

3400 SUB-BOTTOM SONAR SYSTEM

QUICKSTART GUIDE

0021825_REV_A

8/23/2022



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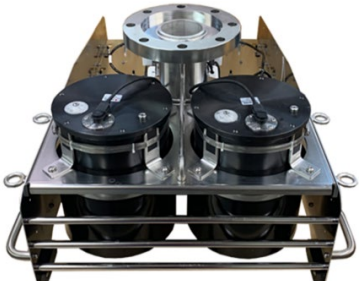


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HARDWARE VARIATIONS AND COMPATIBILITY

3400 Series Sub-Bottom Sonar Systems are wideband frequency modulated (FM) sub-bottom profilers utilizing EdgeTech's proprietary Full Spectrum CHIRP technology to generate high-resolution images of the sub-bottom stratigraphy in oceans, lakes, and rivers and provide excellent penetration of various bottom types. There are currently five 3400 variants with unique configurations designed to meet surveyor needs.

	<p>3400 Sub-Bottom Profiler: This hydrodynamic configuration hosts dual 2-16 kHz transducers and PVDF receiver array configuration. The system is designed to be towed or can be pole-mounted off the side of a vessel with the purchase of a pole-mounting kit.</p>
	<p>3400 OTS LF Sub-Bottom Profiler: This over-the-side configuration is designed to be pole-mounted off the side of a vessel. It consists of a dual 1-10 kHz transducer and PVDF receiver array configuration. It provides for deeper water operations than the towed 3400 Sub-Bottom profilers. This type does support an amplifier option.</p>
	<p>3400 OTS Light Sub-Bottom Profiler: This shallow-water configuration hosts a single 2-16 kHz transducer and PVDF receiver array configuration that offers deeper penetration than the Ultra-Light 3400. It is designed to be pole-mounted and can be used on small vessels.</p>
	<p>3400 OTS Ultra-Light Sub-Bottom Profiler: This shallow water configuration comes with a single 4-24 kHz transducer and PVDF receiver array configuration. It is designed to be pole-mounted and can be used on small vessels.</p>



3400-512E Sub-Bottom Profiler: This hydrodynamic configuration hosts 2-16 kHz and 5-12 kHz sub-bottom transducers and PVDF receiver array configuration. The system is designed to be towed by a vessel. This type does support an amplifier option.

Complete system documentation on this system can be found in the [3400 SERIES HARDWARE MANUAL](#) (0021270) and the [3400 SOFTWARE MANUAL](#) (0021824).

EdgeTech may change the standard components due to their availability or performance improvements. Although the component manufacturers and their models and styles may change from unit to unit, replacement parts will generally be interchangeable.

EdgeTech will make every effort to see that replacement components are interchangeable and use the same software drivers (if applicable). At times, however, direct replacements may not exist. When this happens, EdgeTech will provide the necessary drivers with the replacement part, if applicable.

EdgeTech may also change specific hardware per customer requirements. Therefore, portions of this manual, such as parts lists and test features, are subject to change. These sections should be used for reference only. When changes are made that affect system operation, they will be explicitly noted. Also, some options and features may not be active in the customer's unit at the time of delivery. Upgrades will be made available when these features are implemented.

Contact [CUSTOMER SERVICE](#) with any questions relating to compatibility.

CUSTOMER SERVICE

Customer service personnel at EdgeTech are always eager to hear from users of our products. Your feedback is welcome and a valuable source of information that we continually use to improve these products. Therefore, we encourage you to contact EdgeTech Customer Service to offer any suggestions or to request technical support:

NOTE: Please have your system Model and Serial Number available when contacting Customer Service.

E-mail:	service@edgetech.com
Mail:	4 Little Brook Road West Wareham, MA 02576
Telephone:	(508) 291-0057
Facsimile:	(508) 291-2491
24-Hour Emergency Technical Support Line:	(508) 942-8043

For more information, please go to WWW.EDGETECH.COM.

ATTENTION – READ THIS FIRST!

All personnel involved with the equipment installation, operation, or maintenance described in this manual should read and understand the warnings and cautions provided below.

CAUTION! This equipment contains devices that are extremely sensitive to static electricity. Therefore, extreme care should be taken when handling them. Normal handling precautions involve using anti-static protection materials and grounding straps for personnel.

WARNING! High voltage may be present in all parts of the system. Therefore, use caution when the electronics are removed from their containers for servicing.

WARNING! Do not connect the tow cable to the 3400 Topside before connecting it to the vehicle; otherwise, injury or death can occur if the tow cable's exposed connector is energized. Always connect the tow cable to the vehicle first.

CAUTION! Operation with improper line voltage may cause serious damage to the equipment. Therefore, always ensure that the proper line voltage is used.

