

Smart Tether

Operating Guide

Introduction

The Smart Tether is a revolutionary ROV navigation technology in which all of the sensing elements are housed in the tether itself. This makes setup very quick and straightforward, and a new user can easily be up and running in a matter of minutes.

It is recommended that a new user read through the Connections, Shutting Down, and Basic Software Operation sections before attempting a mission. With that small amount of information you should be able to get the Smart Tether running and get comfortable with its operation. Once you are fluent with operating the Smart Tether, read on to the Advanced Software Features section to learn about the further capabilities of the Smart Tether.

With a small bit of training and only minor modification to your ROV piloting technique, the Smart Tether is a powerful navigation and positioning tool which can add great value to your complete ROV system.

Connections

1. Arrange the ultra-mobile PC (UMPC) as shown below. There is a folding stand in the back of the UMPC which allows it to rest directly under the VideoRay Integrated Control Box (ICB) screen. The power supply can be connected to the outlet in the ICB storage well.
2. Boot up the UMPC by sliding the power switch on the lower left side downward. Continue with other steps while it is booting. The Smart Tether program will automatically open.
3. Connect the male 8-pin connector whip from the Smart Tether Control Box to the female 8-pin connector whip from the ICB (remove the ICB whip from the cable clamp if necessary).



4. Connect the Smart Tether male 12-pin connector to the female 12-pin connector on the Smart Tether Control Box.



5. Connect the USB cable from the Smart Tether Control Box to the available USB port on top of the UMPC.



6. Pull the USB GPS receiver out of the ICB and place it near where the tether enters the water, using the USB extension cords if necessary. Connect the USB cable to the port on the right of the UMPC if not already connected.

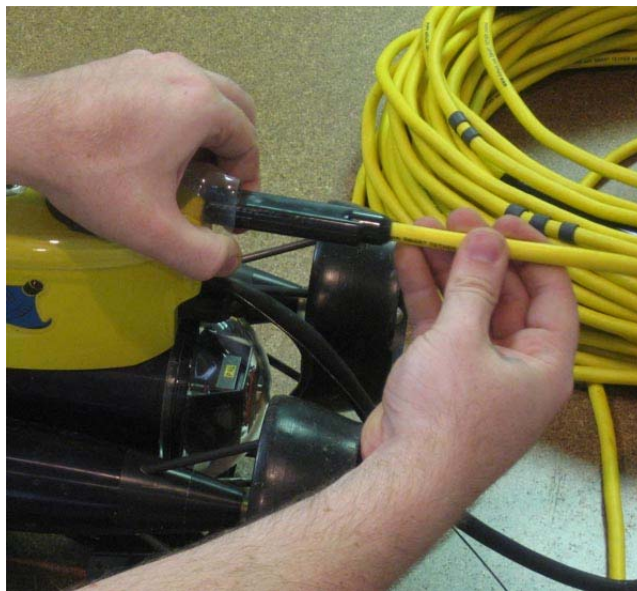
Tip: the GPS receiver has a magnetic base in the event a magnetic structure is available to place it on.



7. Connect the VideoRay ROV 8-pin male connector whip to the Smart Tether 8-pin female connector.



8. Install the terminating Smart Tether sensor node into the clear float block cap by gently pulling the bottom edges of the cap apart and sliding the node in from the rear.



9. Ensure all connectors are fully inserted and locking collars are secure.
10. Turn on the ICB power switch. LEDs on Smart Tether Control Box and Smart Tether Nodes illuminate to indicate Smart Tether system is powered.

Tip: If Smart Tether Control Box LED is not illuminated, turn off ICB power switch, check (disconnect and reconnect) all connections and power supply to the ICB, and try again.



