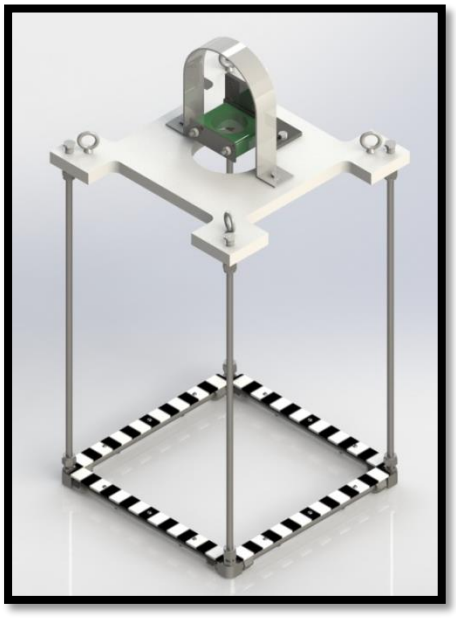
Camera Cage Electronics Manual

Center of Coastal and Ocean Mapping

Operational Design: Carlo Lanzoni
Manual Written and Compiled by: Tim Brown and Matthew Birkebak
Reviewed by: Shachak Pe'eri and Emily Terry



Preface

The Center for Coastal and Ocean Mapping uses a camera cage underwater video camera system with real-time feedback to ground-truth survey measurements. The underwater imaging system designed to perform in situ measurements that help calibrate and validate optical remote-sensing and swath-sonar surveys for mapping and monitoring coastal ecosystems and ocean planning. The system enables researchers to collect underwater imagery using relatively inexpensive instruments and materials that can be hand-deployed from a small vessel. This document is the first manual out of two that describes the design of the cage of the camera. The second manual describes the camera systems and procedures to capture imagery.

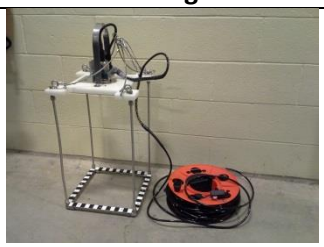
Contents

Camera Cage Electronics

The camera cage is designed to hold an Ocean Systems Delta Vision Standard definition (SD) or Hi definition (HD) camera. As an alternate the camera cage has a GoPro quick release attached for use with GoPro 3 silver edition and an Elgato Game Capture (allows communication and ability to save images in HD from GoPro). The Ocean Systems camera and the GoPro incorporate different materials and different component setups, which will be elaborated in this manual.

(SD) Ocean Systems Camera

(SD) Ocean Systems Camera Bill of Materials

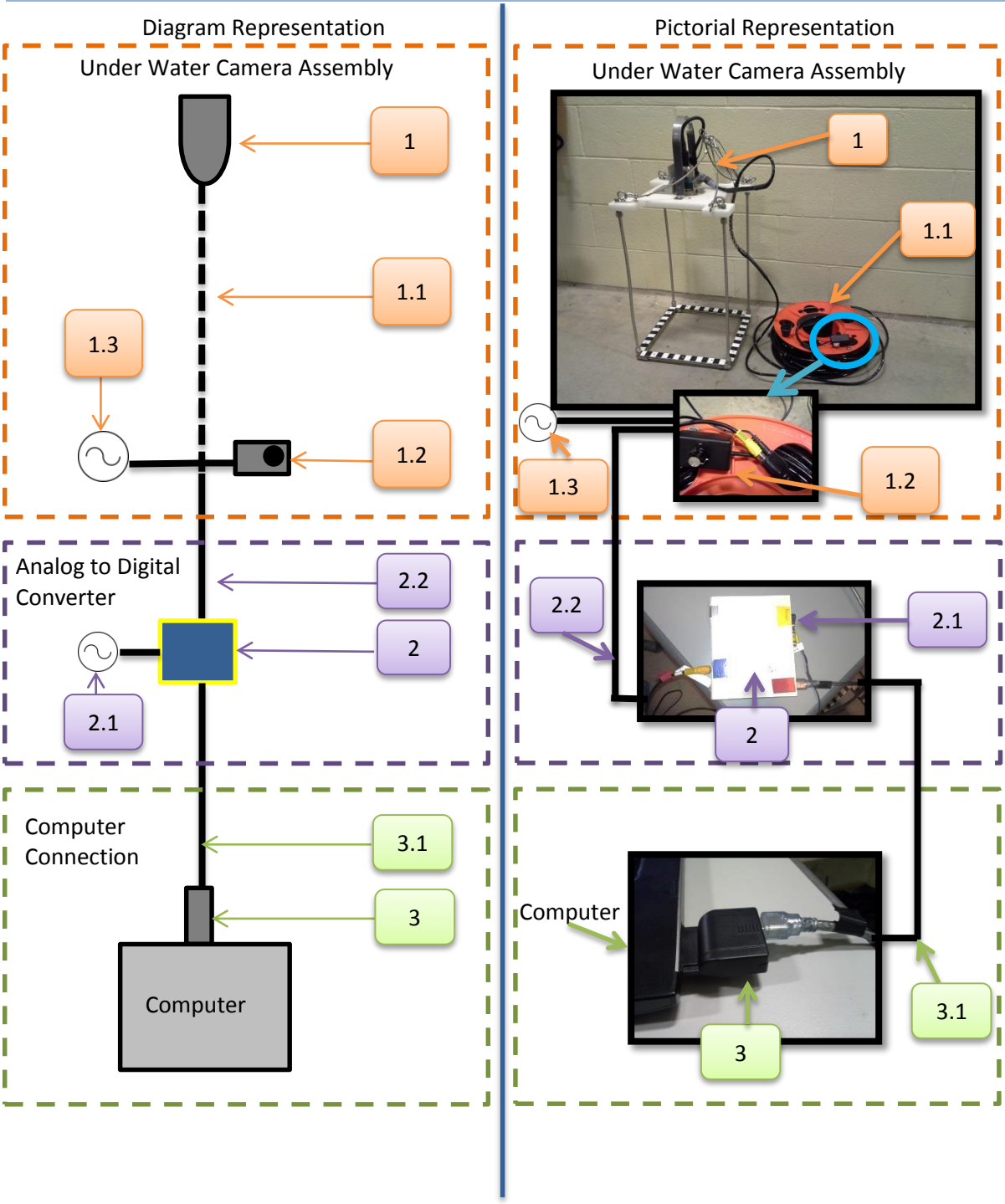
Electrical Components for Ocean Systems Delta Vision Camera (Cage Designed for camera)						
Standard Underwater Camera						
#	Part Name	Picture	Reference to Buy	Price Each	Purchase Quantity	Physical Quantity
1	Ocean Systems Delta Vision Standard Definition (STD)	 **Figure 1 - www.sea-viewdiving.com**	http://www.sea-viewdiving.com/diving_equipment/cameras/oceansystems/deltavisioncolor.htm	~$2000	1	1
1.1	Ocean Systems Camera Cable (Size ranges from 50-200 ft at 50 ft increments)	 **Figure 2 – Ocean Systems Cable**	Included with Ocean Systems Camera	-	1	1
1.2	Camera Light Switch	 **Figure 3 – Camera Light Switch**	Included with Ocean Systems Camera Cable	-	1	1

1.3	Power Adapter for Underwater Camera (MG electronics I.T.E power supply, MGT-12500-SPS 100-240 v, 50/60 hz, .2A)	 **Figure 4 – Power Adapter for Underwater Camera**	Included with Ocean Systems Camera Cable (http://www.mgelectronics.com/shopexd.asp?id=301)	-	1	1
Analog to Digital Converter						
2	Analog to Digital Converter (ADVC 110 Canopus)	 **Figure 5 – Canopus Analog to Digital Converter**	http://www.grassvalley.com/products/advc110	$199.99	1	1
2.1	Power Adapter for Analog to Digital Converter (Globtek ink input 120 v ac 60 hz; output 5v DC 1000ma WR1A1000CCP-N)	 **Figure 6 – Power Adapter for Analog to Digital Converter**	Included with Analog to Digital Converter	-	1	1
2.2	Composite Video Cable male-male (For SD Camera)	 **Figure 7 – Composite Video Cable**	Included with Digital to Analog Converter	-	1	1
3	2 Port ExpressCard 1394a Firewire Card (Need a computer with express card slot or firewire connection compatible with 400 firewire connections)	 **Figure 8 – 2 Port Express Card**	http://www.amazon.com/StarTech-com-ExpressCard-Firewire-Adapter-EC13942/dp/B000RKUKMG	$66.99	1	1