CAUTION! Do not operate the system while the vehicle is out of water for extended periods. The system may be enabled to transmit while in the air for test purposes, but testing should be limited to 5 minutes or less. This system transmits high power into the transducers, which can become hot if operated in the air for extended periods. Damage to the transducers and internal electronics is possible.

Revision History

REVISION	DESCRIPTION	DATE	APPROVAL
A	Release to Production	8/23/2022	CMM

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1.0 SYSTEM SETUP

1.1 Standard 3400 Hardware Configuration

3400 Hardware configuration is straightforward. The 3400 vehicle is connected to the 3400 Topside's Sea Cable connector using a tow cable. A Discover-enabled computer's Ethernet connection is connected to the 3400 Topsides Ethernet connector with an Ethernet cable. Any navigation devices are connected to the COM ports of the topside or laptop.

1. Check to ensure the power entry module is in the **OFF** position and the front panel switch is in the off position before connecting the supplied AC Power Cable (switch position = DOWN).
1. Connect the 3400 Topside to an AC power source using the AC power cable. (Check system power specifications).
2. If not already connected, connect the tow cable to the tow vehicle.

WARNING! Do not connect the tow cable to the 3400 Portable Topside before connecting it to the tow vehicle; otherwise, injury or death can occur if the tow cable's exposed connector is energized. Always connect the tow cable to the tow vehicle first.

- If it is a towed 3400 system, the tow cable should be secured to the bridle shackle with a cable grip, and the tow cable is then run down along a towfish bridle arm to the connector, where both ends are mated. Cable ties should be used to secure the cable to the bridle arm giving the tow cable enough slack between the shackle and connector to prevent the endpoints from being pulled loose.
3. Connect the 3400 Topside to the 3400 vehicle using the tow cable and Sea Cable connector.
 4. Connect any Navigation device to the COM A or COM B serial port on the 3400 Topside or the computer's COM port.
 5. Connect the computer Ethernet connection to the 3400 Topside Ethernet Connector with an Ethernet cable.

NOTE: The Ethernet cable may be extended up to 100 feet using a Category 5 Ethernet patch cable and Ethernet connector. A crossover or direct cable may be used.

