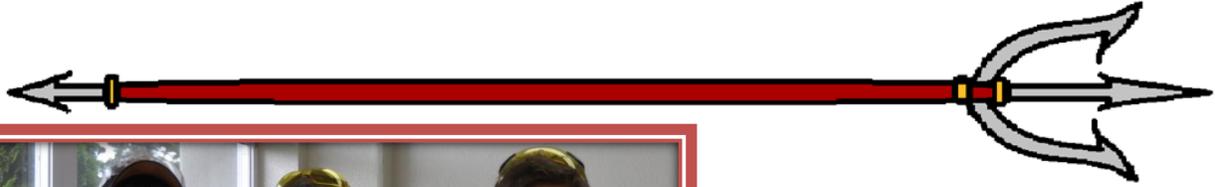


# TYPHOON INDUSTRIES



**Azalea, Oregon USA  
97410**

**Thomas Close**

**Joseph Reid**

**Samuel Close**

**William Close**

**Team Captain**

**Pilot**

**Manipulator Operator**

**Tether Operator**

Age: 15

Age: 15

Age: 13

Age: 10

Company CEO

Trouble Shooting

Company CFO

Field operations assistant

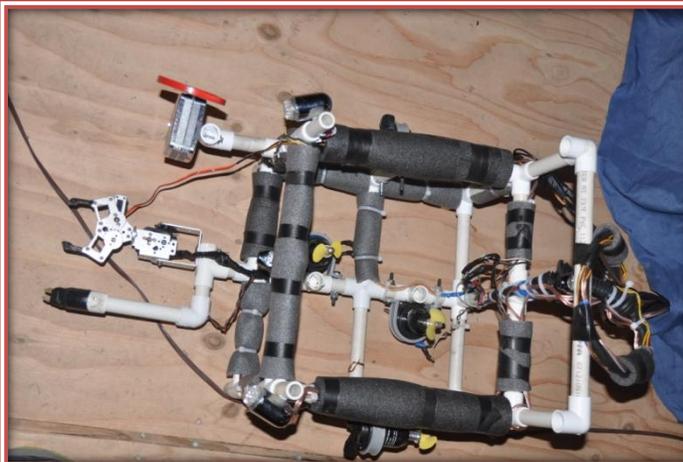
Wiring specialist

Mechanical Engineer

Construction Specialist

Safety Professional

**Featuring the Tempest marc2**



*Tempest Marc3, photo by Sam Close*

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## Team and Robot Safety features

- Conductivity Meter

Is equipped with one twelve volt three amp fast blow fuse to provide maximum safety for testing and in - real time in field testing

- Control Box

Typhoon industries control box system is equipped with an ergonomic in-line fuse, to provide a "failsafe" system for power safety in our control box.

- Motors

The Tempest's motors are equipped with dual high-speed props that pose a potential "blunt force" safety issue.

We combat this issue by employing safety shrouds around motor housing to provide a minimum amount of thrust reduction, and a maximum of safety awareness.