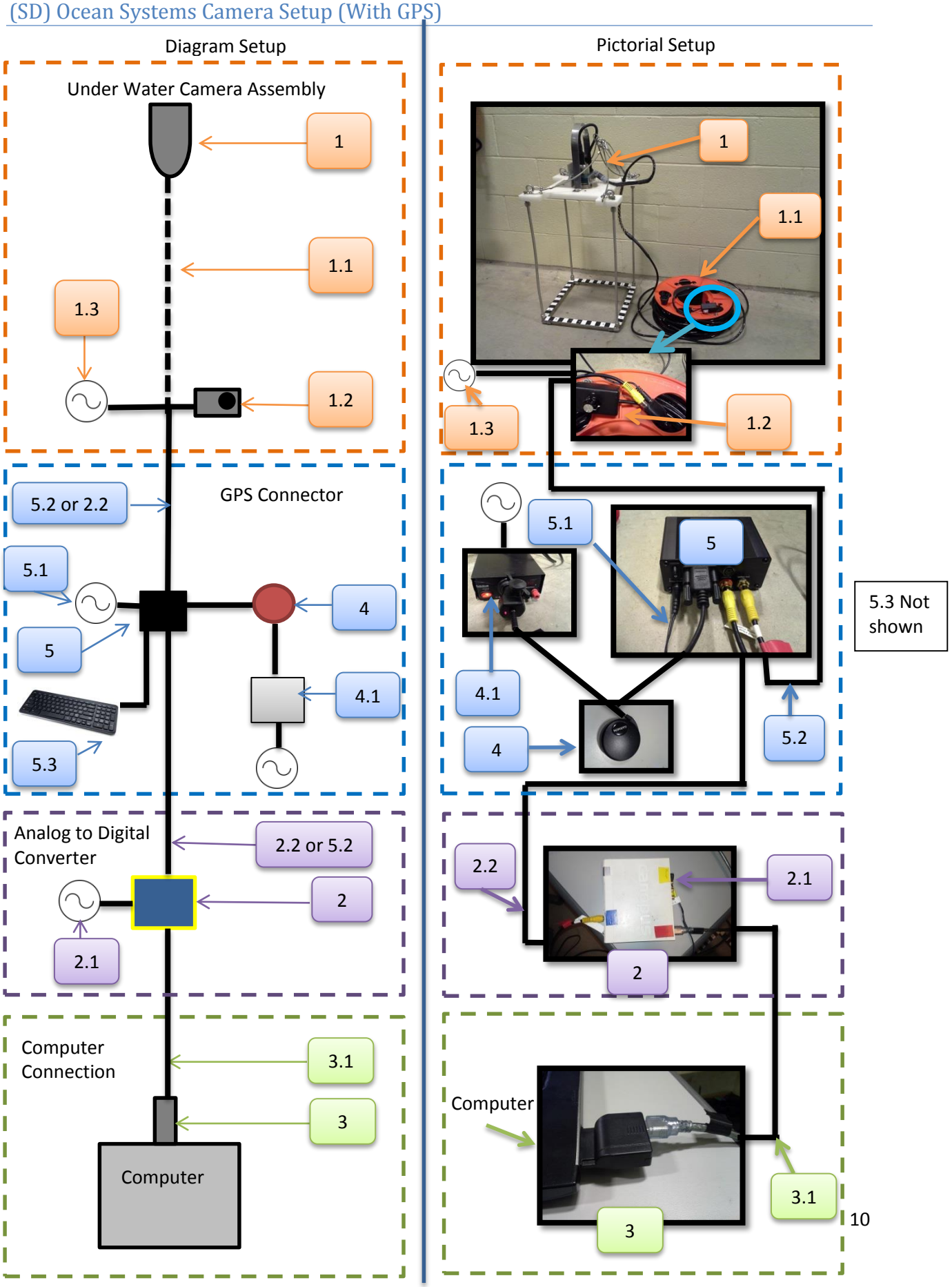
3.1	Fire Wire Cable	 **Figure 9 – Fire Wire Cable (www.amazon.com)**	http://www.amazon.com/Tripp-Lite-FireWire%C2%AE-Cable-F005-006/dp/B0000512U1/ref=pd_sim_e_3?ie=UTF8&refRID=1G8ZABDENFGDXD18RG3Y	$7.96	1	1
Optional GPS Log (Coordinates and Time Display on Video Recording For STD only)						
4	Garmin GPS Device (19N036642; GPS18x pc)	 **Figure 10 – Garmin GPS (www.amazon.com)**	http://www.amazon.com/Garmin-GPS-18x-PC-Receiver/dp/B00488G0B8	$74.63	1	1
4.1	Radio Shack Switching power supply 3 amp DC12V socket	 **Figure 11 – 3 amp power supply (www.amazon.com)**	http://www.amazon.com/RadioShack-22-507-3-Amp-Power-Supply/dp/B000KWLBY2/ref=sr_1_1?s=electronics&ie=UTF8&qid=1429210630&sr=1-1&keywords=radioshack+22-507	$58.99	1	1

5	Converter Unit	 **Figure 12 – Converter to add GPS locations to video signal**		-	1	1
5.1	Plug-In Class 2 Transformer Condor. Model D6300-01. Input: 120vac 60 hz 9w; output: 9vdc 200 ma.	 **Figure 13 – Power Adapter for converter unit (www.amazon.com)**	http://www.jameco.com/1/1/46902-d6300-01-1-8w-ac-dc-wall-adapter.html	$3.95	1	1
5.2	Composite Video Cable male-male (For SD Camera)	 **Figure 14 – Composite Video Cable**	Included with Digital to Analog Converter	-	1	1
5.3	Keyboard (6-pin mini-DIN connector; PS/2)	 **Figure 15 – Keyboard with PS/2 connection (www.amazon.com)**	http://www.amazon.com/Rosewill-Normal-Standard-Enhanced-Keyboard/dp/B0050FDDZO/ref=sr_1_3?s=electronics&ie=UTF8&qid=1429211188&sr=1-3&keywords=keyboard+with+PS%2F2	$6.99	1	1

(SD) Ocean Systems Camera Setup (No GPS)



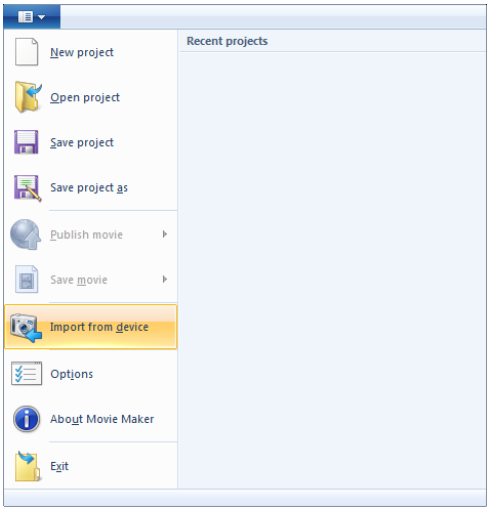
(SD) Ocean Systems Camera Setup (With GPS)