Notes:

- *ALWAYS secure all connections BEFORE turning on ICB power switch.*
 - *ALWAYS turn off ICB power switch BEFORE loosening or disconnecting any connectors.*
- Failure to follow the above procedures may result in damage to the VideoRay or Smart Tether.*

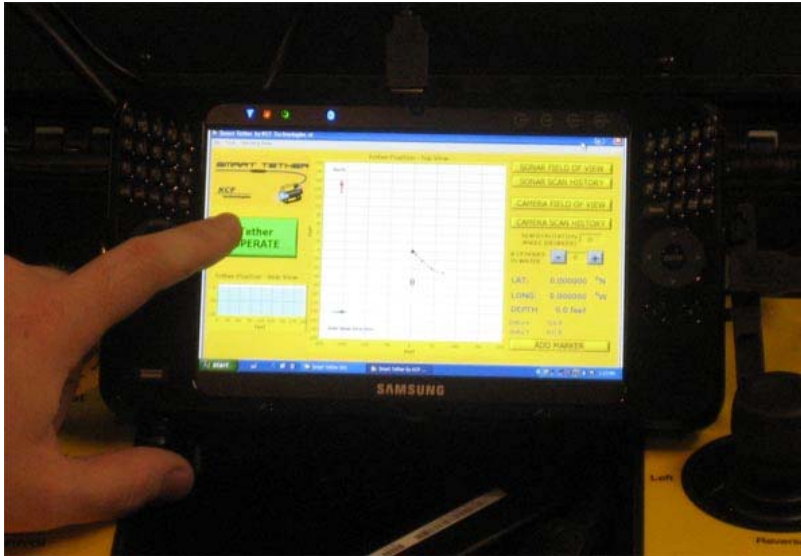
Shutting Down

All connections to the UMPC can be left in place with the exception of the USB cable to the Smart Tether Control box.

1. Press the red “Tether Stop” button in the Smart Tether Software.
2. Turn off the VideoRay and Smart Tether via the on/off switch on the ICB.
3. Shut down the UMPC.
4. Remove the USB cable from the top port, leaving the USB cable attached to the Smart Tether Control Box.
5. Fold the stand into the back of the UMPC and cover the UMPC with the black cloth sleeve.
6. Place the UMPC over the ICB’s small green LCD screen. Shut the ICB lid slowly to make sure the UMPC and wires are not pinched.

Basic Software Operation

1. Open the Smart Tether executable program (by default it will open when the UMPC is turned on)
2. To begin navigating, press the green “Tether Operate” button (always make sure the tether and ROV are turned on before Operating).

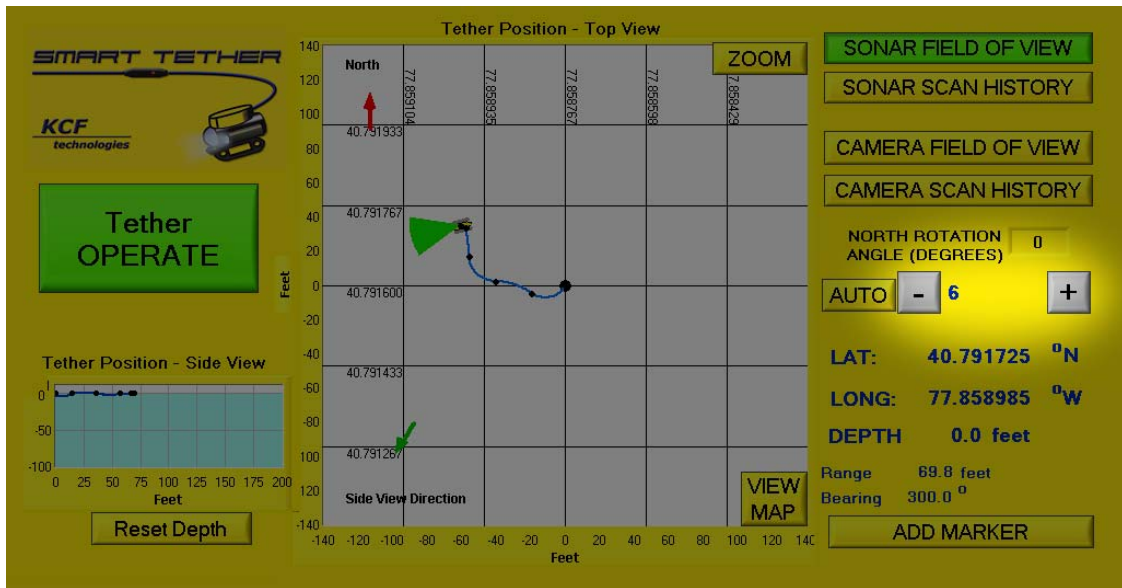


3. As the tether is tended and nodes enter or exit the water, adjust the tether length by pressing the gray “+” and “-” buttons to maintain the correct number of nodes in the water.

