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MISSION SPECIALIST

QUICK GUIDE

VideoRay
Mission Specialist
Defender Expeditionary System

TABLET

- FORWARD
- ALL AUTOS OFF (PUSH)
- PITCH/ROLL RESET (PUSH)
- DIVE
- LATERAL L — LATERAL R
- YAW L — YAW R
- REVERSE
- SURFACE
- SCREENSHOT (REAR BUTTON)
- LOGGING (REAR BUTTON)
- LIGHTS +
- + PITCH
- LIGHTS −
- − PITCH
- MANIP ROTATE (REAR TOGGLE)
- MANIP OPEN/CLOSE (REAR TOGGLE)
- JOG FORWARD
- TILT +
- JOG L — JOG R
- FOCUS − FOCUS +
- JOG REVERSE
- TILT −
- SONAR FREQ HI/LO (PUSH)
- CAM/SONAR MODE (PUSH)
- RANGE +
- GAIN − GAIN +
- RANGE −

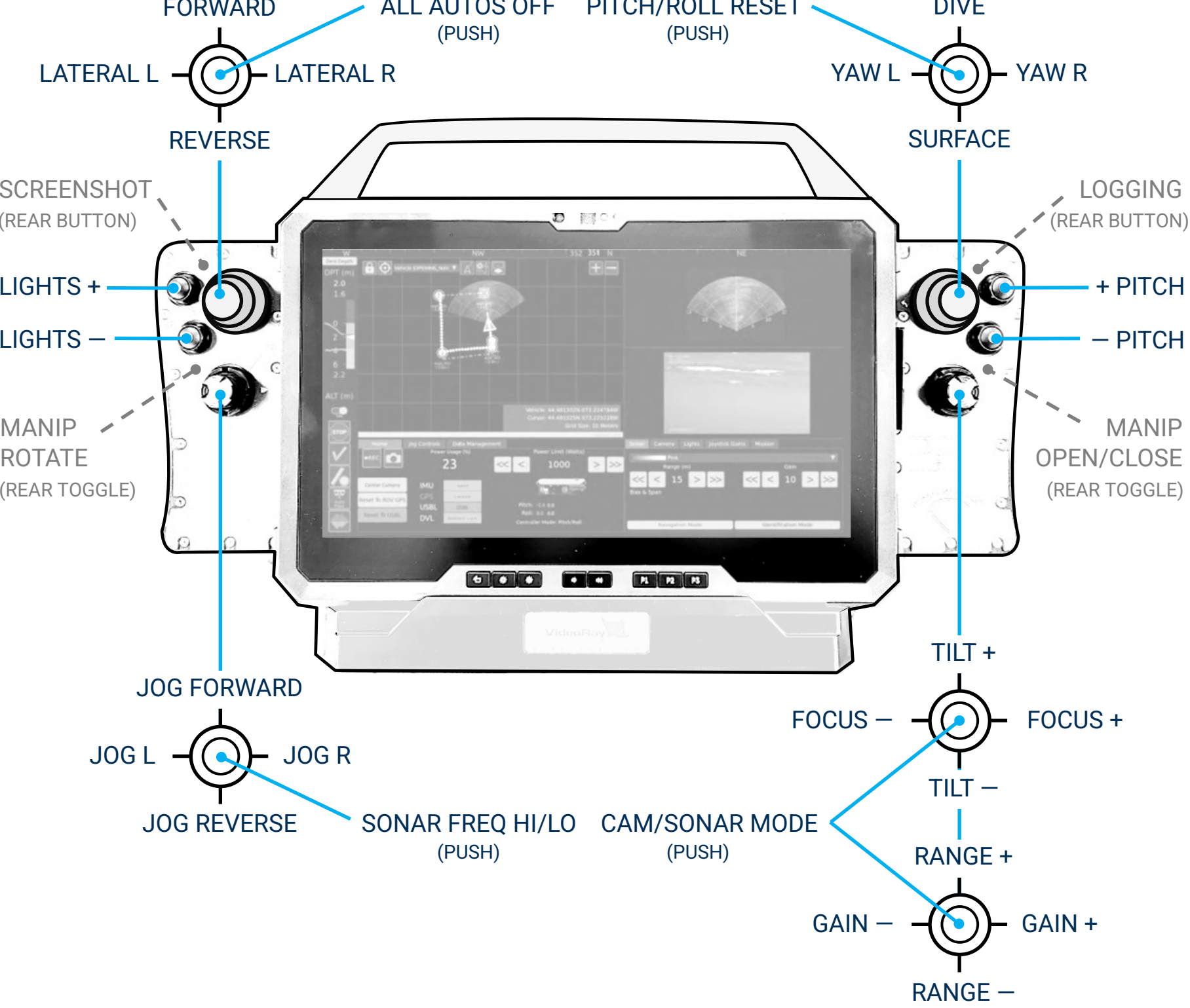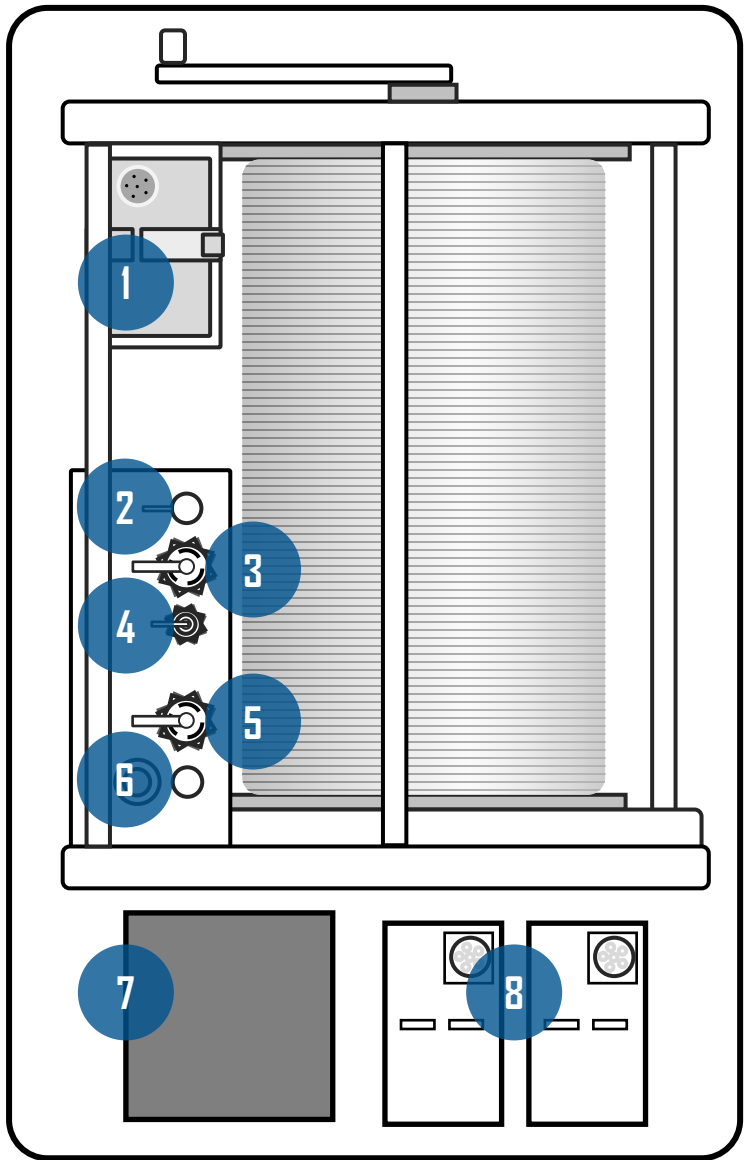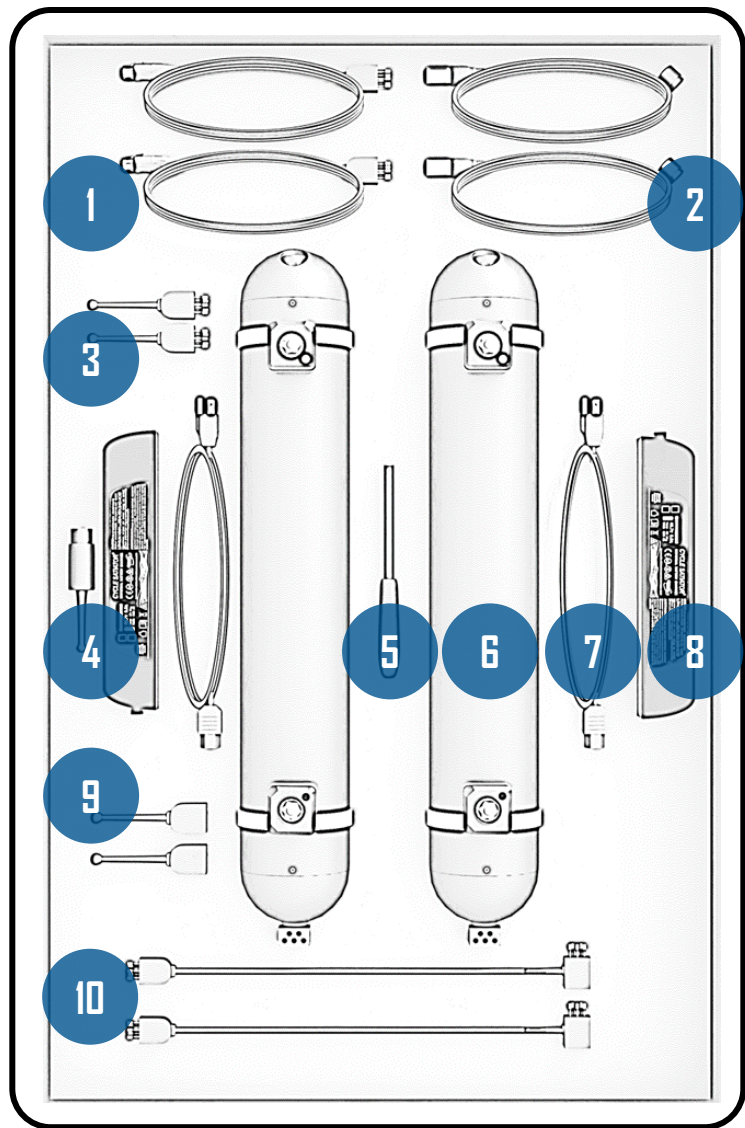## EXPEDITIONARY REEL