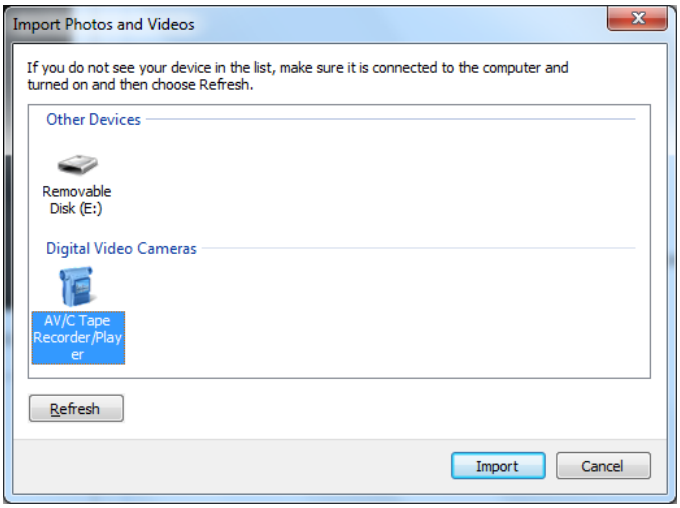
(SD) Ocean Systems Computer Interface

1. See appendix for Ocean Systems Manual for HD/SD Ocean Systems camera operation
2. Open Windows Movie Maker

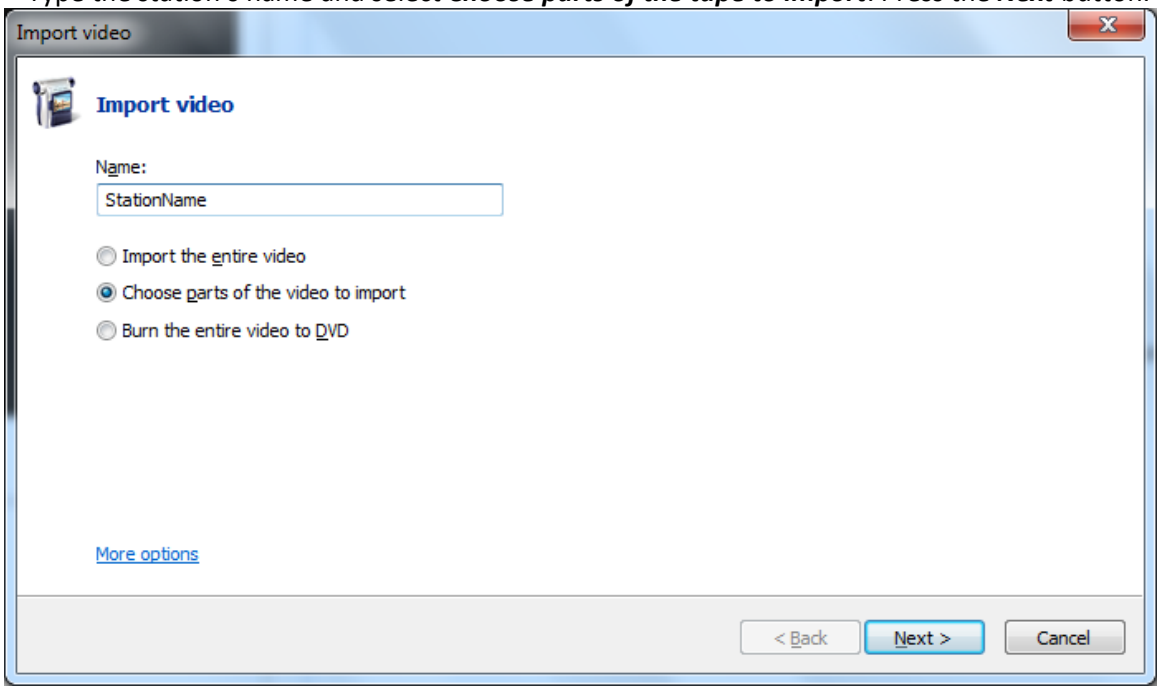
3. Select ***Import from device…*** from the ***File*** menu.



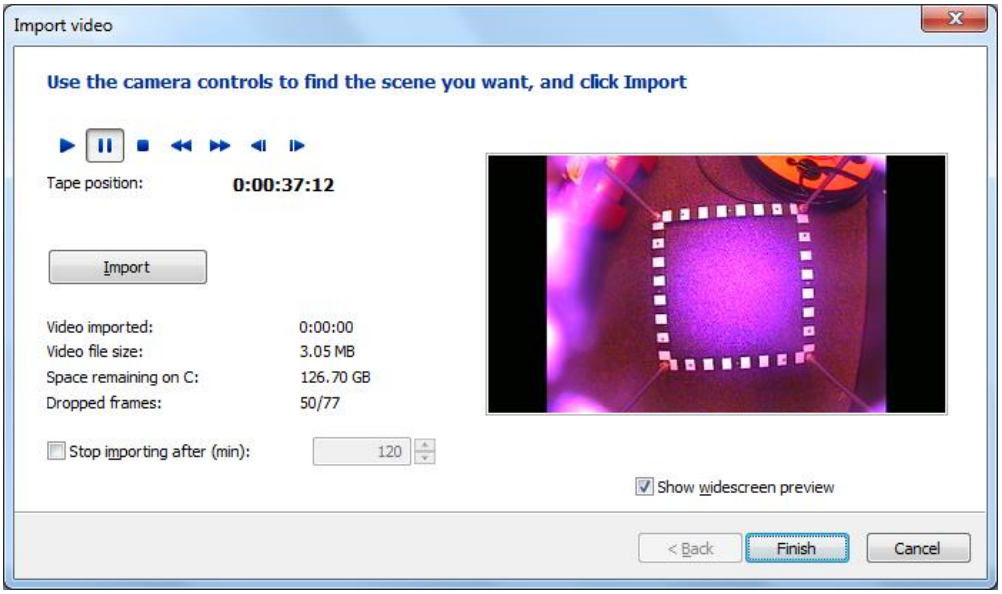
4. Select ***the AV/C Tape recorder/Play*** and press ***Import***.



5. Type the station's name and select ***Choose parts of the tape to import***. Press the ***Next*** button.



6. The camera is ready to capture. Press ***Import*** when you are interested to record and ***Stop*** to pause. When finish recording press the ***Finish*** button. Comment: if you do not see a preview press the ▶button under ***DV camera controls***.



(SD) Ocean Systems Camera Attachment

Ocean Systems Camera

1. Attach Ocean Systems Delta Vision camera to camera mount (part 18 see Construction manual)

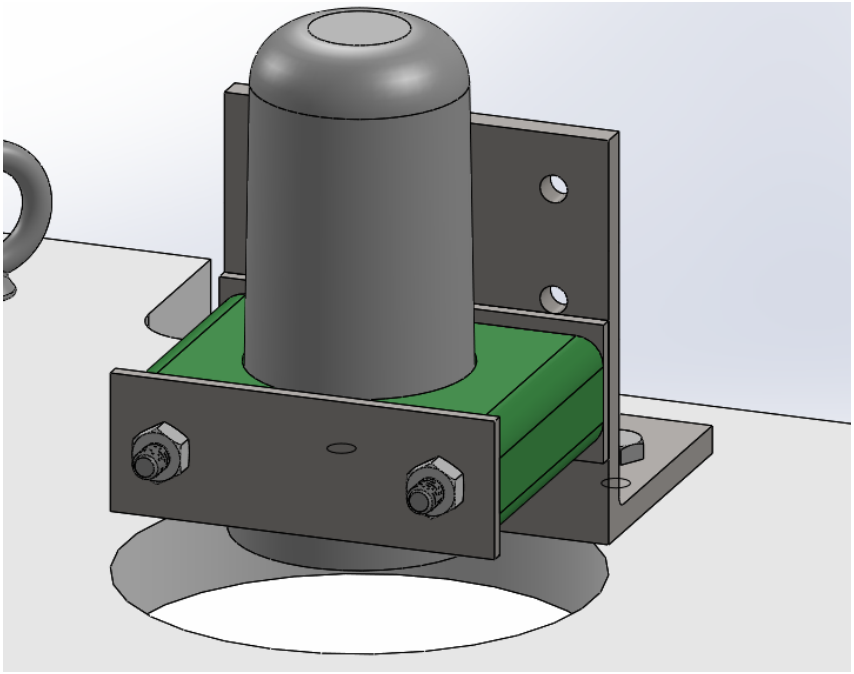
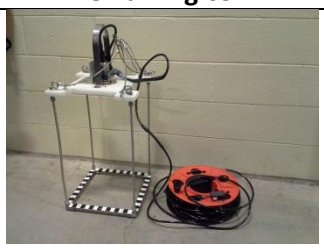