- Systems Power

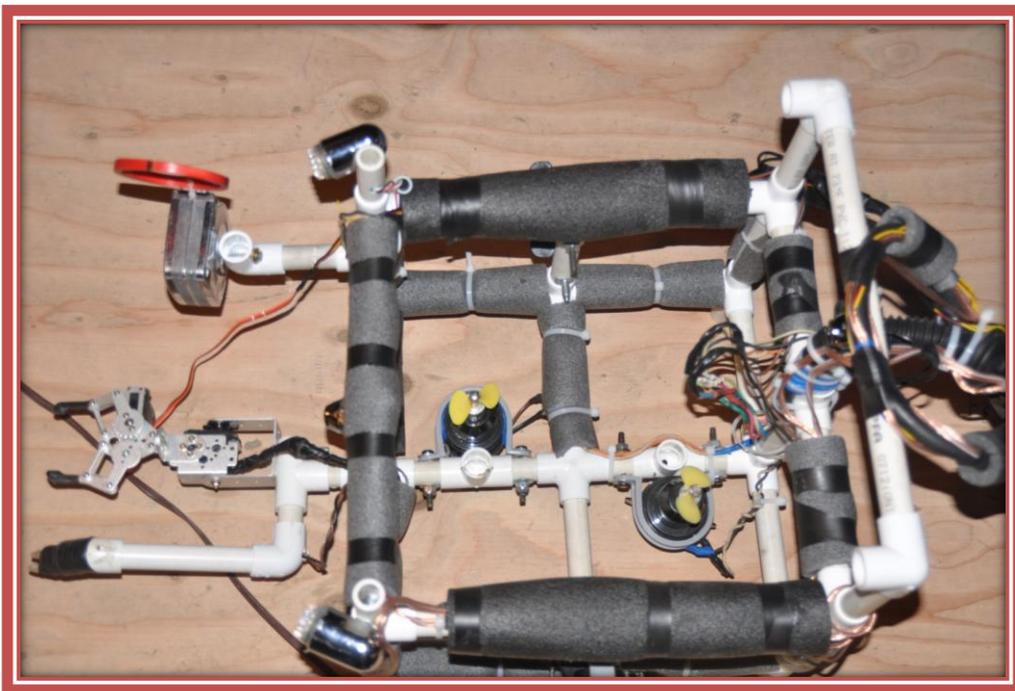
After first running through a 12 volt, 25 amp fuse in the positive line of our company power source, the Tempest Marc 3 has a power feed supplied through the tether, which is built into our control box protected by a 12 volt, 25 amp fast-blow fuse.

## A preview of the Tempest Marc 2

As a Team, Typhoon Industries prides itself on providing our clients effective and low cost solutions to various underwater tasks. Whether the project involves sampling, collecting data, or repairing underwater apparatus, our company is capable of accomplishing the task.

This year we have designed a new type of a Class 3 ROV: The Tempest Marc #2. Equipped with:

- Real-time video relay
- An electrical conductance probe (ECP)
  - SONAR (mock-up)
- Twin LED heads-up lights
- A dual axis robotic arm with "gripper"
- Four custom 3.5 Amp direct-drive motors



The Tempest Marc3, Photo by Sam Close

## Costs of the Tempest Marc3

- Frame: Donated
  - Tether: Reused
  - Motors: Donated
  - Cameras:\$30:00
  - Gripper:\$60:00
  - Miscellanies:\$484:00
- 

**Total Cost:\$717.11**



**Typhoon Industries at Galesville Reservoir, on-site. Photo by: Amanda Close**

## **Company Evaluation:**

### **How would you characterize your company's overall success?**

Being able to come together as a team, and effectively create what we think is our MOST successful ROV yet.

### **What do you consider strengths of your company and the ROV you designed?**

"Having everyone able to do their job with the maximum amount of efficiency through collaborative teamwork. This year our focus was on designing a small, compact frame that we can easily maneuver and multiple cameras and robotic arm to quickly identify and obtain specimens."

-Sam Close

### **What areas do you see needing improvement?**

Our customers are constantly requesting more challenging tasks. We anticipate improvements our robotic arm, that include the use of pneumatics.

### **What was the most rewarding part of this experience?**

"Being able to collaborate as a group, and make a effective ROV."

-William Close

### **What would you do differently next time?**

Utilize project management tool such as Gantt charts, so that we may better prioritize our time and efforts. We believe more front end planning will insure all team members are involved and contributing as early as possible in the process.

**What does your team do to solve issues as they appear?**

As a team we have face many issues, and had to overcome them as quickly and as effectively as possible. we use an trouble shooting system to assesses the issue and solve it as effectively as possible.

Here is our "Trouble Shooting" system:

What is the issue?

