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DEFENDER LASER SCALAR ASSEMBLY INSTRUCTIONS

Pottstown, PA

Document Number	Rev.	Date	Originator	Checked	Approved
WI-72920-LASER SCALAR	R	5/19/21	M. Willis	A. Goldstein	A. Goldstein



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Revision History

Rev.	Date	Description	Originator	Checked	Eng. Approved
R	5/19/2021	Initial	M. Willis	A. Goldstein	A. Goldstein

Abbreviations

Abbr.	Definition
ATM	Atmosphere (pressure unit)
ENG	Engineering
FHMS	Flat Head Machine Screw
HD	High Definition
ICB	Interface Control Box
IMU	Inertial Measurement Unit
IN / "	Inch
LED	Light Emitting Diode
M	Meter
MM	Millimeter
MSS	Mission Specialist Series
OCC	Operator Control Console
PHCS	Pan Head Cap Screw
P/N	Part Number
QTY	Quantity
SHCS	Socket Head Cap Screw
SS	Stainless Steel
V	Volt
VR	Videoray LLC

References

Document Number	Description
72920	LASER SCALAR WITH INTEGRATION AND MOUNTING FOR THE DEFENDER
73379	LINE LASER SCALAR Y-CABLE TO 9 PIN - DEFENDER
72924	LASER HINGE ASSEMBLY; LASER SCALAR FLOAT MOUNT
72820	LINE LASER SUBSEA ASSEMBLY



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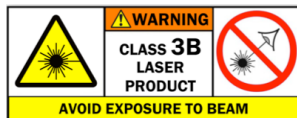
1.0 INTRODUCTION

The purpose of this procedure is to define the steps required to assemble and align the laser assemblies onto the Defender.

1.1 Safety Requirements

Approved safety glasses are required to be worn when installing the Laser Scalar onto the Defender ROV. The covers should be kept on the lasers at all times except when aligning and right before diving. There is no on/off switch for the lasers. If they are connected to the vehicle and the vehicle has 12V power, the lasers will be on.

DO NOT LOOK INTO THE LASERS OR ALLOW THE LASERS TO BE POINTED AT ANY EYES. DAMAGE TO YOUR EYES CAN OCCUR.



1.2 Tools Needed

- Phillips Head Screwdriver (#2 preferable)
- 1.5mm Hex Wrench
- 4mm Hex Wrench
- 9/64" Hex Wrench
- Adjustable Wrench
- Molykote 111 Compound
- Heat Gun



1.3 Information about Instructions



The instructions need to be followed in numerical order to complete assembly properly. If there is any questions please contact support@videoray.com before proceeding.

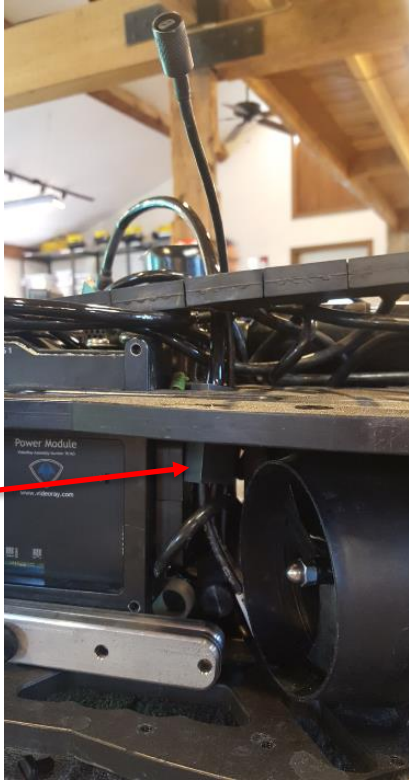

NOTE 1: All electrical connections are to be made **after** application of Molykote 111 compound onto the male pins whether specifically stated in the instructions or not.



NOTE 2: Do not overtorque screws, many times metal screws are going into plastic threads and overtightening will cause damage. As a general rule of thumb when first meeting resistance go another ¼ turn and that should be sufficient.

2.0 LASER INSTALLATION INSTRUCTIONS

Step	Description	Initial
1.	<p>Cut a 3" long strip of 7/8" inner diameter heat shrink tubing. See drawing 72888. Slide it onto the laser housing. Using a heat gun, apply heat to shrink the tube so that it shrinks tightly around the housing. See picture below.</p> 	
2.	<p>See drawing 72820 for assembly of two Laser Housings. Use Molykote 111 on all O-rings before installation. Use blue Loctite on all socket head fasteners.</p>	
3.	<p>See drawing 72924 for assembly of Laser Hinges. Note direction of 8-32 screws so that nuts are in the rear for both sides.</p>	
4.	<p>See drawing 72920 for assembly of Laser Mount.</p>	
5.	<p>Make sure lasers housing assemblies (72820) have caps on them.</p>	
6.	<p>Take off the float of the Defender and unplug anything connected to Port 6 of the Comms Module.</p> <p>NOTE: Ports 4 or 5 can be used if needed.</p> 	