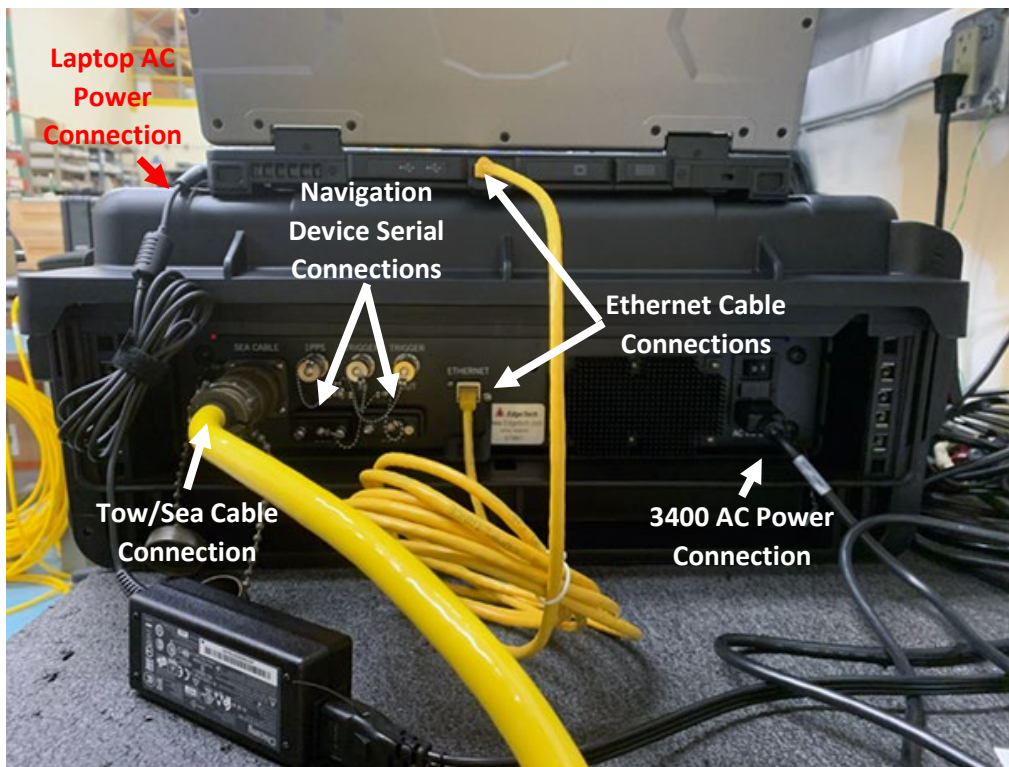


Figure 1-1: 3400 Topside and Computer Connections

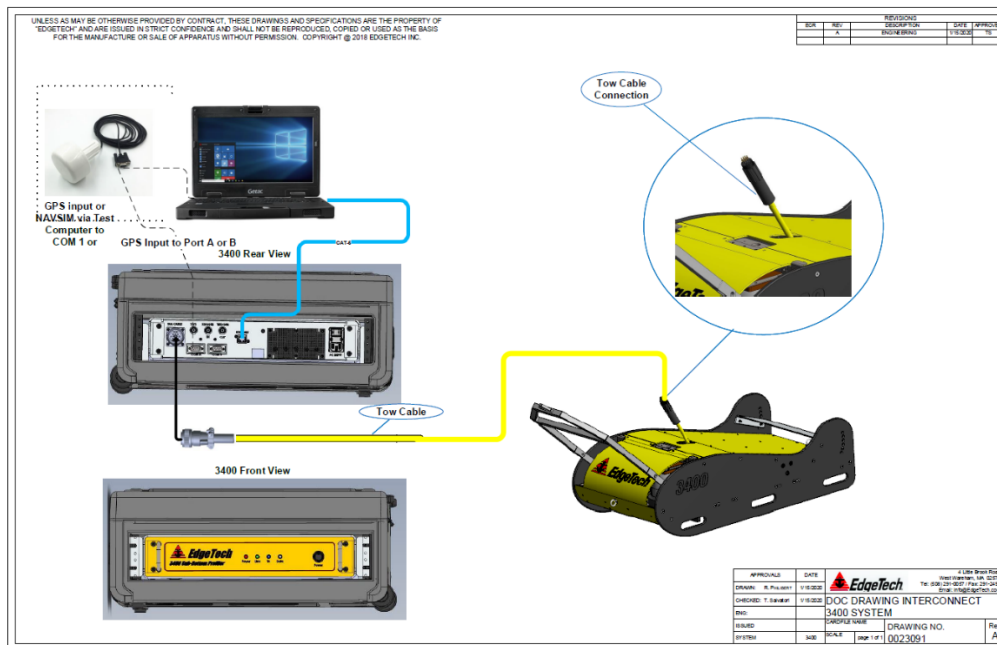


Figure 1-2: 3400 Sub-Bottom Profiler Connection Diagram

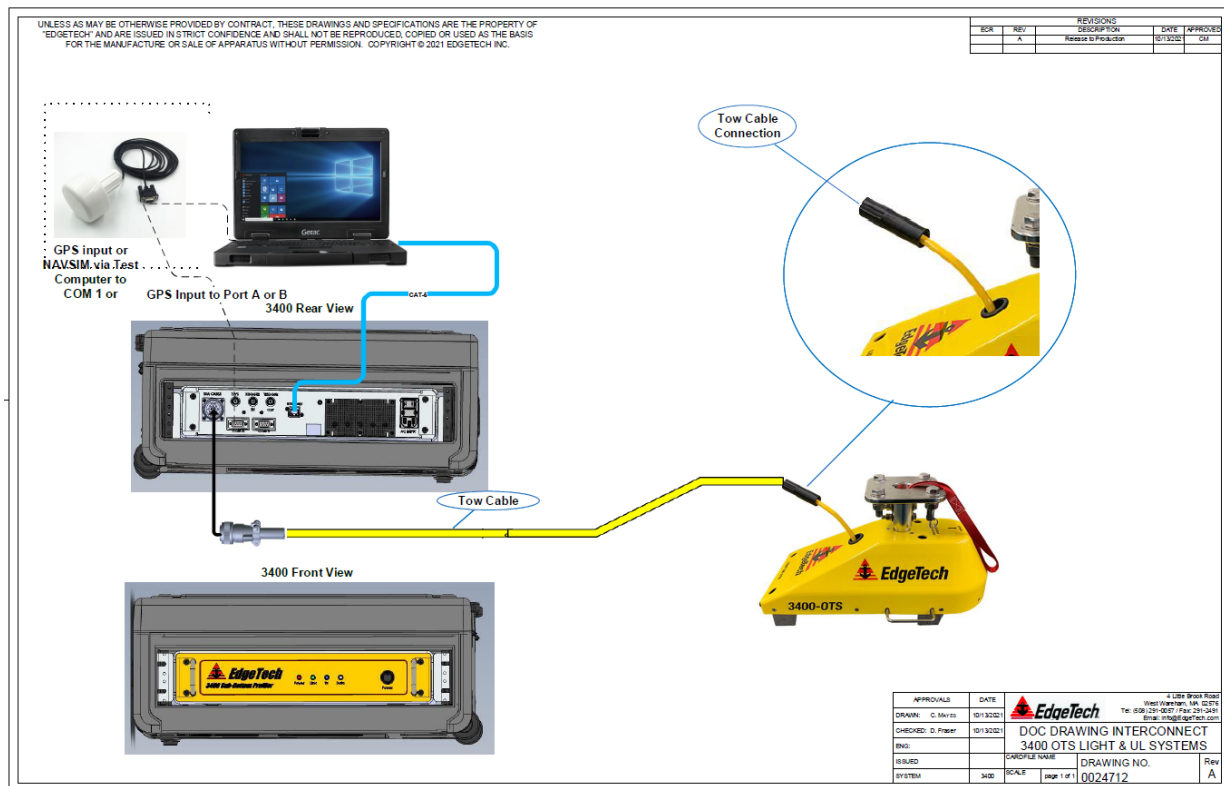


Figure 1-3: 3400 Light and Ultra-Light Sub Bottom Profiler Connection Diagram

1.2 3400 System With Amplifier Configuration

The 3400 with amplifier option connection setup differs slightly from the standard 3400 setup configuration. The 3400 vehicle is connected to the amplifier with a tow cable. The amplifier is connected to the Sea Cable connector on the 3400 Topside with the amplifier interface cable. The Discover-enabled computer's Ethernet connection is connected to the topside's Ethernet connection using an ethernet cable. Any navigation devices are connected to the COM ports of the topside or laptop.

To connect:

1. Ensure all power switches on the topside and amplifier are in the **Off** position and all front panel switches are in the off position before connecting the supplied AC Power Cables (switch position = DOWN).
2. Connect the 3400 Topside and amplifier to a source of AC power using the AC power cable. (Check system power specifications).
3. Connect the J2 Connector on the amplifier to the Towfish connector using the supplied tow cable.

WARNING! Do not connect the tow cable to the amplifier before connecting it to the tow vehicle; otherwise, injury or death can occur if the tow cable's exposed connector is energized. Always connect the tow cable to the tow vehicle first.

- If it is a towed 3400, the tow cable should be secured to the bridle shackle with a cable grip, and the tow cable is then run down along a towfish bridle arm to the connector, where both ends are mated. Cable ties should be used to secure the cable to the bridle arm giving the tow cable enough slack between the shackle and connector to prevent the endpoints from being pulled loose.
4. Connect the 3400 Topside Sea Cable connection to the J1 3400 I/O Connector on the amplifier with the amplifier interface cable
 6. Connect any Navigation device to the COM A or COM B serial port on the 3400 Topside or the computer's COM port.
 5. Connect the computer Ethernet connection to the 3400 Topside Ethernet Connector with an Ethernet cable.

NOTE: The Ethernet cable may be extended up to 100 feet using a Category 5 Ethernet patch cable and Ethernet connector. A crossover or direct cable may be used.



2.0 SYSTEM ACTIVATION AND TESTING