1. 2590 Battery Port
2. HMI Fischer Cable to Tablet Port
3. Ethernet Port
4. USBL Topside Cable Port
5. USB Port
6. Power On / Indicator
7. Tool Kit
8. 2590 Batteries

LI-ION SUBSEA BATTERIES

1. XLR to 5-Pin Male Charging Cable (2)
2. Charger Port to XLR Charging Cable (2)
3. 5-Pin Male Dummy Plug (2)
4. 8-Pin Tether Dummy Plug w/ Cap
5. Power Wand
6. Li-Ion Subsea Battery (2)
7. Charger A/C Power Cord (2)
8. Battery Charger (2)
9. 5-Pin Female Dummy Plug (2)
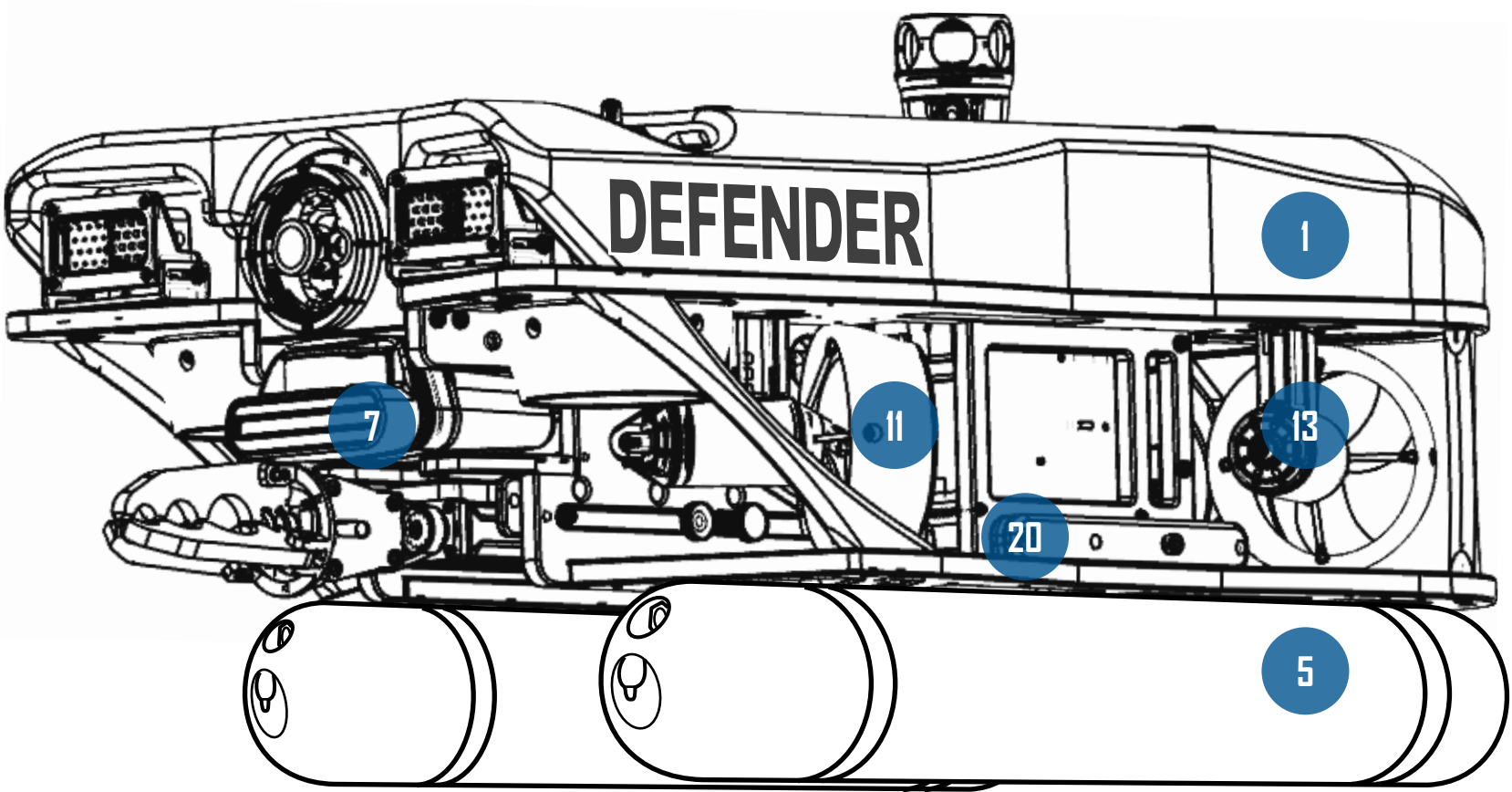10. 5-Pin FM/M to 5-Pin Male Power Cable (2)

