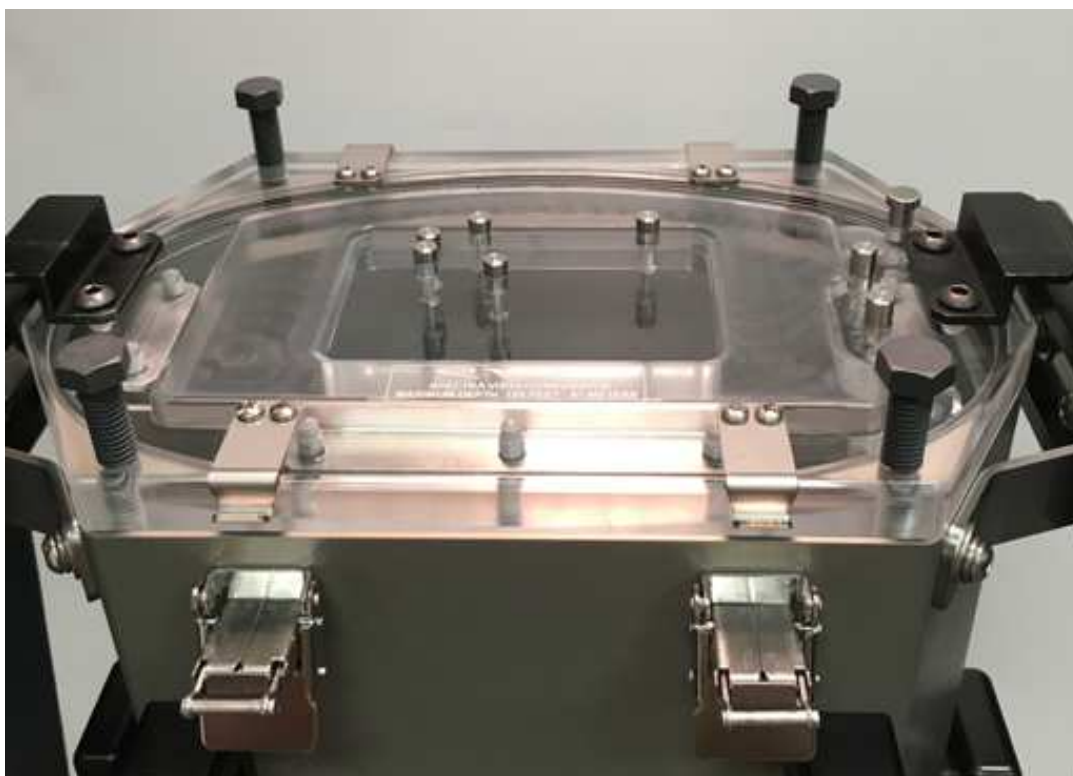
This operation is basically the reverse of the installation sequence described previously. It is best performed on a clean, padded surface, to avoid accidental damage to any components. After ensuring that excess moisture has been removed from the external surfaces of the underwater housing, release the four draw latches. Please note that there are small, raised latch release tabs which must be depressed prior to opening the draw latches. These tabs are a precaution against accidental release. (See **Figure 18**).

After releasing the latches, withdraw the rear panel/tray assembly. There will be some friction from the sealing O-rings. Try to withdraw the assembly evenly. If there is too much resistance to removal, the latches may be used to assist in extracting the rear panel/instrument assembly from the housing. After the rear panel has been withdrawn sufficiently, the cylindrical crossbars of the latches can be moved to a position on the back side of the corresponding latch hooks. Depressing the draw latch levers will then push the cross bar against the back of the latch hook, safely easing the rear panel from the housing. (See **Figure 18**).

**Note: DO NOT ATTEMPT TO PRY THE REAR PANEL FROM THE MAIN HOUSING by using a screwdriver or similar metal tool. Damage may result.**



**Figure 18 Draw Latch, Used for Rear Panel Extraction**



**Figure 19 Using Jackscrews To Extract Rear Panel**

The Rear Panel supports the use of four nylon jackscrews (P/N HDW001409) as an aid to extracting the Rear Panel / Instrument assembly from the enclosure (See **Figure 19**).