Step	Description	Initial
7.	<p>Move the 5-pin daisy chain on the starboard side of the vehicle out of the way so that you can insert that laser cable into the hole that is right ahead of the power module.</p> 	
8.	<p>Bend the laser cable 73379 so that it can be inserted into the space created in the previous step i.e. the hole directly in front of the power module.</p> 	

Step	Description	Initial
<p>9.</p>	<p>Picture below shows cable inserted into hole as described above. All connectors are above the Defender top frame plate.</p> <div data-bbox="376 829 534 1136" data-label="Text"> <p>Y Terminal Block can be seen below the top plate of the Defender frame</p> </div> 	
<p>10.</p>	<p>Coat the male pins of the 9 pin M/F connector with MolyKote 111.</p> 	


Step	Description	Initial
11.	<p>Feed the 9-pin connector from underneath the 5-pin daisy chain and plug into port 6 of the comms module.</p> 	
12.	<p>Plug remaining connectors in as necessary. If no other connectors, make sure and put a dummy plug on the female end of the 9-pin laser cable connector.</p> 	



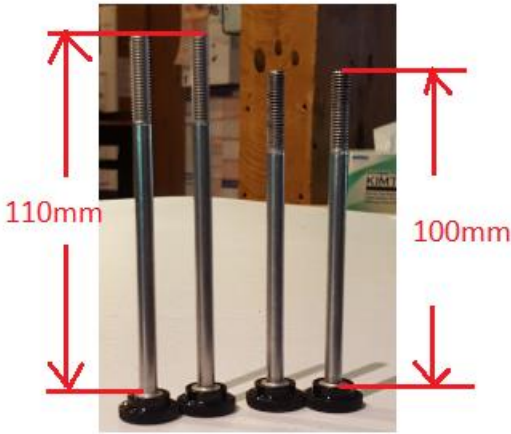




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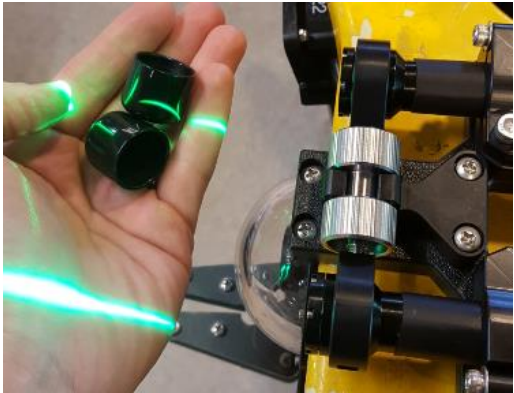

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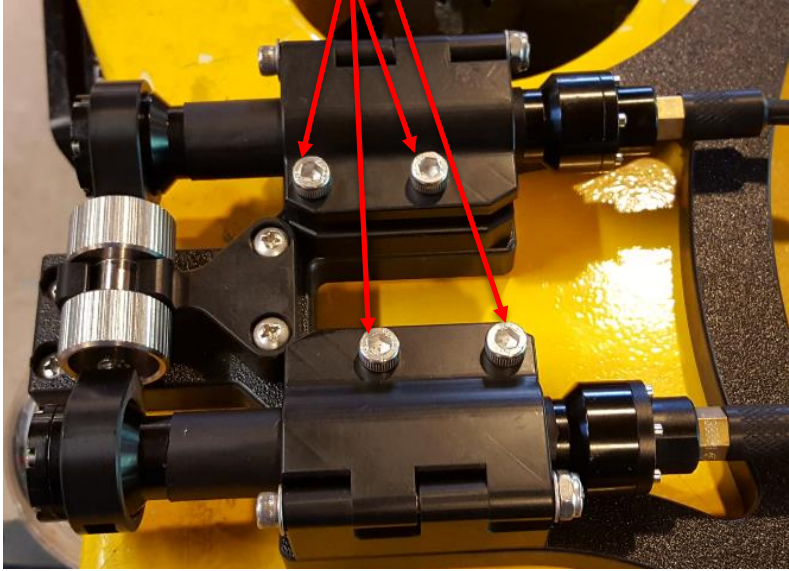
Step	Description	Initial
13.	<p>Put float back on the defender while making sure to feed the two laser cable connectors through the GPS hole like shown.</p> 	