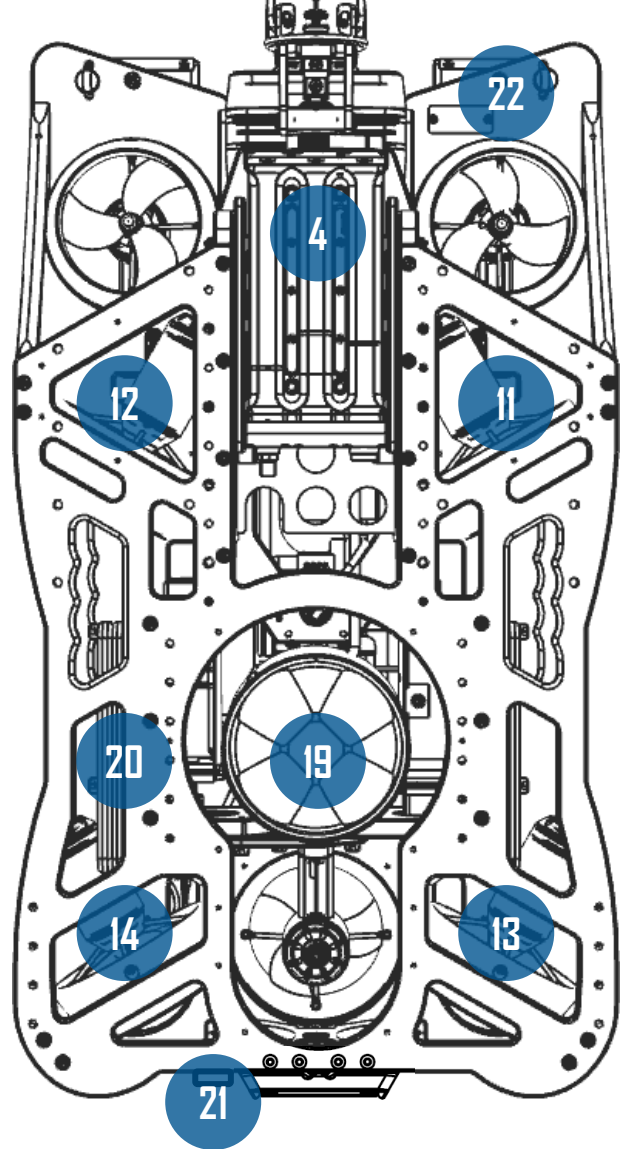## DEFENDER EXPEDITIONARY SYSTEM

1. Float Block   part number 70779
2. USBL X010 Beacon   part number 70696
3. LED Lighting Modules   part number 70023
4. Rotating Manipulator   part number 70824
5. Li-Ion Subsea Battery   part number 73502
6. HD Camera Module   part number 70044
7. M750d Sonar   part number 71047
8. Port Vertical Thruster   part number 70503
9. Starboard Vertical Thruster   part number 70503
10. Rear Vertical Thruster   part number 70503
11. Port Forward Thruster   part number 70503
12. Starboard Forward Thruster   part number 70503
13. Port Rear Thruster   part number 70503
14. Starboard Rear Thruster   part number 70503
15. Submersible GPS Module   part number 70809
16. Power Module   part number 70160
17. Communications Module   part number 70191
18. AHRS Module   part number 70273
19. Navigation DVL   part number 71044
20. Ballast Weight   part number 70453
21. Rear Auxiliary Camera   part number 73234
22. Serial Number Plate   part number 71094