Figure 16 - Ocean Systems Camera

2. Attach Cable through cable grip (part 22 see Construction manual)

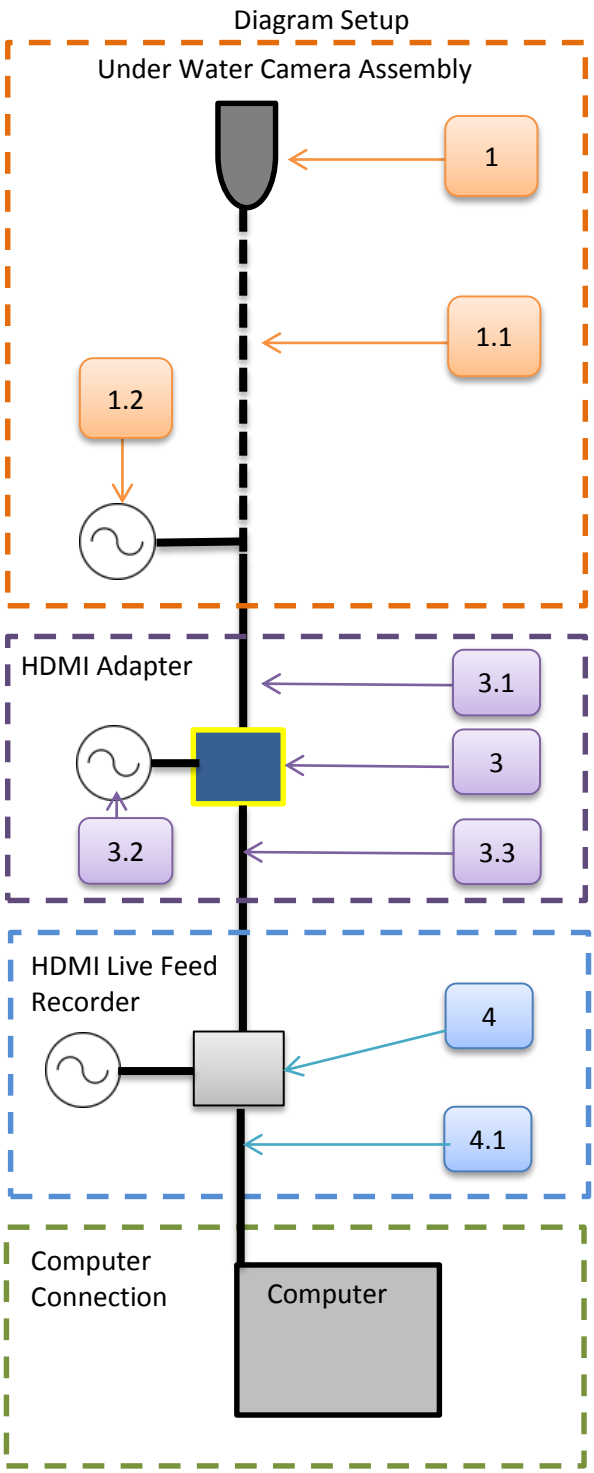
(HD) Ocean Systems Camera

(HD) Ocean Systems Camera Bill of Materials

Electrical Components for Ocean Systems Delta Vision Camera (Cage Designed for camera)						
HD Underwater Camera						
#	Part Name	Picture	Reference to Buy	Price Each	Purchase Quantity	Physical Quantity
1	Ocean Systems Delta Vision Hi Definition (HD) (Does not Have Light Included)	 **Figure 17- www.sea-viewdiving.com**	http://www.sea-viewdiving.com/diving_equipment/cameras/oceansystems/deltavisionhd.htm	~$2100	1	1
1.1	Ocean Systems Camera Cable (Size ranges from 50-200 ft at 50 ft increments)	 **Figure 18 – Ocean Systems Cable**	Included with Ocean Systems Camera	-	1	1
1.2	MG AC/DC switching adapter input: 100-240 V – 50/60 Hz .5A. Output: 12v – 1A	 **Figure 19 – Underwater Camera Power Adapter**	Included in with ocean systems camera Model: MGT121AR	-	1	1
3	Ever Focus HD-SDI	 **Figure 20- Ever Focus Adapter**	http://www.amazon.com/EVERFOCUS-ELECTRONICS-EHA-RPT-EverFocus-Electronics/dp/B0053YJYJ6/ref=sr_1_sc_1?ie=UTF8&qid=1429879533&sr=8-1-spell&keywords=ever+focus+HD-SDI	$118	1	1

3.1	Female BNC-female BNC cable	 Figure 21- BNC cable	http://www.amazon.com/CableWholesale-6-Feet-Stranded-Braided-10X1-01106/dp/B003V77GAQ/ref=sr_1_1?ie=UTF8&qid=1429879400&sr=8-1&keywords=bnc+cable	$6	1	1
3.2	L.T.E. Adapter	 **Figure 22- Ever Focus Power Adapter**	Included with Ever focus http://www.lte.com.tw/productsupply.php?id=115	-	1	1
3.3	HDMI cable	 **Figure 23 - HDMI Cable**	http://www.amazon.com/AmazonBasics-High-Speed-HDMI-Cable-Supports/dp/B00NH128MC/ref=sr_1_6?ie=UTF8&qid=1429880006&sr=8-6&keywords=HDMi+cable	$6.50	1	1
4	Elgato Game Capture HD	 **Figure 24 - Elgato**	https://www.elgato.com/en/gaming/gamecapture-hd	$149.95	1	1
4.1	USB to USB mini Cable	 **Figure 25 - USB to USB mini cable**	Included with Elgato Game Capture	~$5.49	1	1

(HD) Ocean Systems Setup (No GPS)

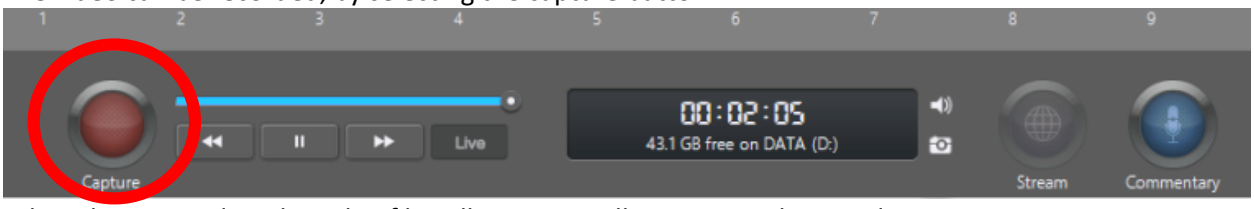


(HD) Ocean Systems Computer Interface

Once all components are connected (See HD setup) then turn on computer and open elgato software. If elgato software is not installed on computer than use install disk provided with elgato device or go to elgato website (https://www.elgato.com/en) and install software. The legato user interface is shown.

Figure 26 - elgato software interface

1. The camera connected to the elgato should load automatically into the software. If the camera is not found than check that the camera is plugged into the elgato and powered on.
2. The video can be recorded, by selecting the capture button



3. When done recording the video file will automatically request to be saved.
4. See Appendix for HD ocean systems Manual for use without elgato system.