After making all connections, the system is ready to be turned on, and the Discover Software started. See the [DISCOVER 3400 SOFTWARE MANUAL](#) for operation details.

2.1 Activating the System

To activate the 3400 Portable Sub-Bottom Profiling System after making all necessary connections:

1. Operate the ON/OFF switch to the ON position (switch position = UP).
7. Observe the front panel LEDs.



Figure 2-1: 3400 Topside Front Panel-LED Indicator Lights

The Power-on sequence for the LEDs should appear as follows once the power is turned on.

1. The green Power Button LED should illuminate.
2. All but the LINK LEDs will momentarily illuminate after power is applied for about 20-25 seconds.
3. All LEDs will turn off except the green Link LED, which will turn ON a few seconds after.
4. The green Link LED, and blue TX Light will flash on the first CHIRP Signal. The blue TX LED will then turn off.
5. The red power LED will illuminate, the green Link LED will Flash, the blue TX LED will turn off, and the tri-color Data LED will initially be amber and then transition to green if data integrity is good.

After startup, LEDs on the topside processor should display the following under normal circumstances:

LED	LIGHT INDICATION
Power Indicator Light	A red power indicator LED. When illuminated, AC power is applied to the topside and towfish.
Power Button Light	A green power indicator LED. When illuminated, AC power is applied to the topside.
Link Indicator Light	A green indicator LED. The Link LED Illuminates continuously as the 3400 Topside establishes a reliable communications link with the sub-bottom sonar. It flashes when a reliable communications link with sonar is established.
Tx Indicator Light	The blue LED lights up during startup to show system initialization, then shuts off. Once the system begins pinging, the LED blinks continuously.
Data Indicator Light	A Tri-Color Data indicator LED. The LED is green when the data is good. If the signal degrades, it will turn to yellow and then red, showing data loss.

2.2 Performing Sub Bottom Pre-Deployment Checks

EdgeTech suggests checking for diagnostic warnings and then performing pre-deployment checks. Both checks should be performed before the tow vehicle is deployed and after the system is activated.

Discover Diagnostic Warnings:

Discover provides default popup diagnostic warnings if certain failures occur when the system, sonar, or subsystems are turned on or off. These will appear in Diagnostic Information popup windows.