TOP VIEW (FLOAT REMOVED)
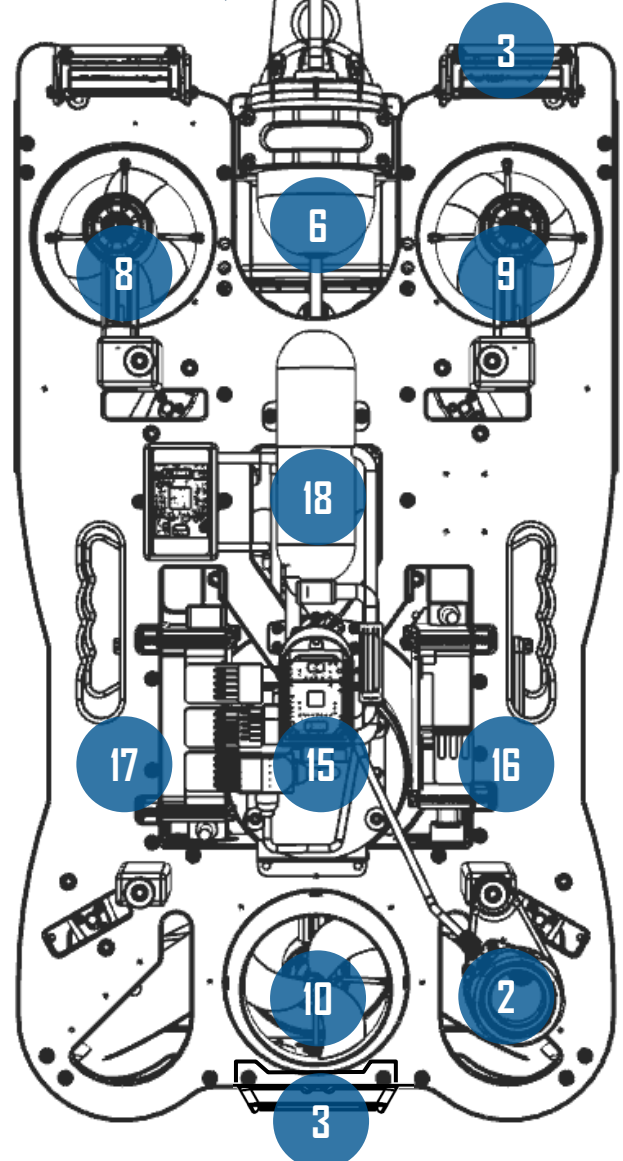
BOTTOM VIEW

Expeditionary System 300m Configuration

|	
Defender Submersible	Dual Frequency FL Sonar
Navigation Package	Li-Ion Subsea Batteries
USBL Positioning	Expeditionary Reel / 500 m Tether
Dual Axis Manipulator	Expeditionary Splashproof Controller

REV 1.0.0

Pre-Dive Operations

VISUAL INSPECTION

1. Confirm all mission equipment is on scene
2. Remove float block and inspect connections
3. Check thruster tales and that propellers spin freely
4. Check propellers for damage and cracks along hub
5. Check camera dome for moisture or damage
6. Ensure manipulator is securely mounted and extended
7. Ensure Defender's USBL beacon is securely mounted
8. Ensure subsea batteries have different node IDs (32/33)
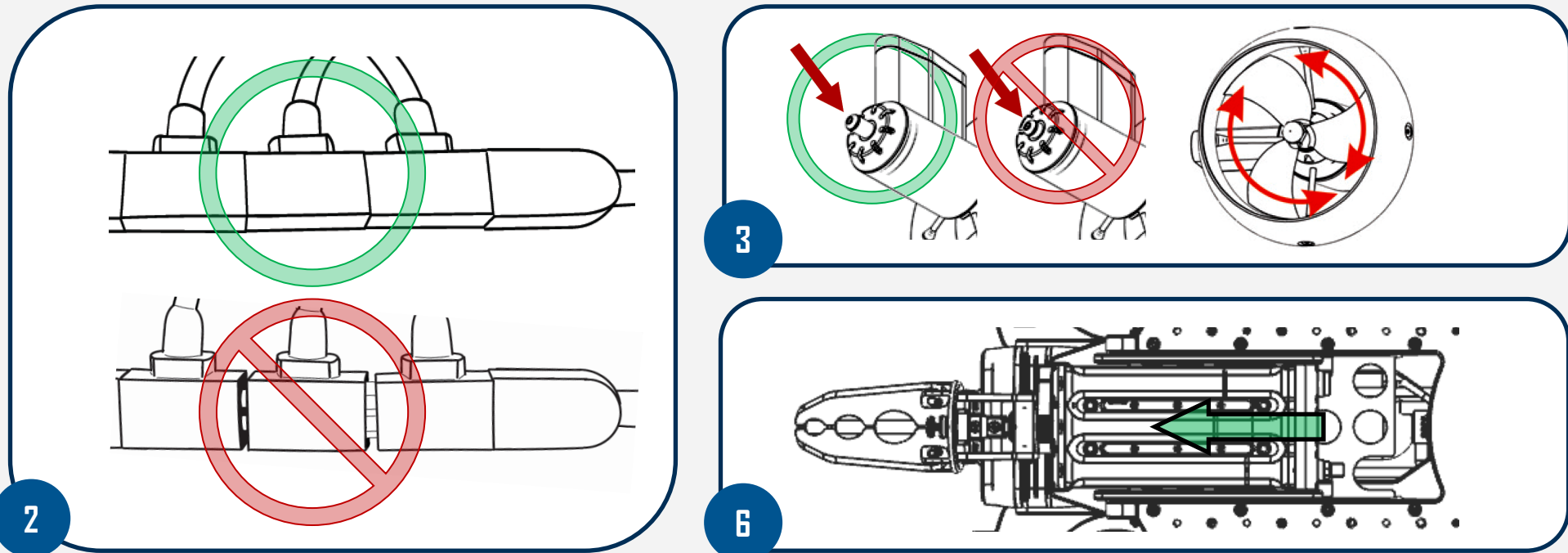
MAKE CONNECTIONS