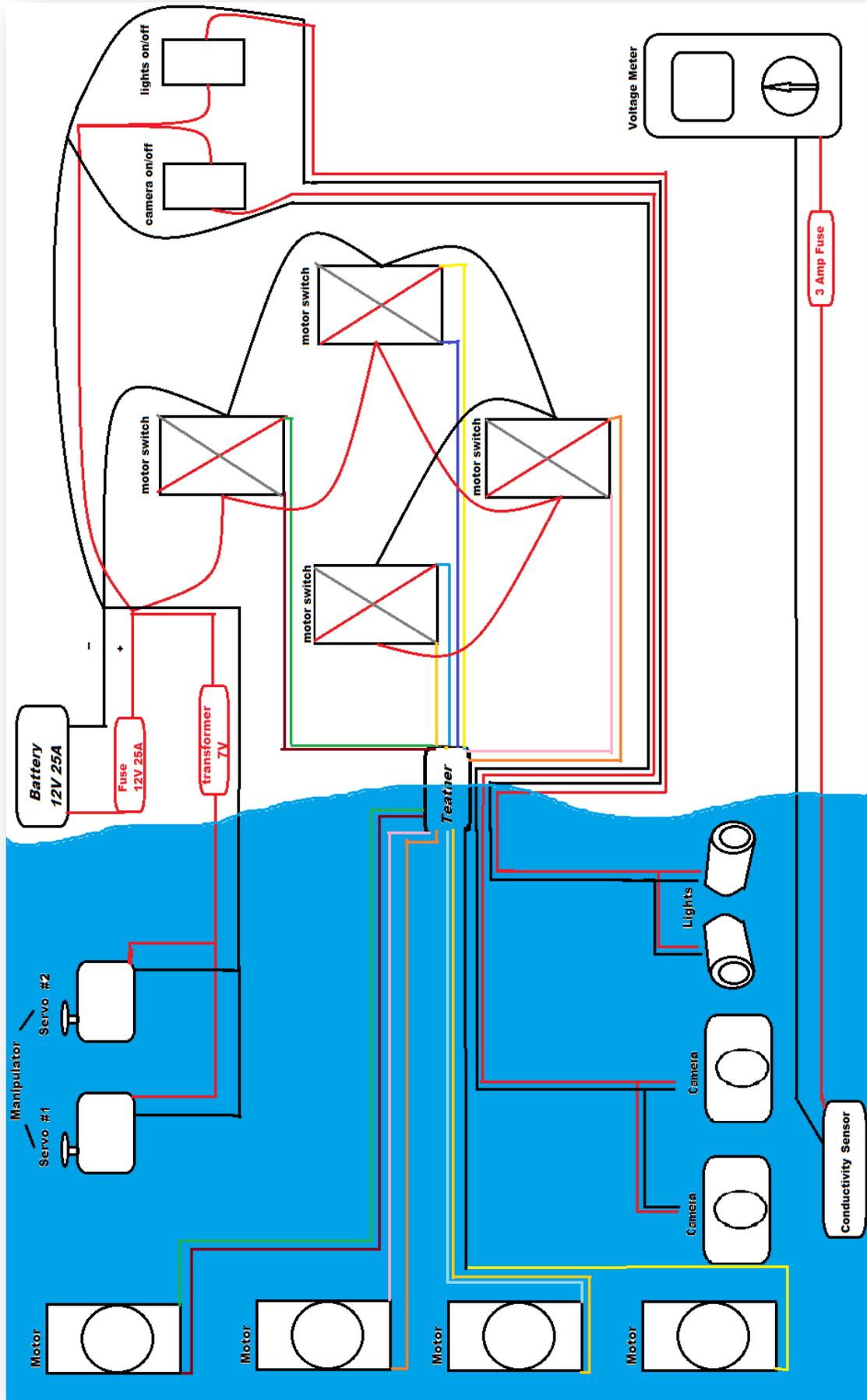
What caused the issue?

Can it be fixed?

Issue fixable Yes/No-----issue fixed.

Is replacement necessary? Yes/No-----  
issue solved.

Does the solution work? Yes/No-----repeat steps.



## **Tempest Marc #2 Design Rational**

### **Frame:**

Made of schedule 40 one-half inch (1/2") PVC, and is designed for maximum maneuverability and functionality.

### **Motors:**

Four custom 3.5 Amp direct-drive motors with high speed propeller, capable of propelling the Tempest at a rate of about one-half a knot per hour (0.26 m/sec).

### **Camera:**

140 degrees of wide-angle view, while being strategically placed to allow maximum visibility and depth perception.

### **Manipulator:**

Specialized manipulator arm, using our tough-grip grasping system: utilizing two servomotors, the operator can maneuver the manipulator arm horizontally or vertically.