Tip: The tether nodes are marked with bands indicating their number, i.e. the number of nodes in the water, to help with this operation. Each narrow band (■) represents 1, each wide band (■■■) represents 5. For example if the last node to enter the water is marked ■■■ ■, it indicates that 6 (5+1) nodes are being used.

Tip: Using extra tether: If the 6th and final node is in the water but more tether is still needed, you can increment the Smart Tether software in 10-foot increments as you add more tether. The tether is marked every 10 feet with a band similar to the tether node numbers. Each narrow band (■) represents 10 feet, each wide band (■■■) represents 50 feet.

Tip: Using the minimum amount of tether necessary to complete your mission helps to maximize the accuracy of the Smart Tether. Accuracy will be negatively affected by having large amounts of slack, unnecessary tether in the water. A person tending the tether and informing the operator of how many tether nodes are in the water is most helpful.

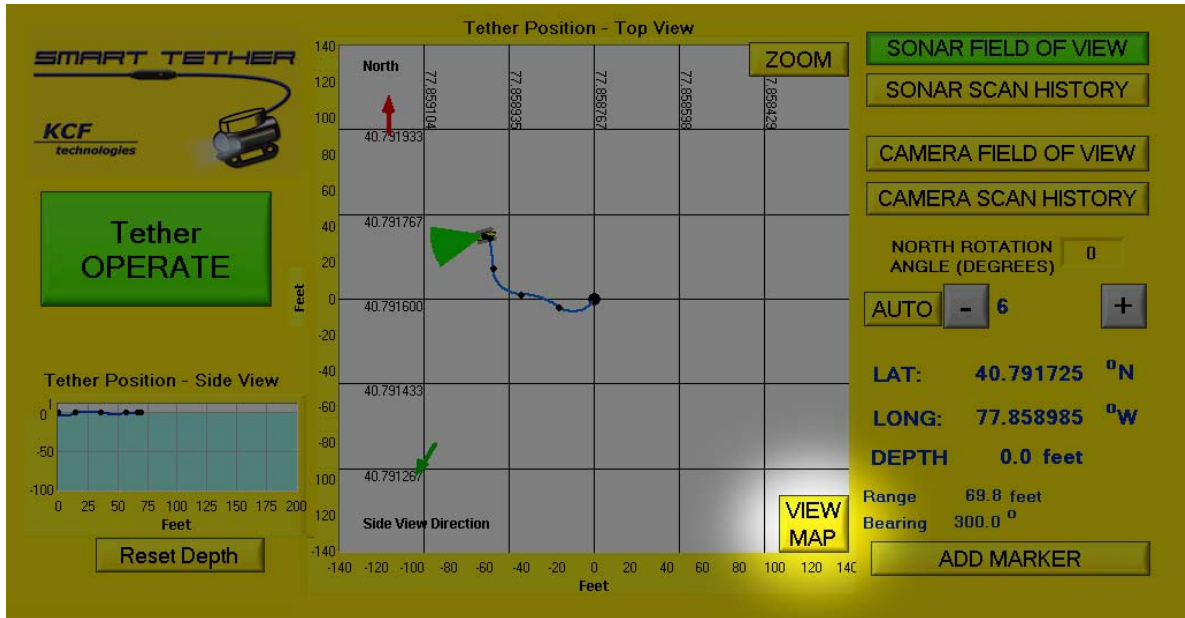


4. To end the operation, press the red “Tether Stop” button. You will be prompted to either continue your previous scan, which will retain the scan history display and continue writing to the same data file, or begin a new scan, which starts a fresh data file and scan history.
5. To resume operation, press the green “Tether Operate” button.