1. Start at the Defender and work toward the controller
2. Lubricate and securely connect the tether to the Defender
3. Connect the strain relief and test all angles to prove no tension is on the tether
4. Using silicone, lubricate and connect the Beacon to 9-pin cable to the Defender's USBL beacon
5. Lubricate and connect the other end to the 9-pin chain at Port 6 of the Communications Module
6. Replace float block and extend the Defender's GPS mast
7. Insert and secure the 2590 battery in the Expeditionary Reel port
8. Take note of Fischer cable connector labels and connect tablet to console's HMI port
9. Connect USBL topside beacon cable to the reel USBL port and deploy beacon 1+ m
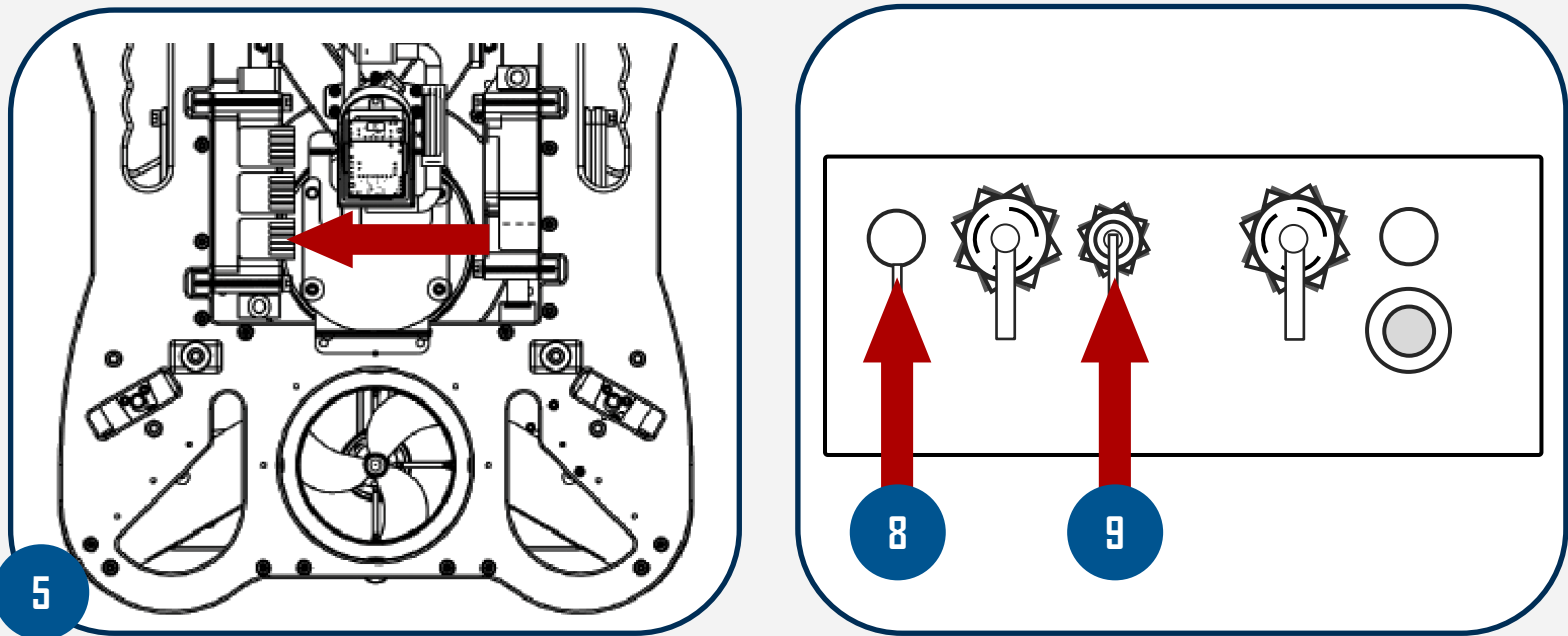
POWER SYSTEM ON