### **Head Lights:**

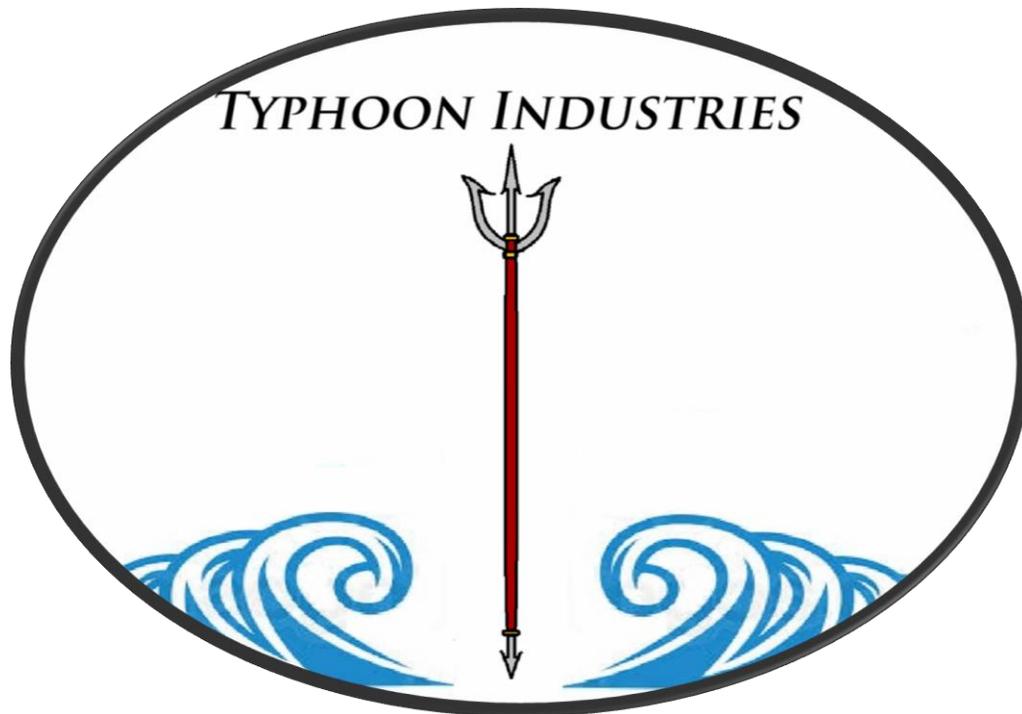
Twin LED heads-up display system, capable of illuminating our field of vision under most light conditions.

### **Sensor:**

Electrical conductance probe (ECP) attached to its frame, allowing the probe to test the electrical conductivity of sinkholes and groundwater.

### **ARMU:**

Equipped with an automatic recoil measurement unit (A.R.M.U.) payload tool, to allow measurements of exact distances of given objects.



## **About Us**

Typhoon Industries is based in Azalea Oregon, USA. We are a small business that specializes in the custom design and engineering of remotely operated vehicles(ROV'S)

## **Our mission**

To understand the varying needs of our customers so that we can develop "Right Sized" working solutions that are affordable, easy to maintain, simple to transport, and constructed from readily available materials.



**Thomas Close**

***Team Captain***

Age: 15

Company CEO

Wiring specialist

Safety

Professional



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***Pilot***

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Trouble Shooting

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Operator***

Age: 13

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Construction  
Specialist



**William Close**

***Tether operator***

Age: 10

Field Operations  
Assistant

# Special Thanks

We would like to thank all of our awesome benefactors for their support, Mentors for their patience and advice, and to give credit where it's due.

**Rhys Hamlet**, for his support and advice.

**Mark Close**, for his mentorship, and transportation capabilities.

**Amanda Close**, for all around support and mentorship.

**Jacqui Reid**, for always being there with support and advice.

**Steven Thone**, with Homebuilt ROV's.

Our Awesome Cow Creek Community for helping to get us here.

And of course, **The Mate Center**, for giving us this opportunity to participate in the competition.

## Research Sources:

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- Mate: <http://www.marinetech.org/rov-competition-2/>
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## Photo Sources:

- Sam and Amanda Close