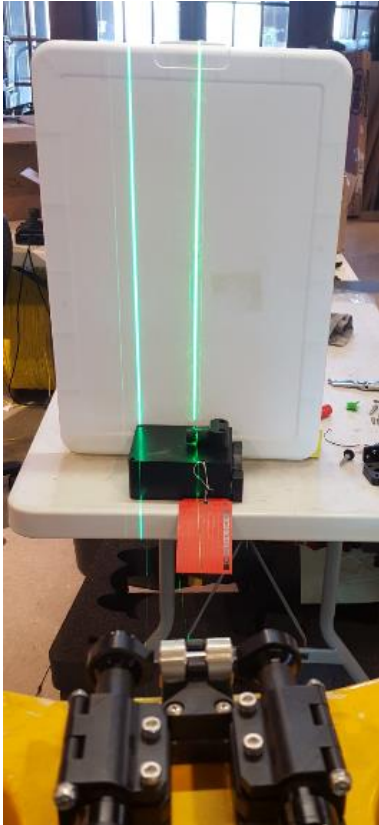
Step	Description	Initial
<p>14.</p>	<p>Place assembled Laser Float mount on top of float like shown. Then push back on the mount plate so that the front bracket fits underneath the front lip of the float.</p> <p>Push back so bracket fits underneath the front edge of the float</p>  <p>Float Mount seated properly</p> 	
<p>15.</p>	<p>Locate the (Qty 2) 110MM screws to use. The regular 100MM screws will not fit.</p> 	

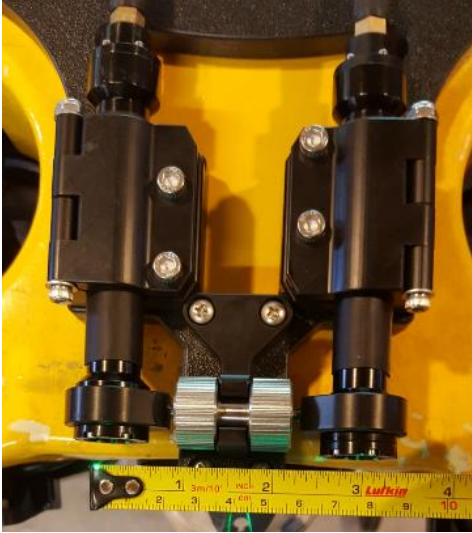

Step	Description	Initial
16.	<p>Install the 110mm screws through the laser mount and into the float. Tighten like normal.</p> 	
17.	<p>Connect the two laser cable connectors to the two lasers as shown.</p> 	



3.0 LASER ALIGNMENT

Step	Description	Initial
1.	<p>Make sure the lasers are pointing away from anyone or anything reflective. Point lasers towards a wall or something flat. The Defender should be about the same distance away from the wall as the distance of subsea measuring is to take place. If unknown, 5 to 6 feet is a good approximation.</p>	
2.	<p>Make sure the tether is connected properly to the Defender and turn on the OCC.</p> <p>NOTE: The lasers get power only and there's no off button! So if the power to the vehicle is on that means the lasers will be on! Be careful!</p>	
3.	<p>Take off the covers from the lasers.</p> 	
4.	<p>Most likely the beams are not going to be parallel on fit up. They will likely look something like below.</p> 	

Step	Description	Initial
5.	<p data-bbox="293 306 1240 365">Loosen the hinge assembly M5 screws and rotate the laser housings (72820) so that the beams are parallel to each other.</p> 	

Step	Description	Initial
6.	<p>Tighten the M5 screws on the Hinge Assemblies after beams are parallel.</p> <p>NOTE: During tightening, the beam lines may become slightly askew. This process of loosening and tightening may have to be done a couple times to get it right.</p> 	

Step	Description	Initial
7.	<p>The distance between laser centers at the origin should be 3 inches (~76mm).</p> 	
8.	<p>The distance between beams should stay the same as the beams get further away from the origin. Without looking towards the laser origin, measure the distance between beams.</p> <p>Example below has the beams expanding away from each other and the measurement between beams is ~3.5 inches.</p> 	

Step	Description	Initial
<p>9.</p>	<p>Rotate the Alignment wheel on the Laser Mount Assembly to bring the beams closer together or farther apart as needed. If closer together is desired, rotate the wheel towards the rear of the vehicle.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div data-bbox="337 659 440 884" style="width: 25%;"> <p>Rotate forward to push beams farther apart</p> </div> <div data-bbox="483 426 1075 963" style="width: 50%; text-align: center;">  </div> <div data-bbox="1101 516 1211 741" style="width: 25%;"> <p>Rotate back to bring beams closer together</p> </div> </div>	
<p>10.</p>	<p>Measure a couple time to make sure the beams are 3 inches apart.</p> <div data-bbox="483 1058 1068 1503" style="text-align: center;">  </div>	
<p>11.</p>	<p>Alignment and Adjustments are done. The lasers are ready to be used subsea now.</p> <p>NOTE: If not immediately diving, put caps back on lasers and power down OCC.</p>	

APPENDIX 1

Picture of Assembly with Spares (i.e. All shipped items)