1. Power on the Expeditionary Reel
2. Power on the tablet
3. Insert the power wand into the forward center port of either battery (NOT both) for approx. one second
4. Listen for two audible tones from each battery
5. After several seconds, verify that the Defender is powered up by checking the status LEDs on the Power and Communications Modules
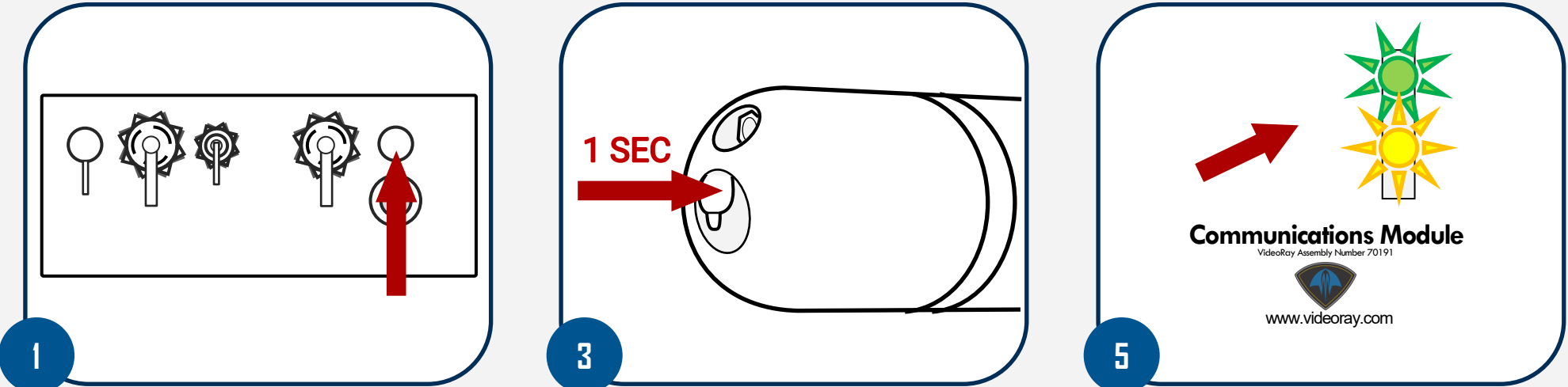
FUNCTION TEST

1. Double-click the EOD Icon on the desktop to open the Greensea software
2. Momentarily test thrusters (horizontal/vertical in all directions)
3. Momentarily test LED light functions (on/bright/dim/off)
4. Check manipulator operation (open/close, rotation)
5. Verify video feed imagery, camera tilt, and picture-in-picture (PIP) functions
6. Verify sonar feed is displayed
7. Check that compass ribbon is responsive and accurate
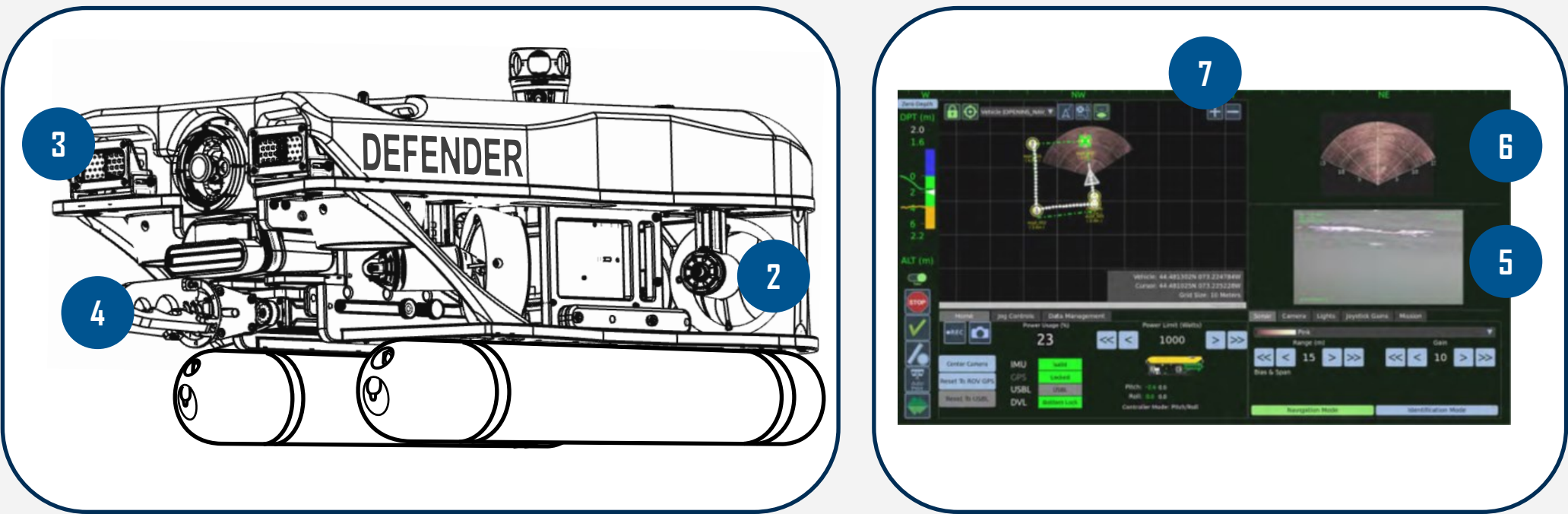
LAUNCH