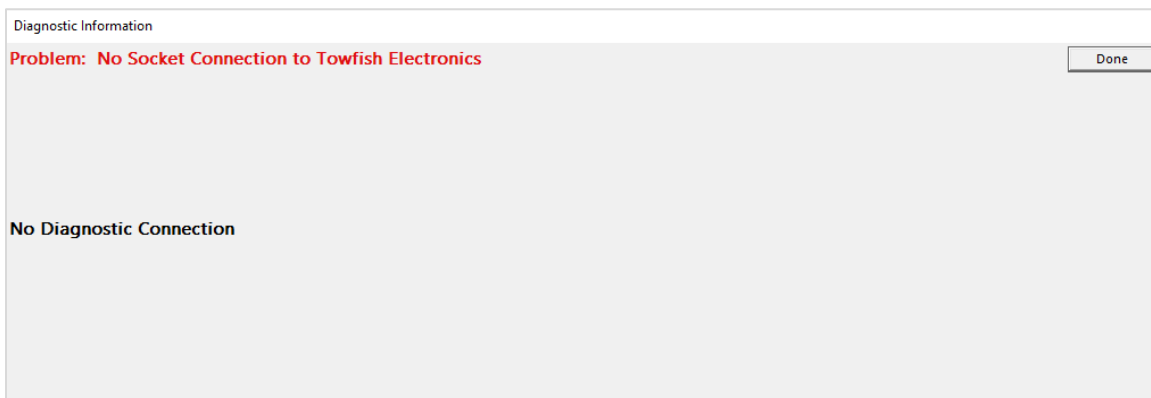


Figure 2-2: Example Diagnostic Warning- No Towfish Connected

The Discover Radio Indicator Tabs in the Lower Control Panel on the lower right side of the Discover UI displays the current status and warnings of the 3400 system. Detailed descriptions of status messages are found in the Radio Indicator section of the [3400 SOFTWARE MANUAL](#).

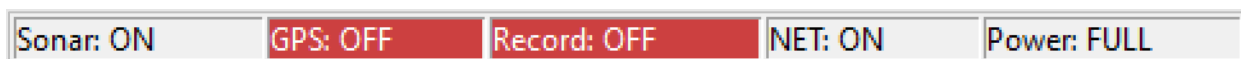


Figure 2-3 Radio Indicator Tab

Pre-Deployment checks involve:

1. Listening for the transmitted pulses from the transducers on the tow vehicle
2. Tapping gently with a screwdriver handle or hand near the PVDF panel while observing the Sub-Bottom Displays in the Discover Application Window, ensuring it plays back and navigation is present. The Discover 3400 Application Windows is shown in the figure below, and the tap test results are displayed in [FIGURE 4-9](#).

NOTE: See the [DISCOVER 3400 SOFTWARE MANUAL](#) for detailed software information.