(HD) Ocean Systems Camera Attachment

Ocean Systems Camera

1. Attach Ocean Systems Delta Vision camera to camera mount (part 18 see Construction manual)

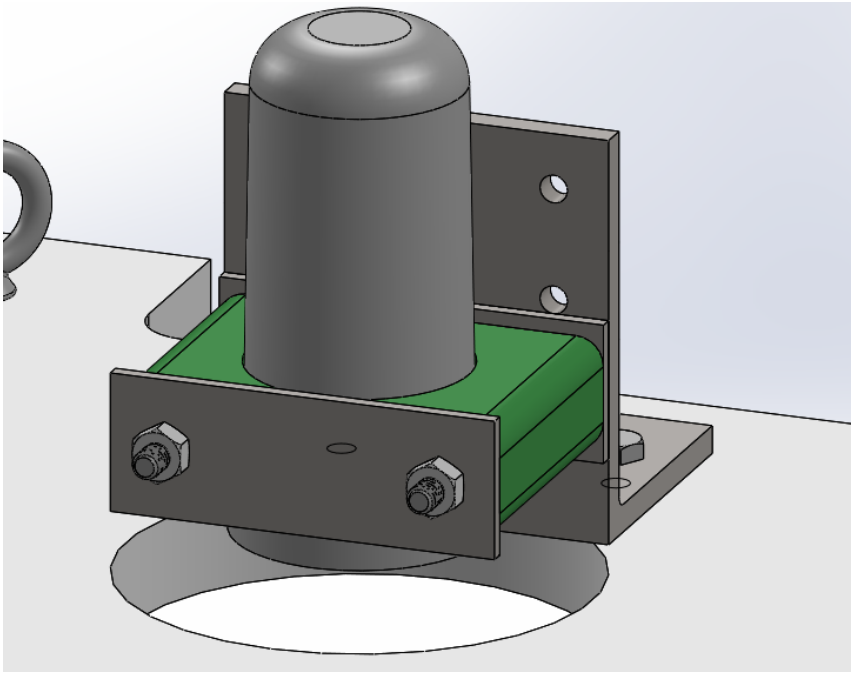


Figure 27 - Ocean Systems Camera

2. Attach Cable through cable grip (part 22 see Construction manual)

GoPro Camera

GoPro Camera Bill of Materials

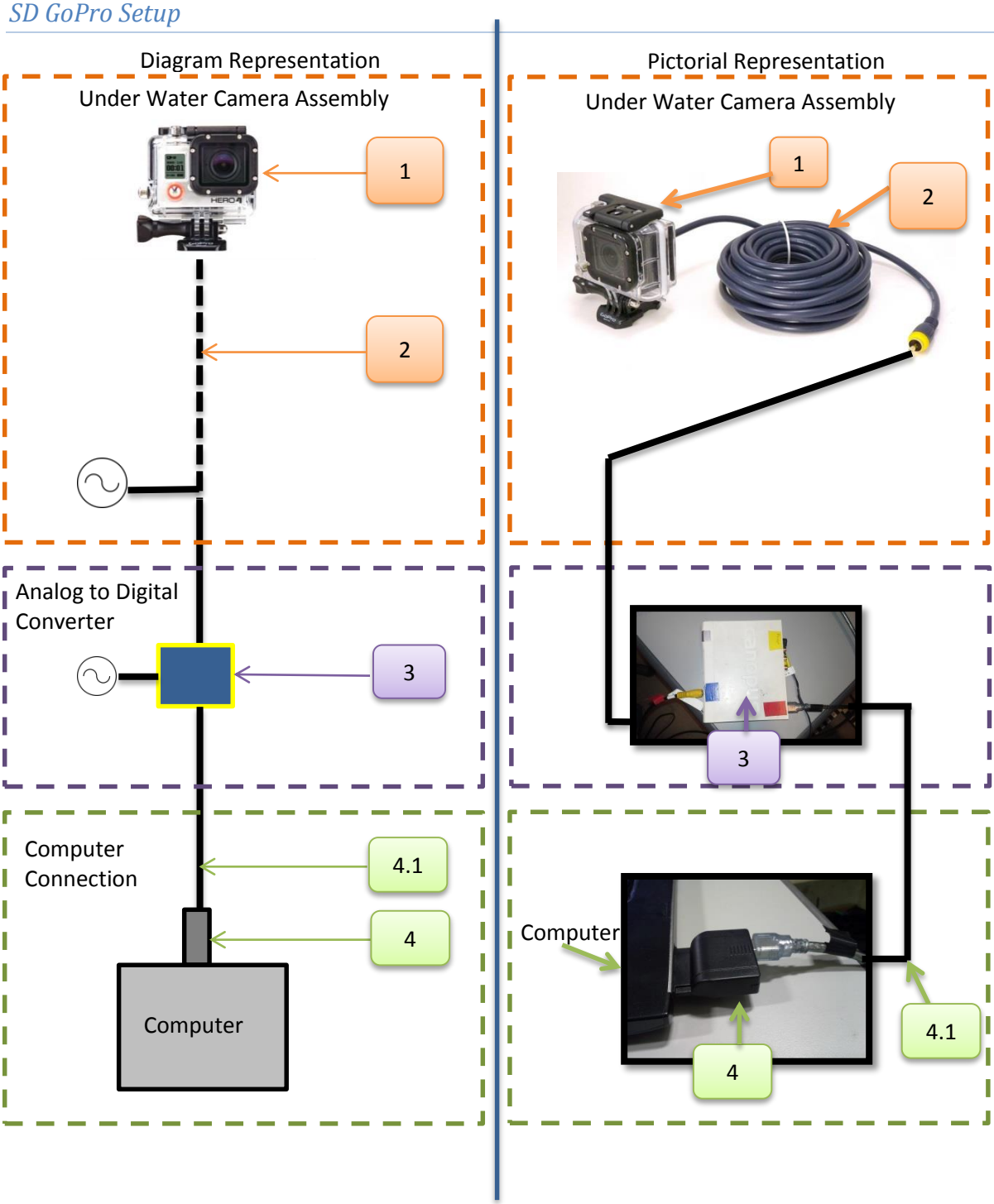
Electrical Components for Ocean Systems Delta Vision Camera (Cage Designed for camera)						
SD GoPro Underwater Camera						
#	Part Name	Picture	Reference to Buy	Price Each	Purchase Quantity	Physical Quantity
1	GoPro Hero3+ Silver	 **Figure 28 - GoPro**	http://shop.gopro.com/cameras/hero3plus-silver/CHDHN-302-master.html	$299.99	1	1
2	Underwater Case Live Feed (Camera Case rated to 200 ft underwater)	 **Figure 29 – eyeofmine SD camera case**	http://www.eyeofmineactioncameras.com/INTEGRATED_POWER_VIDEO_cable_Housing_Hero3_3_4_p/euvh32dic.htm	$250	1	1
3	Analog to Digital Converter (ADVC 110 Canopus)	 **Figure 30 – Canopus Analog to Digital Converter**	http://www.grassvalley.com/products/advc110	$199.99	1	1
4	2 Port ExpressCard 1394a Firewire Card (Need a computer with express card slot or firewire connection compatible with 400 firewire connections)	 **Figure 31 – 2 Port Express Card**	http://www.amazon.com/StarTech-com-ExpressCard-Firewire-Adapter-EC13942/dp/B000RKUKMG	$66.99	1	1

4.1	Fire Wire Cable	 **Figure 32 – Fire Wire Cable (www.amazon.com)**	http://www.amazon.com/Tripp-Lite-FireWire%C2%AE-Cable-F005-006/dp/B0000512U1/ref=pd_sim_e_3?ie=UTF8&refRID=1G8ZABDENFGDXD18RG3Y	$7.96	1	1
HD GoPro Underwater Camera						
1	GoPro Hero3+ Silver	 **Figure 33 - GoPro**	http://shop.gopro.com/cameras/hero3plus-silver/CHDHN-302-master.html	$299.99	1	1
2	HD Underwater Case Live Feed (Camera case rated to 40 ft. and cable rated to 35 ft)	 **Figure 34 - eyeofmine HD camera case**	http://www.eyeofmineactioncameras.com/GoPro_HERO3_HERO3_HERO4_Underwater_HDMI_Live_Vid_p/euvh-3h.htm	$280	1	1
3	Elgato Game Capture HD	 Figure 35 - Elgato	https://www.elgato.com/en/gaming/gamecapture-hd	$149.95	1	1

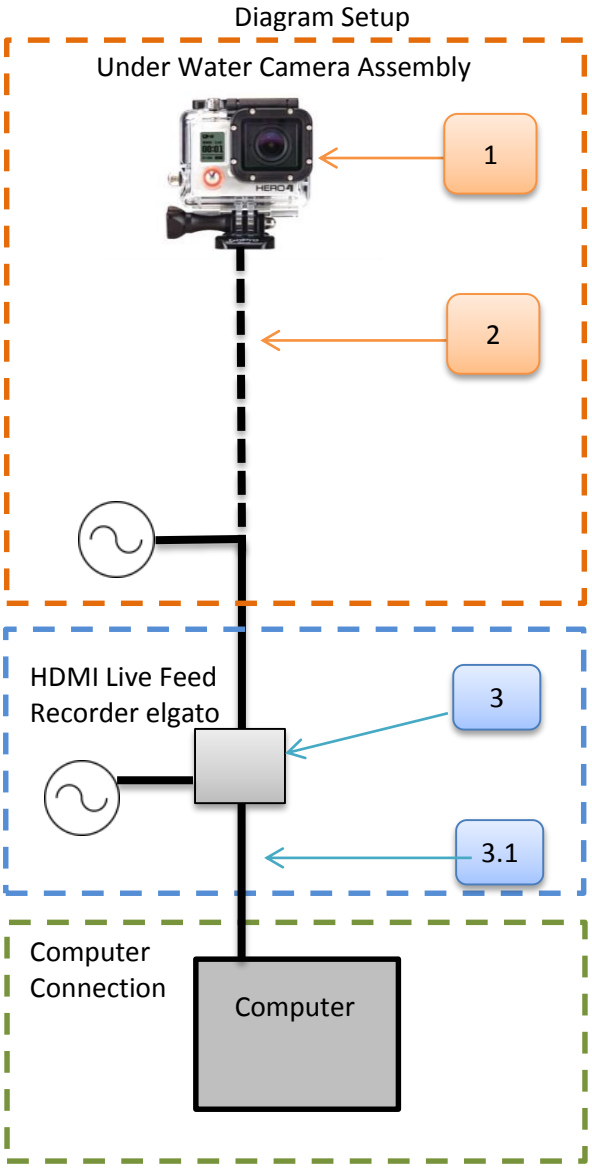
3.1	USB to USB mini Cable	 **Figure 36 - USB to USB mini cable**	Included with Elgato Game Capture	~$5.49	1	1

