1 - Tether System Overview

Written By: REA

INTRODUCTION

The tether system connects the control box, which is on the surface, to the ROV, which will venture underwater.

The tether should have two wires for each motor; one carrying power to the motor and one carrying it back to complete the circuit.

Since the Development Class has three switches controlling three motors, the tether providing power to the motors will have six wires. Your tether may include other wires, cords and cables as well.

If a camera is used on your ROV, there will be an additional camera cable in the tether. The camera cable will have two wires to provide power to the camera, and additional wires for the data (video signal) coming from the camera. The camera wires are usually all wrapped into one cable. If you are building a hydraulic or pneumatic manipulator, the airline tubing will be part of the tether.

Other systems, lights and sensors, may require additional cables as well. Remember, although it may be nice to have lots of systems on the ROV, each system needs wires or lines, and each wire adds thickness and mass to your tether. If there are too many systems on a small ROV, the motors may not be able to push the big thick tether through the water.

If you do have two or more lines running through the tether, it may be ideal to wrap your tether in a sheathing. The Development Class kit does not come with this sheathing (it really isn't needed since the Development Class only has one cable with six motor wires). The Tether presentation shows how to wrap your tether in sheathing. Remember! Wrap your tether BEFORE making the soldering connections on either end.

Length of the Tether

Why don't we build our small, 12-volt ROVs with 32 meters of tether so we can explore in a greater area? Why not 150 meters of tether?

Longer tethers have issues. It takes a little bit of voltage to push electricity through every bit of wire you have. As you increase the length of

wire, you decrease the amount of voltage that you are getting at your motor. This is called voltage drop. Since electricity must run through a

circuit (from the battery to the motor and back to the battery) every 300 mm you increase your tether length, the electricity now has to travel

0.62 meters (2 feet) more in distance through the circuit. All that distance can add up. As your motor sees less voltage, it won't turn as fast.

That means you have a lot less thrust. At 8 meters of tether, the motors work well and provide plenty of thrust. At 10 meters, they still work

well, but don’t provide quite as much thrust. At 13 meters to 16 meters you will really notice the drop-in motor thrust. At 33 meters of tether,

your motors will likely not provide enough thrust to move your vehicle through the water. There are many online tools to calculate voltage

drop. Think about some of the things that could be done to increase the voltage at the bottom end of the tether.