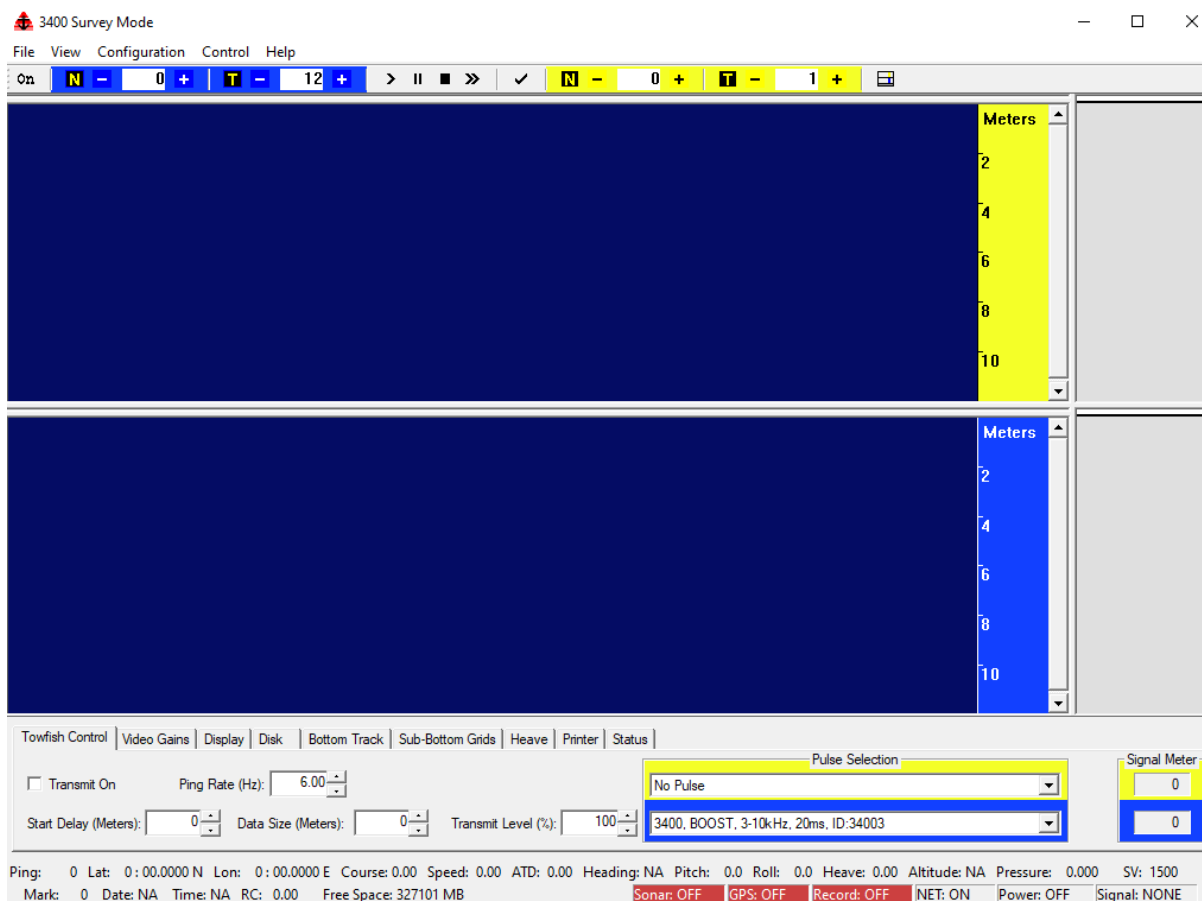


Figure 2-4: Discover 3400 Application Window

To perform the pre-deployment checks:

1. Follow the instructions in the **ACTIVATING THE SYSTEM** section of this manual.
2. Run a Tap Test – Navigate to the Towfish Control Tab, shown in **FIGURE 2-5**.

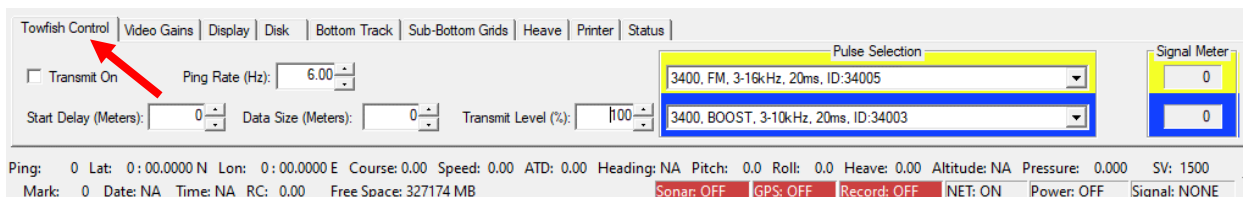


Figure 2-5: The Towfish Control Tab

3. In the Sub-Bottom Control Tab, select a Transmit Pulse using the “Pulse” dropdown. Set “Transmit Level (%)” to “100”. Select the “Transmit On” checkbox. Verify that you can hear the system transmitting. The transducers should begin transmitting (at 100%) and receive data should start scrolling on the Waterfall Display in Discover Sub-Bottom, from right to left.

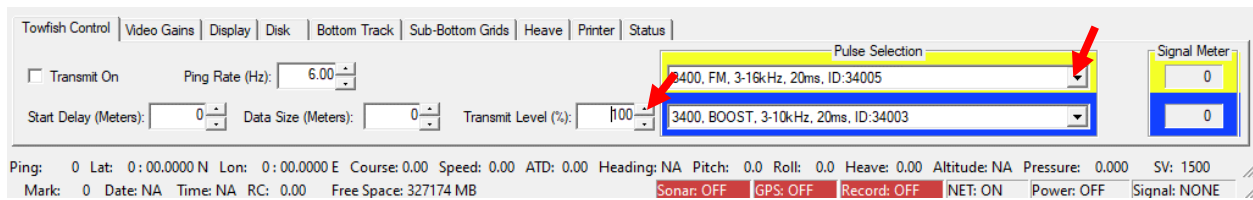


Figure 2-6: Towfish Control Tab-Pulse and Transmit Level Called Out

4. In the Towfish Control Tab, select a Transmit Pulse using the “Pulse” dropdown. Set “Transmit Level (%)” to “0”. The transducers should begin transmitting (at 0%) and receive data should start scrolling on the Waterfall Display in Discover Sub-Bottom, from right to left.
5. In the Discover Window Shortcut Toolbar, set gain to either 0 or -3 dB, and then click the Normalize Gain (N) Button.