GoPro Camera Setup

SD GoPro Setup



HD GoPro Setup

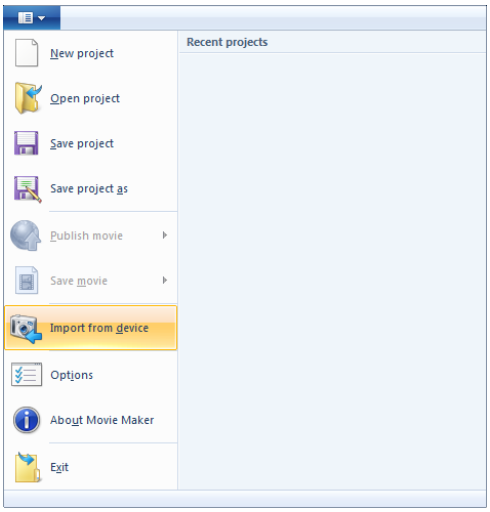


GoPro Camera Computer Interface

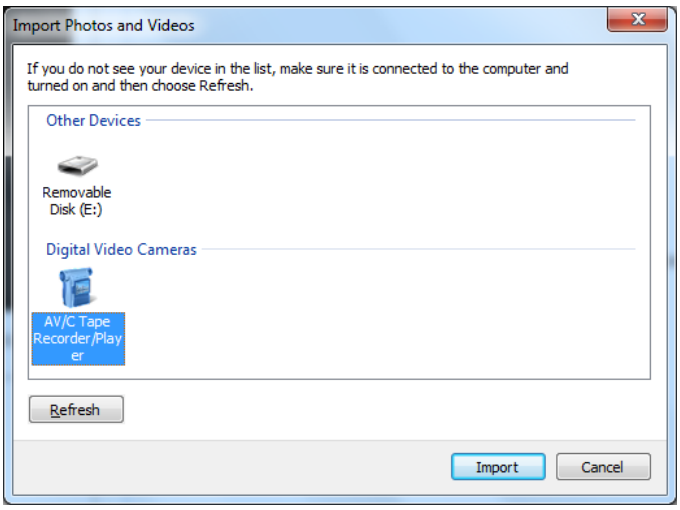
SD GoPro interface

1. Open Windows Movie Maker

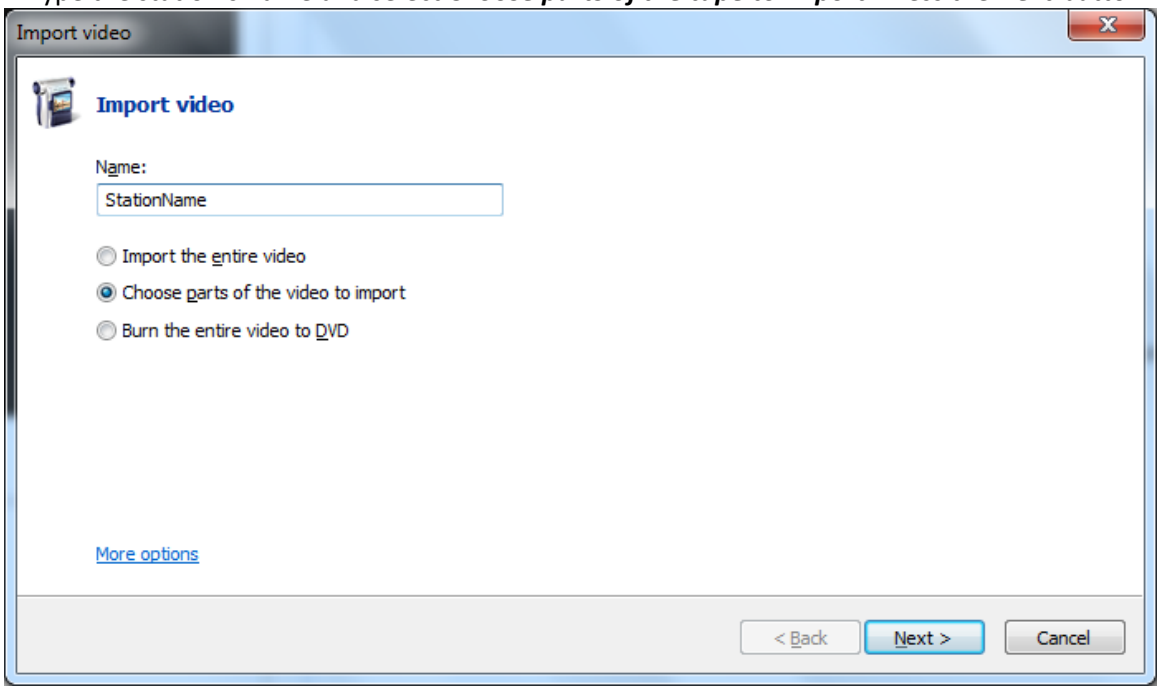
2. Select ***Import from device…*** from the ***File*** menu.



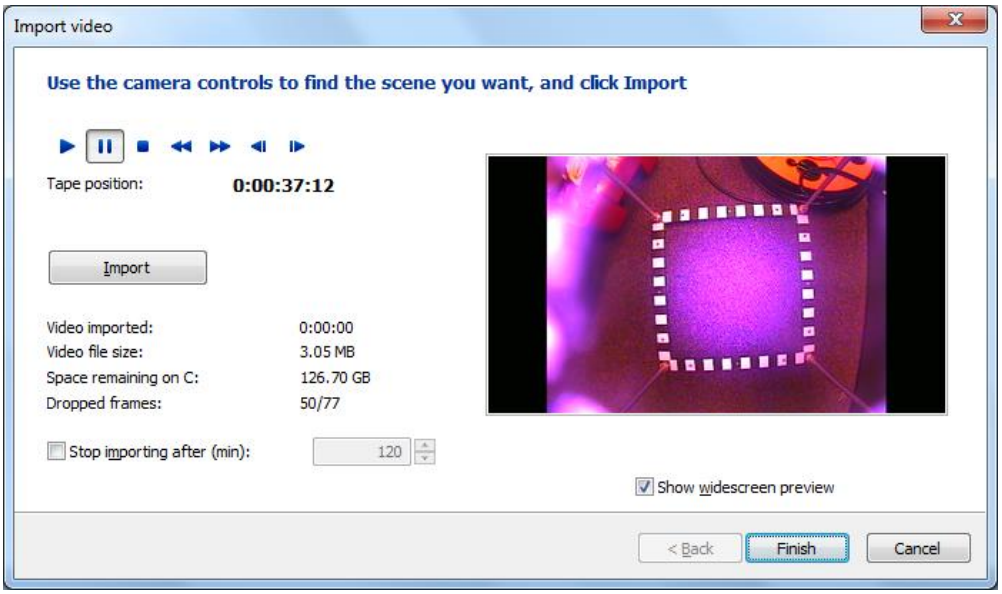
3. Select ***the AV/C Tape recorder/Play*** and press ***Import***.



4. Type the station's name and select ***Choose parts of the tape to import***. Press the ***Next*** button.



5. The camera is ready to capture. Press ***Import*** when you are interested to record and ***Stop*** to pause. When finish recording press the ***Finish*** button. Comment: if you do not see a preview press the ► button under ***DV camera controls***.

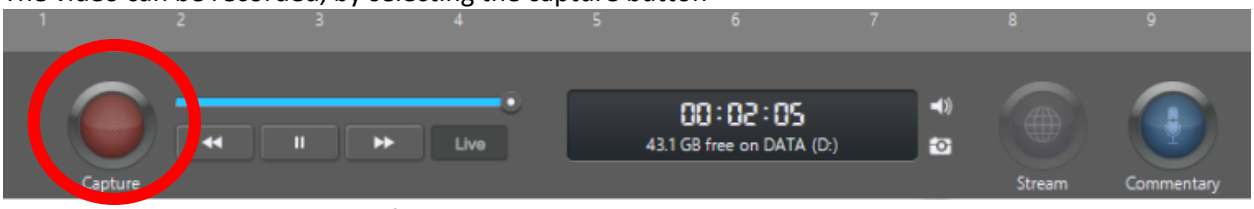


HD GoPro Interface

Once all components are connected (See HD GoPro setup) then turn on computer and open elgato software. If elgato software is not installed on computer than use install disk provided with elgato device or go to elgato website (https://www.elgato.com/en) and install software. The legato user interface is shown.

Figure 37 - elgato software interface

5. The camera connected to the elgato should load automatically into the software. If the camera is not found than check that the camera is plugged into the elgato and powered on.
6. The video can be recorded, by selecting the capture button



7. When done recording the video file will automatically request to be saved.
8. See Appendix for HD ocean systems Manual for use without elgato system.

GoPro Camera Attachment

GoPro Hero3+

1. Attach GoPro Hero 3+ to quick release mount (part 19 see Construction manual).

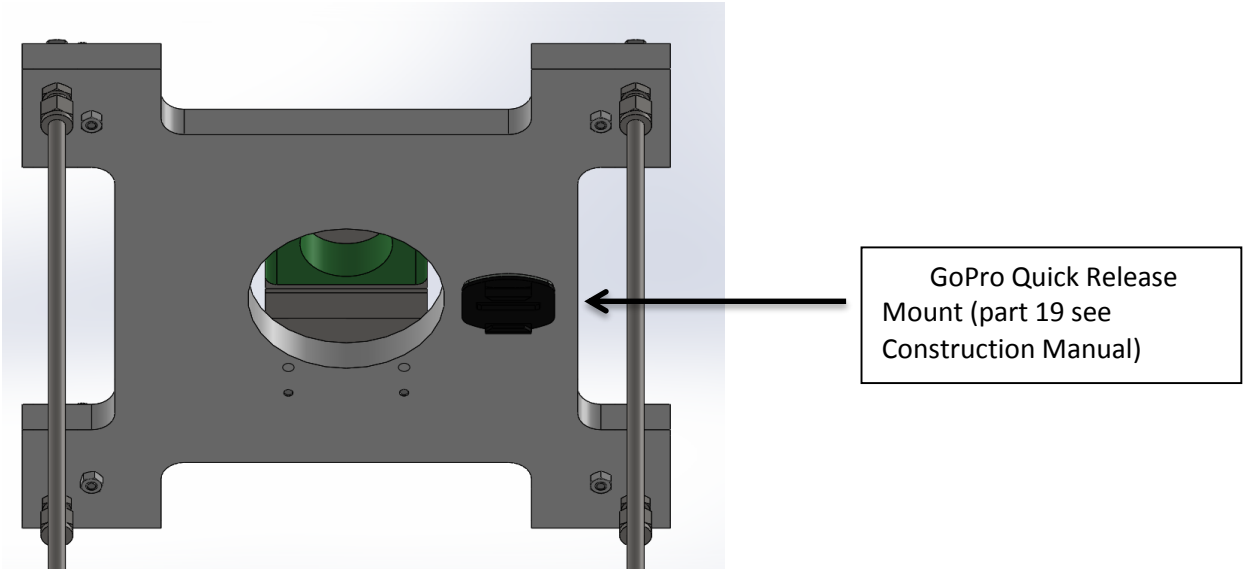


Figure 38 - GoPro Mount

2. Attach HDMI cable to GoPro and attach through cable grip (part 22 see construction manual). Connect end of HDMI cable into Elgato Game Capture. Attach Elgato Game capture to computer.