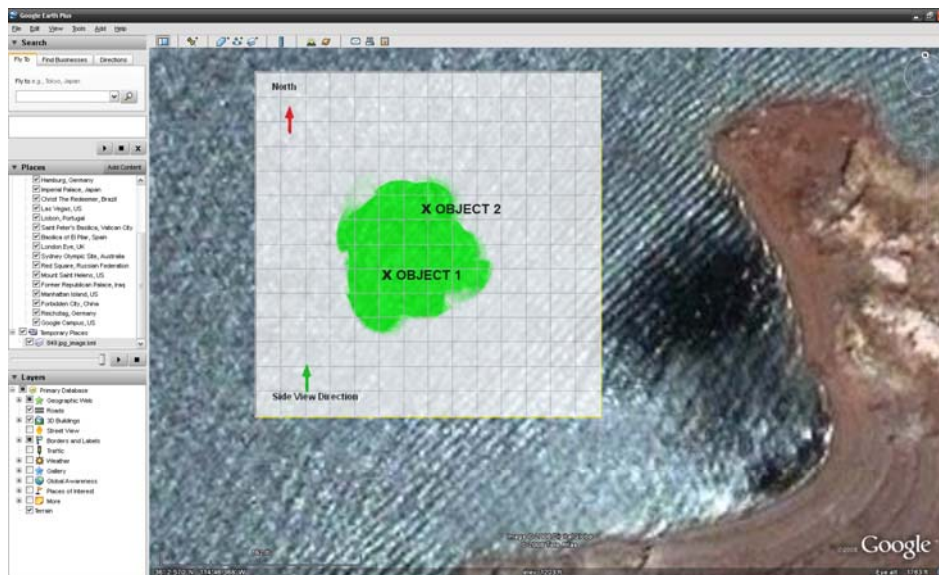
Google Earth

The Smart Tether can view your scan history and markers in Google Earth, giving you a simple way to check your location relative to real landmarks. Using this feature is simple.

1. At any time you would like to view your markers and scan history in Google Earth, click the “View Map” button in the bottom right corner of the tether top view plot.



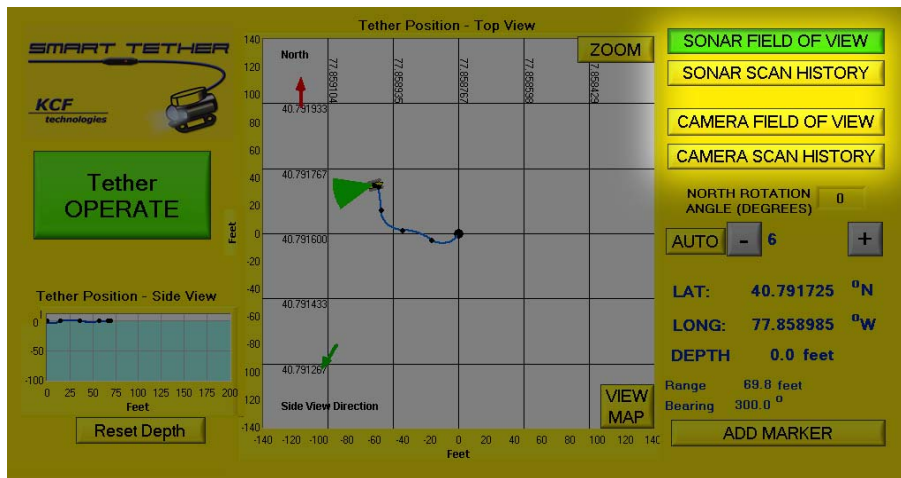
2. At the prompt, select whether you would like to view the Visual scan history (area covered by the VideoRay camera so far) or SONAR scan history (area covered by an optional BlueView SONAR). Google Earth will automatically launch if it is not already open, and auto-zoom to your location for easy viewing of your scan.