Figure 2-7: Discover Shortcut Toolbar- Range Text Field and Normalize Gain Button Called Out

6. Tap the tow vehicle's underside near the PVDF receiver with a screwdriver handle while observing the Sub-Bottom Waterfall Display in Discover. Streaks or noise spikes should be visible in the Sub-Bottom Display, as shown in **FIGURE 2-8**. This verifies the receive channel is operating.

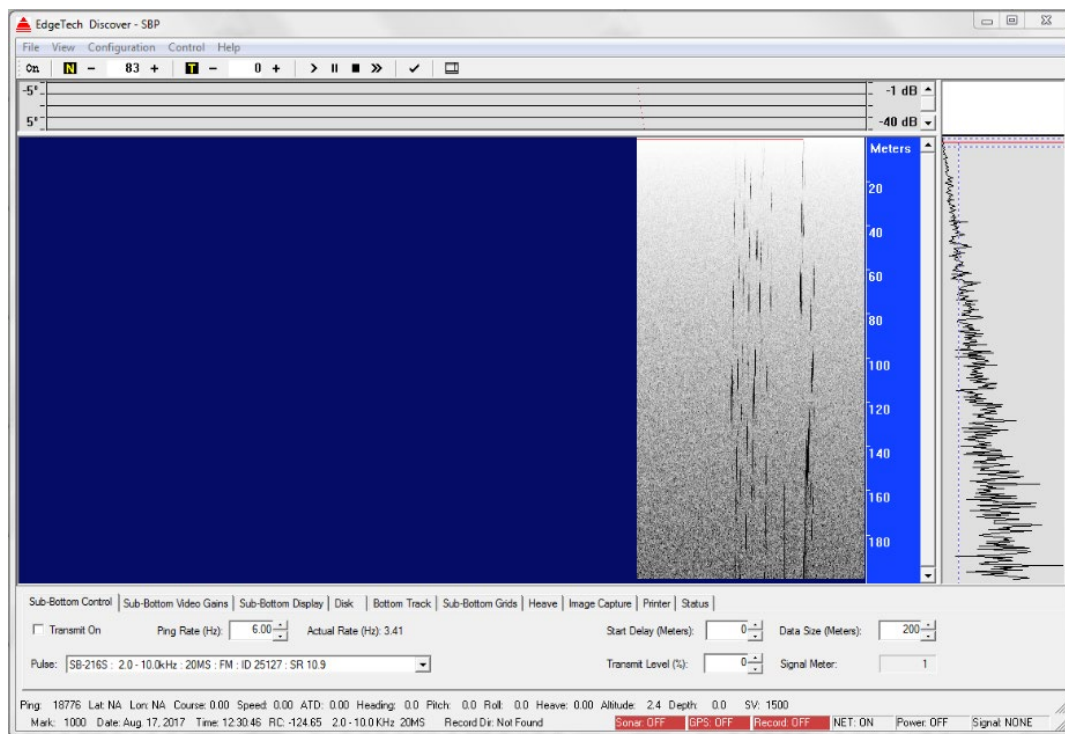


Figure 2-8: Tap Test Results

7. Test that the vehicle's compass works correctly by moving the towfish and checking that the pitch and roll are reported correctly in the Main Status Line Display in Discover.
 - Verify that the starboard roll is correct by rotating the fish's tow arm towards its starboard direction around 20 degrees. The Roll value should be positive in this direction and reach a max of +180 degrees.
 - Verify that the port roll is correct by rotating the fish's tow arm towards its port direction around 20 degrees. The Roll value should be negative in this direction and reach a max of - 180 degrees.
 - Verify that the pitch is working correctly by lifting the nose of the fish. The pitch value should read positive and reach a max of +90 degrees.
 - Verify that the pitch is working correctly by lifting the vehicle's tail. The pitch value should read negative and reach a max of -90 degrees.

3.0 DEPLOYMENT

Points to be considered for the deployment of 3400 Vehicles:

- Location of the propeller of the vessel. It may be better to deploy from the side of the boat in shallow water.
- Expected turning direction during deployment. When deploying a towed variant from the side of the boat turns should be made so the vehicle swings away from the propeller.
- Bending the cable with a radius less than 5 inches may cause damage to the cable. Do not bend the tow cable sharply.

Deployment:

1. Depending on the situation and conditions, the vessel should be underway at a slow speed (0-2 knots) or stopped in neutral.
8. Slowly and carefully lower the towfish to a safe depth-just below the propeller wash (2-3 meters, depending on water depth). Do not strike the towfish against the side of the vessel.
9. Normalize the gain in Discover by clicking the N icon button and observe the data. Adjust TVG manually as needed to have a uniform display color.



Figure 3-1: Shortcut Toolbar Normalize Gain and Normalize TVD Buttons

10. Observe and track the first bottom return.
11. Once you are sure that you have detected the seafloor, carefully lower the towfish to the desired depth (about 5m from the seafloor is ideal).

CAUTION! Do not strike the seafloor. This may foul or damage the vehicle.