Appendix

The  symbol represents alternating current. For this report the symbol represents alternating current of 120 V, 60 hz (standard U.S. outlet).

Delta Vision Industrial - HD

Underwater Video Camera

Ocean Systems, Inc.
3901 Smith Avenue
Everett, WA 98201
800.355.4234 / 425.258.0778
support@oceansystemsinc.com
www.splashcam.com

Congratulations on the purchase of your Delta Vision Industrial High Definition underwater video system. We would like to extend our gratitude for your choice. We realize there are many other underwater video systems available. We will strive to keep you happy for years to come.

Before You Start:

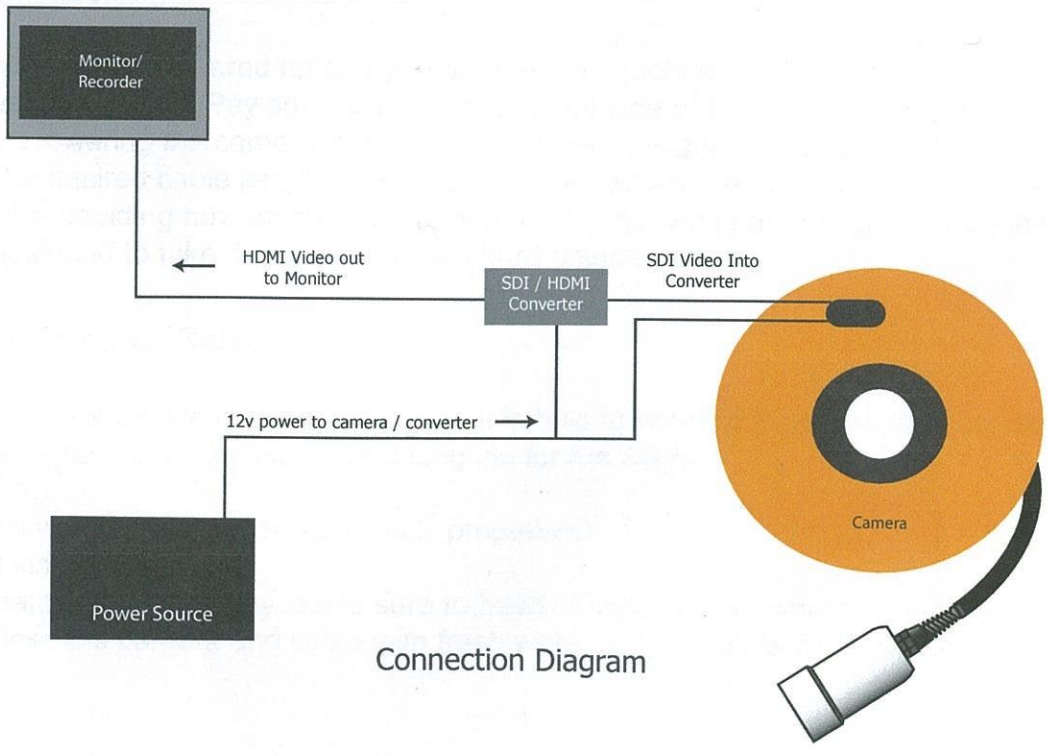
Please take a moment to make sure all of the components of your system are present.

What you should have:

- Delta Vision Industrial HD underwater video camera and cable reel
- Light Pod
- SDI to HDMI Converter
- AC/DC power supplie for use with AC power
- Cigarette lighter adapters for use with 12v DC
- 6ft. male/male HDMI Cable
- Drift fin with ballast hook
- Cable Clamp

Test Your System:

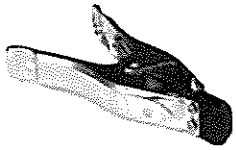
Before you take you system to the field, it is a good idea to familiarize yourself with the hook up procedure. Please refer to the diagram below to make your power and video connections. Please note you will be able to run this system on the battery or if you prefer you have the necessary AC/DC adapters to use AC power as well.



Connection Diagram

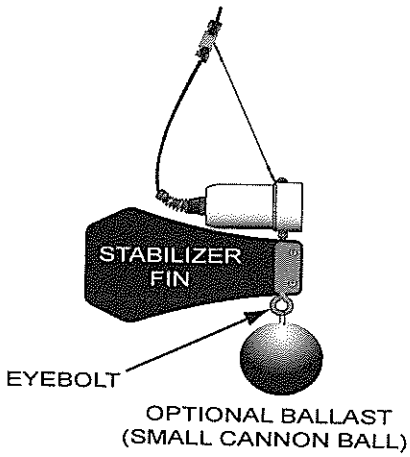
Cable Clamp:

The cable clamp may be used to hold the camera at a depth by clamping onto the cable and then lashing the clamp to a boat cleat or similar. The cable clamp may also be used to turn the camera head in the water. This will only work if there is very little current and the drift fin is not attached. The camera will respond to a depth of about 100ft.



Drift Fin:

The drift fin is used to stabilize the camera head in medium to strong currents. When the fin is attached the camera will look into the current. If you are moving in a forward direction, that is the direction the camera will look. Up to 3 lbs of ballast weight may also be attached to the eyebolt if needed.



Deploying The Camera:

Using a drop/towed underwater video system is like riding a bike. You can tell the operator how to do it, but becoming an efficient operator will come from time spent on the water using the system. You will learn how current effects the camera, how much cable you need to get to a certain depth, how to control the camera head and much more.

Make sure the system is powered up and you are getting a picture on the monitor. Set the adjustable strain relief to the desired position. Pay some extra cable off the side of the reel and lower the camera into the water. If you are lowering the camera to more than 30 feet, it is best to unplug the power/video connections and spool off the desired cable length then plug your connections back to the camera. A depth finder is a very useful tool in deciding how much cable to deploy. Do not worry about contact with the bottom. The cameras are designed to take direct impact from hard objects.

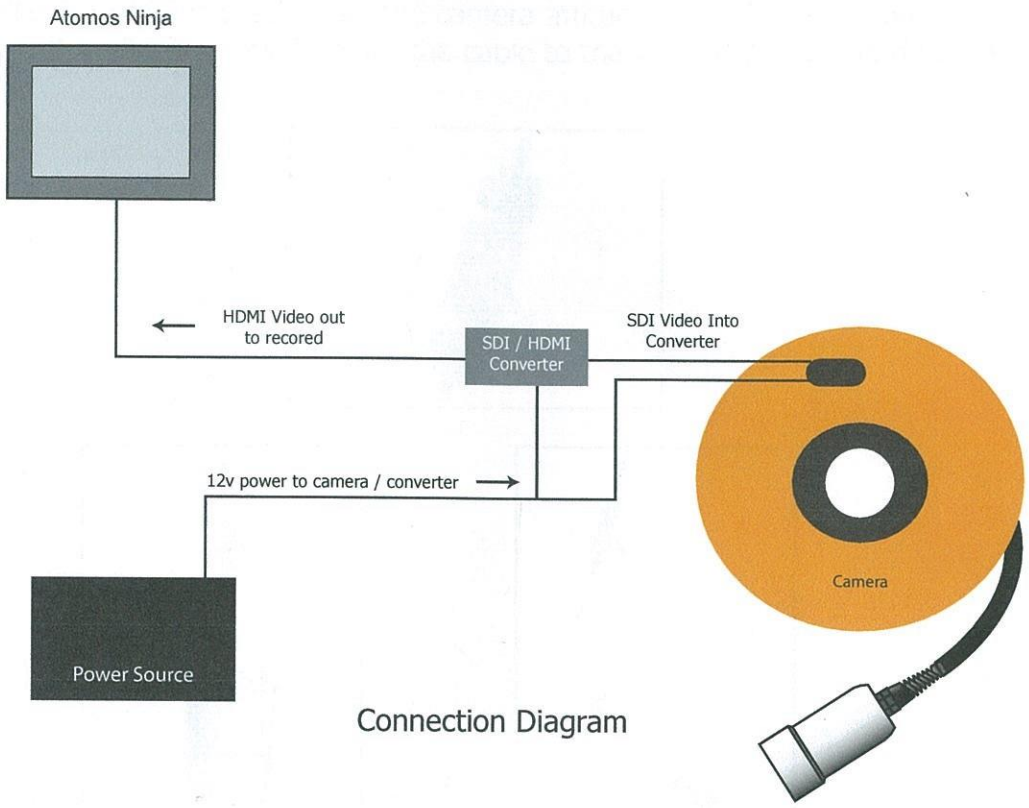
Care For The Camera Cable:

The umbilical cable is the life line of the camera. It is built to be used in very rugged condition. However, it is good to take certain steps to insure the a long life for the cable.