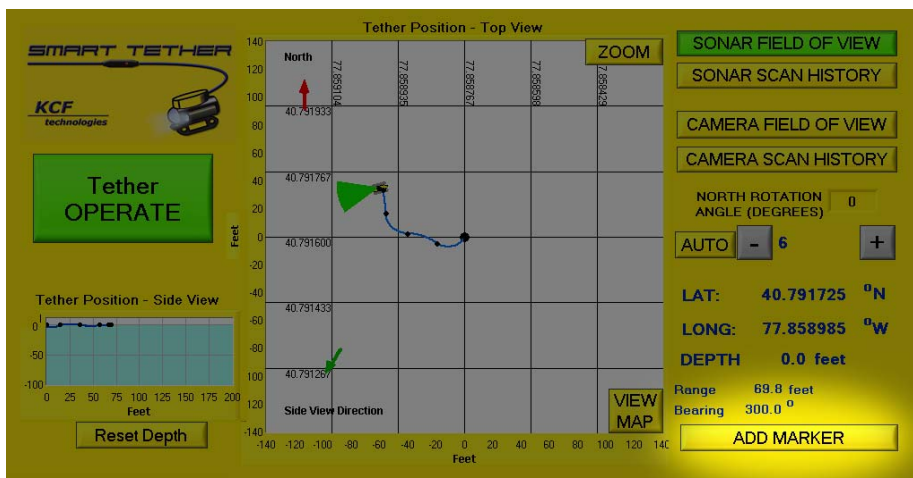
Advanced Software Features

1. Scan Tools

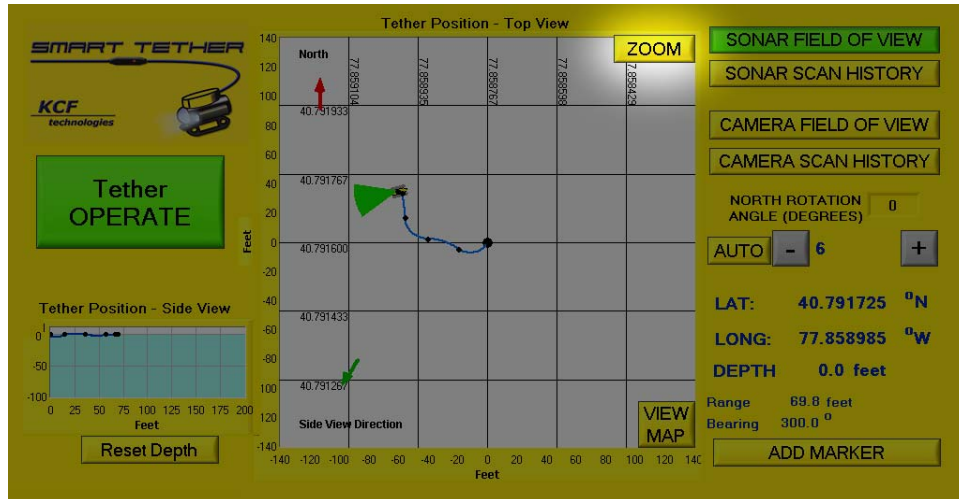
- a. Field of View: The Camera and SONAR Field of View buttons show you the current field of view of the VideoRay. This can also make it slightly easier to see the heading of the VideoRay.
- b. Scan History: The Camera and SONAR Scan History buttons show you all the area that has been covered by either device during the current scan. This can be helpful in ensuring you have covered an entire scan area. The scan history colored area gets darker the longer you remain in an area, i.e. an area that is lightly color may have only been briefly scanned, while a darkly-colored area means the ROV has hovered there for a longer time.



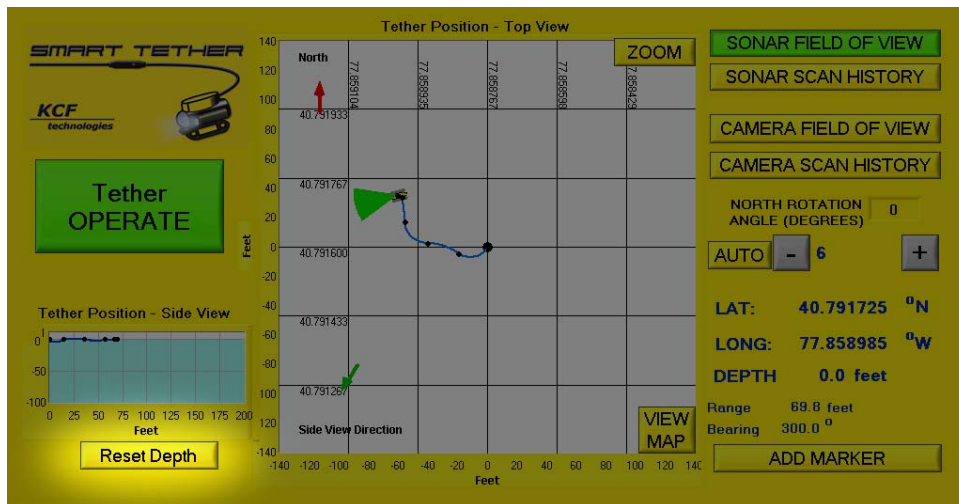
2. Markers: adding markers or waypoints to the screen can be very helpful in navigating. At any time, simply press the "Add Marker" button at the bottom right of the screen. A new window will pop up where you can enter marker data. To mark the current ROV location, simply type a title for the marker and click Enter. To mark a different location, e.g. a known GPS point you'd like to navigate to, type in the title and the coordinates in latitude and longitude and the marker will be placed at the location you select.