12. Check that Discover is still tracking the bottom, and adjust the tracking parameters.
13. Increase the boat speed to the desired survey speed (normally between 3-5 knots) and re-adjust the amount of cable out so that the altitude of the towfish is correct.
14. In Discover's Disk Tab, name the file in the file record textbox, and choose the desired path for the file.

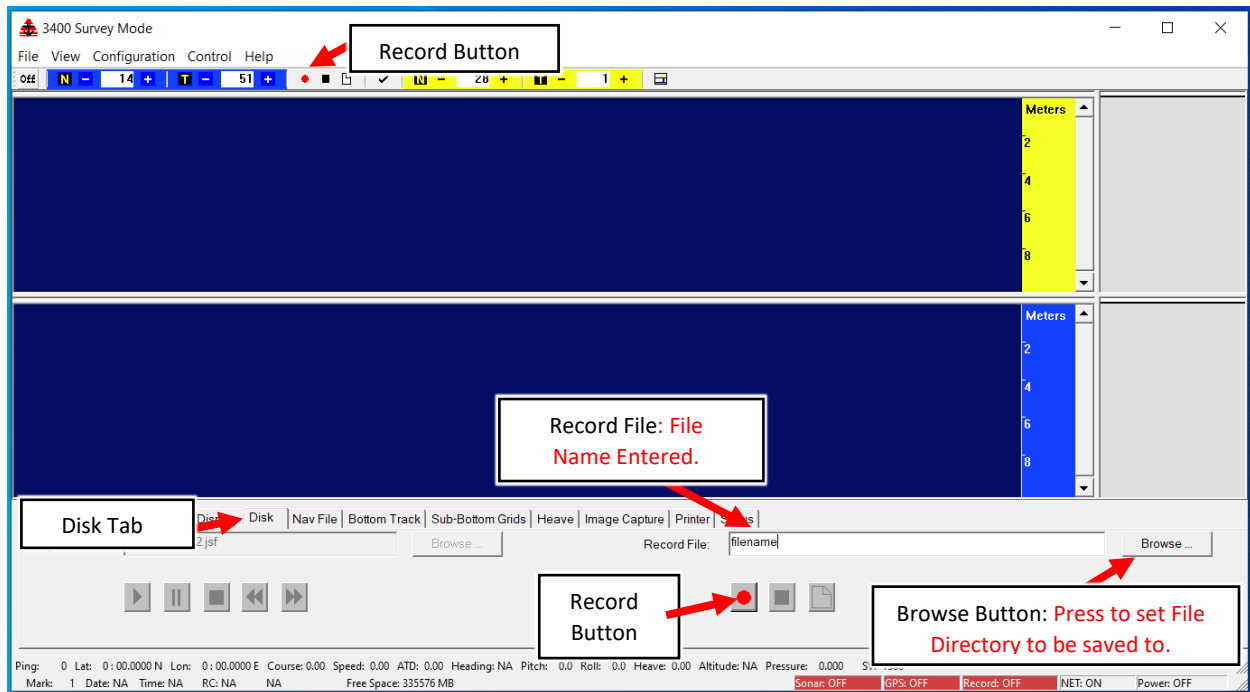


Figure 3-2: Discover UI-Disk Tab Recording Controls

15. Start recording by clicking the Red Dot Recording button in the shortcut icon bar or Disk Tab Recording Controls.

4.0 QUICKSTART GUIDE CHECKLIST

Power	
1. Ensuring power switches are off, connect the power cables to all components and power source for AC or DC	<input type="checkbox"/>
Internet and GPS	
2. Connect Ethernet cable to topside and laptop	<input type="checkbox"/>
3. If using a wireless connection, enable wireless connection	<input type="checkbox"/>
4. Connect GPS to Port A or B of topside or the laptop's COM Port	<input type="checkbox"/>
Topside to Tow Fish	
5. Connect Tow Cable to Towfish	<input type="checkbox"/>
6. Connect Tow Cable to Topside	<input type="checkbox"/>
7. If using an amplifier:	
a. Connect tow cable to the amplifier	<input type="checkbox"/>
b. Ensure amplifier and topside connected with amplifier interface cable	<input type="checkbox"/>
8. Secure shackle to cable grip and seize shackle with wire or zip tie	<input type="checkbox"/>
Laptop	
9. Turn on the laptop and start the Discover software	<input type="checkbox"/>
Power	
10. Turn on Topside power	<input type="checkbox"/>
11. Observe indicator lights on the 3400 topside's front panels and Discover displays. Watch for the NET indicator in Discover to change from OFF To ON in Discover	<input type="checkbox"/>
Pre-deployment Test	
12. Perform pre-deployment rub test	<input type="checkbox"/>
Finalize	
13. Deploy Towfish and start recording	<input type="checkbox"/>