1. Avoid contact with sharp objects (especially propellers)
2. Try to avoid kinking the cable
3. If using a snatch block or pulley, make sure to have at least a 6" minimum bend radius
4. If possible rinse the camera and cable with fresh water and pat dry before returning to the case.

Delta Vision HD Connection Diagram with Atamos Ninja

Please refer to the Atomos User Guide for Instruction on use of the recorder

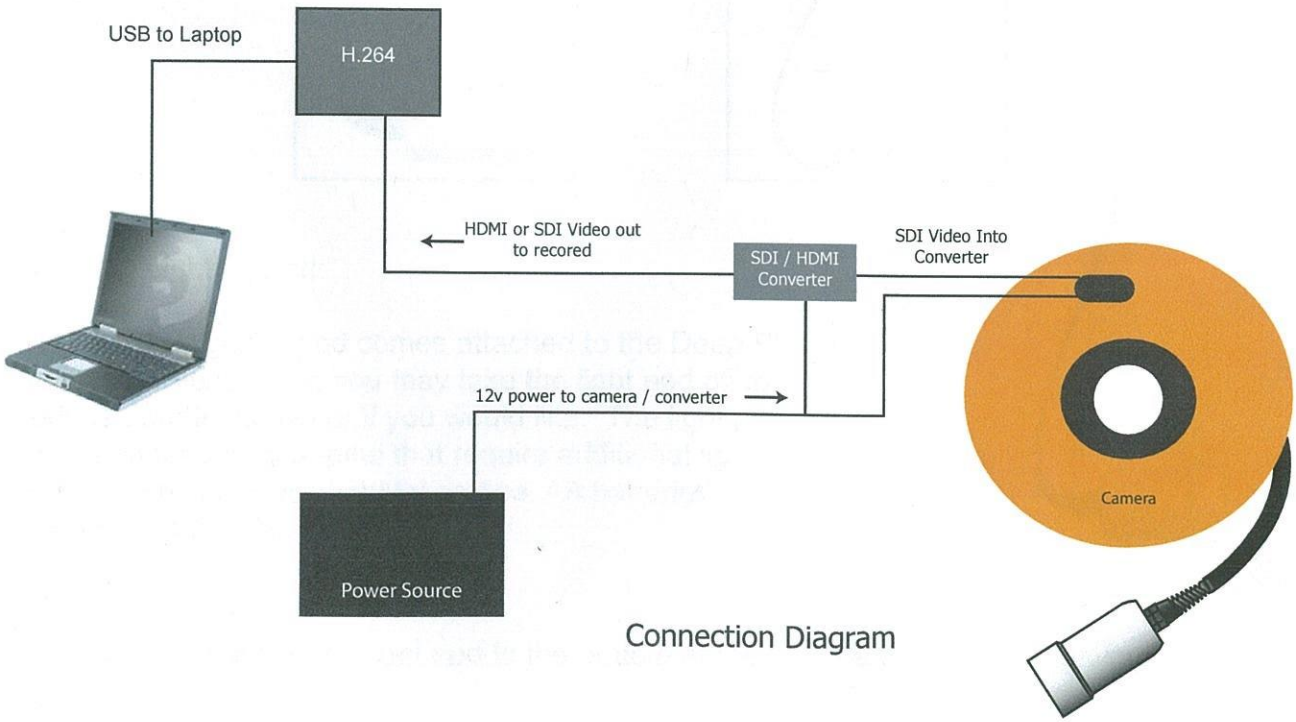


Connection Diagram

Delta Vision HD Connection Diagram with Blackmagic Pro H.264

Please refer to the Blackmagic User Guide for Instruction on use of the recorder

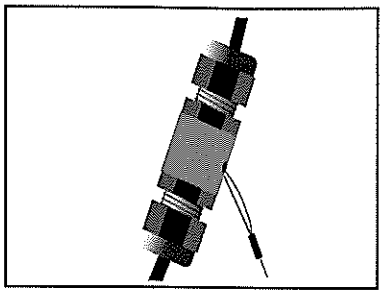
Please note the power input cable for the H.264 recorder is 2.5mm. You will need to use the supplied AC/DC power supply
We can build a 2.5mm to 2.1mm adapter if needed to run off the case battery

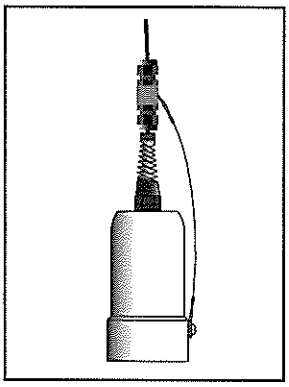


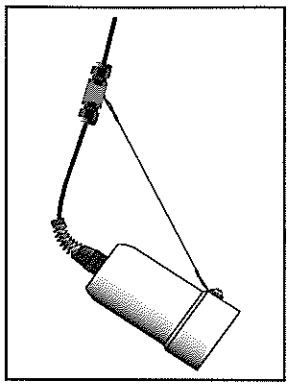
Connection Diagram

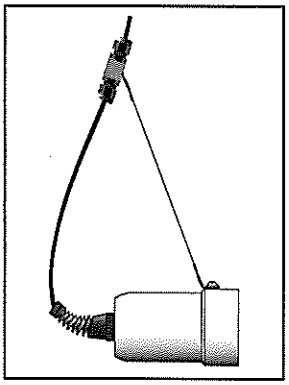
Adjustable Strain Relief:

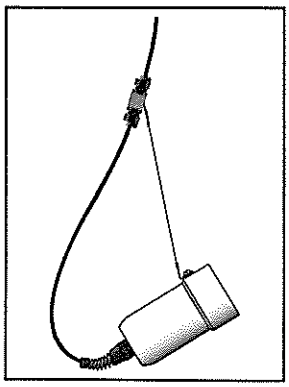
One of the more unique features of our drop/towed underwater video cameras is the patent pending adjustable strain relief. The ASR is used to set the camera attitude in the water. Before you deploy the camera simply loosen the ASR nuts pull back on the cable to the desired position and tighten the locking nuts.





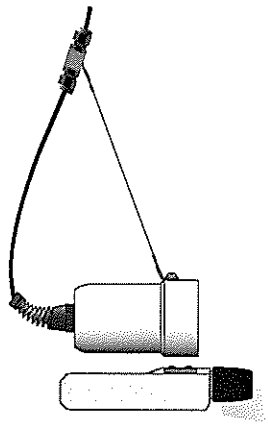






Auxiliary Lighting Pod:

The LP-100 lighting pod comes attached to the Deep Blue for shipping. Please note you may take the light pod off to reduce drag in the water if you would like. The light pod is designed for use at depths that require additional lighting and for use at night. Each light takes 4ea. AA batteries and should burn for about 4 hours.



Attached the light pod to the bottom of the camera for auxiliary lighting.

Deploying The Camera:

Using a drop/towed underwater video system is like riding a bike. You can tell the operator how to do it, but becoming an efficient operator will come from time spent on the water using the system. You will learn how current effects the camera, how much cable you need to get to a certain depth, how to control the camera head and much more.

Make sure the system is powered up and you are getting a picture on the monitor. Set the adjustable strain relief to the desired position. Pay some extra cable off the side of the reel and lower the camera into the water. If you are lowering the camera to more than 30 feet, it is best to unplug the power/video connections and spool off the desired cable length then plug your connections back to the camera. A depth finder is a very useful tool in deciding how much cable to deploy. Do not worry about contact with the bottom. The cameras are designed to take direct impact from hard objects.

Care For The Camera Cable:

The umbilical cable is the life line of the camera. It is built to be used in very rugged condition. However, it is good to take certain steps to insure the a long life for the cable.

1. Avoid contact with sharp objects (especially propellers)
2. Try to avoid kinking the cable
3. If using a snatch block or pulley, make sure to have at least a 6" minimum bend radius
4. If possible rinse the camera and cable with fresh water and pat dry before returning to the case.

For Customer Support:

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