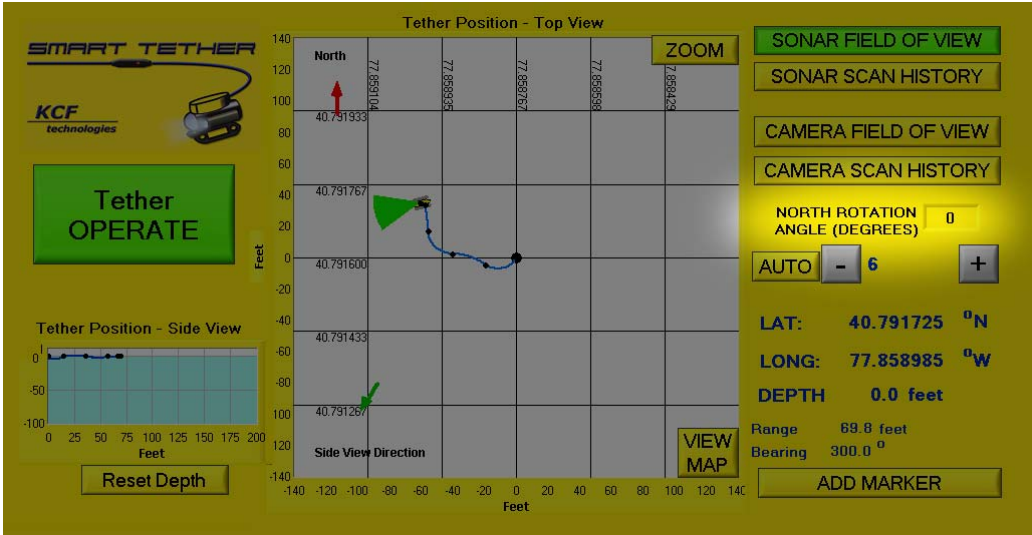
- Zoom: Press the Zoom button at the top right of the tether plot to change the zoom level. Options are 2x, 1x, 1/2x, and 1/4x. The standard (1x) has a 140-foot span, ensuring the entire Smart Tether can always be viewed. For short-distance operations, the 2x zoom level may be more appropriate, and the 1/2x and 1/4x zoom out levels may be useful when operating from a boat or other moving point where larger areas are being examined.



- Depth Reset: In the event the Smart Tether pressure sensors experience drift, the depth measurement may get slightly out of calibration. If this happens, remove the entire tether from the water and press the “Reset Depth” button, and click yes. It is a good idea to press Operate before putting the tether in the water to check that the depth is zero.



- North Rotation Angle: Sometimes if the UMPC is not facing North, it may be more intuitive for some users to rotate the tether plot so that “up” on the screen corresponds to the general direction the ROV is being driven, for instance perpendicular to a pier. To do this, simply type in the compass direction you want to face up on the screen (e.g. 0 = North, 90 = East, etc.), and press Enter. The scan will restart with the new screen orientation.



Software Troubleshooting

If the tether experiences communications problems and begins to give error messages, the following troubleshooting procedures should rectify the problem.

1. Press “Tether Stop” in the Smart Tether software.
2. Close the Smart Tether Software.
3. Turn off the ICB.
4. Check all connections: Control Box whip to ICB whip, Tether to Control Box, Tether to ROV, and Control Box USB to UMPC.
5. Turn the ICB back on and wait 5 seconds. Retry software operation.
6. If the above steps do not solve the problem, shut down and restart the UMPC and ICB before trying again.