1. Deploy the Defender and check ballast / trim— optimum buoyancy is just at the surface and level
2. Zero the depth while on the surface
3. Reset to GPS when position for the Defender is acquired and displayed in the Map View
4. Enable Auto controls (heading, depth/altitude, pitch, roll, dynamic positioning)
5. Dive 1-2 m and verify positioning in the Map View and sensor status in the Flight View *Home* tab
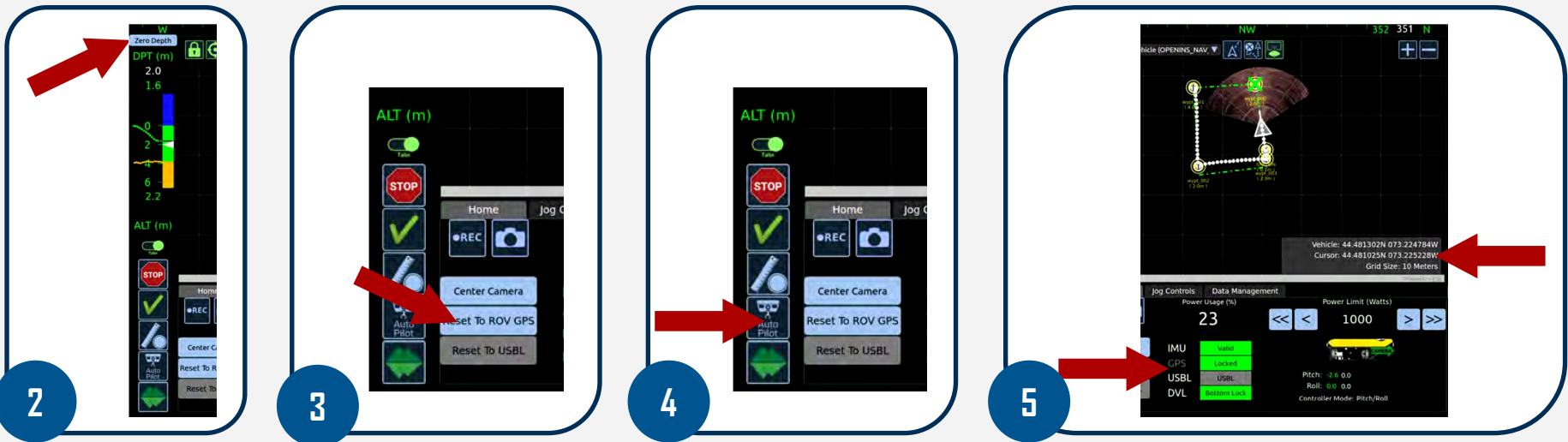
Subsea Battery Operation

Piloting the Defender will have minor variations when subsea batteries are installed. The recommended considerations are as follows:

Once the Defender is launched, immediately check and adjust ballast so that the top of the float block hovers just at the waterline.

With the batteries mounted below the frame, be cognizant of the Defender's deeper draft. Increase your minimum altitude from the bottom when navigating to avoid inadvertent grounding.

Lithium (Li-ion) batteries can operate at the default power setting of 1,000 watts or to the maximum power setting if more power is needed or desired.

When using Nickel Metal Hydride (NiMH) batteries, it is recommended to reduce the Defender's power setting to 700 watts via the *Home* tab in the Flight View menu. This power setting will extend the flight time of the Defender with little effect on navigation and accessories.

During extended periods of use, the batteries may experience excessive power drain resulting in insufficient power for continued normal use. In addition to on-screen battery meters indicating low levels, signs and symptoms of insufficient power will become apparent on the monitor of the tablet, to include freezing of the video feed, the ribbon compass going dark, or the video feed going dark. If this occurs, safe recovery of the Defender should now be the priority of the pilot.

Recommended actions are as follows:

a. Disable Auto controls to reset the Defender's attitude and reduce power consumption
b. Turn off lights
c. Reduce power setting to 500 watts via the Flight View *Home* tab
d. Navigate back to the deployment site (or surface for tether-pull recovery) and recover the Defender using proper procedures

Post-Dive Operations

1. Maintain communication between pilot/tether handler
2. Disable all Auto Pilot controls and Dynamic Positioning
3. Recover via the tether or Defender frame
4. Open quick-release manip jaw partially for removal
5. Power off the subsea batteries by inserting the power wand into the forward center port of each battery for approx. one second
6. Listen for a single audible tone from each battery and confirm no status LEDs blinking on the Power and Communications Modules
7. Power off the reel and remove 2590 battery
8. Stop video logging and exit Greensea software via the ⬙ flyout menu and confirm exit
9. Power off the tablet via the side power button and confirm power off
10. Undo all system connections and replace protective caps/covers
11. Protect reel connector ports and rinse tether
12. Remove float block, soak and rinse Defender
13. Conduct a thorough post-dive inspection of the system and allow to dry completely
14. Follow SOP for charging Subsea Batteries and the 2590 reel battery
15. Follow SOP for mission file data