After releasing all four latches, insert the four jackscrews as shown, hand-tightening each until they all bottom out against the rear face of the enclosure opening. Then use a 9/16" wrench or socket, **turning each screw a single turn in succession**, until the Rear Panel can be lifted from the enclosure.

**When sliding the Rear Panel assembly out of the enclosure, use extreme caution to avoid placing undue strain on the trigger cable and its electrical connector.**

When the assembly has been slid sufficiently far out of the housing, loosen the knurled electrical connector ring and disconnect the trigger cable from the bottom of the instrument. Then complete the removal of the tray assembly, so the four retaining thumbscrews and the short interconnect cable can be removed, and the instrument can be detached from the tray.

Be careful to avoid exposing the Spectroradiometer to any moisture.

**Ballast Weights**

Standard dive weights may be used to provide any necessary ballast. The weights may be secured to the black skids located on the bottom of the housing, using standard cable ties. It is recommended that the unit be set up to be very slightly negative to allow for easy underwater maneuvering.

### **Specifications – ASM512-500 / HR-512i**

The following specifications apply to the underwater housing for the **SVC HR-512i**:

<b>Unit Size</b>	13.5 inch long, 13.3 inch wide, 8.4 inch high 34.3 cm. long, 33.8 cm. wide, 21.3 cm. high
<b>Unit Weight (Including Instrument)</b>	31.6 lb. (14.3 kg)
<b>Maximum Operating Depth</b>	130 feet (40 meters)
<b>Maximum Full-charge Operating Time</b>	> 8 hours
<b>Optical Window Material</b>	BK7 glass
<b>Environmental</b>	Temperature: -10C to +40C
<b>Cleaning</b>	Do not allow salt water to dry on the enclosure. After each use, rinse outside surfaces with fresh water. Wipe down exterior with soft, dry cloth only.

### **Consumable Parts List – ASM512-500**

O-Ring Lubricant	Mfg: Dow Corning P/N: Molykote 111
O-Ring, Front Optical Port, Face Seal	Mfg: Parker P/N: 02-255-70
O-Ring, Rear Acrylic Panel, Bore Seal	Mfg: Parker P/N: 02-267-70
O-Ring, Front Aluminum Panel, Bore Seal	Mfg: Parker P/N: 02-267-70
O-Ring, Handle Trigger Switch, Face Seal	Mfg: Parker P/N: 02-210-70

## **Specifications – ASM1024-500 / Full-Range Instruments**

The following specifications apply to the underwater housing for the **SVC full-range i-Series instruments**:

<b>Unit Size</b>	17.3 inch long, 13.5 inch wide, 8.3 inch high 43.9 cm. long, 34.3 cm. wide, 21.1 cm. high
<b>Unit Weight (Including Instrument)</b>	43 lb. (19.5 kg)
<b>Maximum Operating Depth</b>	130 feet (40 meters)
<b>Maximum Full-charge Operating Time</b>	>3 hours
<b>Optical Window Material</b>	BK7 glass
<b>Environmental</b>	Temperature: -10C to +40C
<b>Cleaning</b>	Do not allow salt water to dry on the enclosure. After each use, rinse outside surfaces with fresh water. Wipe down exterior with soft, dry cloth only.

## **Consumable Parts List – ASM1024-500**

O-Ring Lubricant	Mfg: Dow Corning P/N: Molykote 111
O-Ring, Front Optical Port, Face Seal	Mfg: Parker P/N: 02-255-70
O-Ring, Rear Acrylic Panel, Bore Seal	Mfg: Parker P/N: 02-267-70
O-Ring, Front Aluminum Panel, Bore Seal	Mfg: Parker P/N: 02-267-70
O-Ring, Handle Trigger Switch, Face Seal	Mfg: Parker P/N: 02-210-70



## Document Revision Sheet

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