Proof of Concept Test Demo Sheet

**TEAM NAME: Test Date & Time:**

**Test # and Name (from PoC plan) Test Type:**

1. **Purpose of Test and How it Relates to Project (Brief, concise, but complete, description):**

Functionality Demonstrated: Safely merge current from two 14.8V, 100A Lithium Ion Polymer batteries while maintaining a maximum current flow of 200A without current back feeding into either battery.

Relation to Overall System: The merge circuit is the external power source’s point of entry to all systems in CU RoboSub. It is responsible for allowing two Lithium Ion Polymer batteries (LIPos) to safely operate in parallel. If this circuit does not work the system will not be able to draw the required current for normal operations of all systems. If the circuit is flawed or thermal damage causes a short between the two batteries, there is a significant potential for the LIPos to fail catastrophically resulting in the batteries being rendered inoperable or causing them to catch fire.

Safety Considerations: Lithium Ion Polymer batteries are extremely hazardous if handled improperly. If they are overcharged to an output voltage greater than or equal to 16.8V, or depleted to an output voltage of less than or equal to 12V, it becomes very probable that the batteries will become unstable and catch fire. The resulting chemical fire CANNOT be extinguished by normal means. The batteries must be quickly placed in a bucket of water and sealed. More information can be found in the attached Material Safety Data Sheet.

To address the safety issues concerning Lithium Ion Polymer batteries, a 5 gallon bucket, mostly filled with water, will be present during all tests involving the use of the batteries. Should a battery start to smolder or catch fire, it will immediately be placed into the bucket and a lid will be affixed.

1. **Test Setup, Pre-conditions, and Procedure (Brief, concise, but complete, description):**

1. Preconditions:

A. Two voltage sources set to 14.8V and 1A max current

B. Multimeter set to measure DC voltage <= 20V

C. Two 14.8V, 100A Lithium Ion Polymer batteries, >=95% full charge

D. One 1.5 ohm, 5% power resistor rated for 200 Watts

E. Power systems test board

2. Testing:

A. Attach one voltage source to each of the inputs on the merge circuit

B. Turn on voltage sources

C. Using a multimeter, measure the output voltage of the merge circuit

D. Turn off, then remove both voltage sources

E. Attach test load to the merge circuit output and ground

F. Connect one Lithium Ion Polymer battery to input 1 and one battery to input 2.

G. Using the multimeter, measure the voltage drop across the resistor

H. Disconnect both batteries and remove the power resistor

1. **Success Criteria (feasibility) / Selection Criteria (alternatives) / Design Info (gathering): (Concise, complete, quantitative):**

Voltage output is 14.8V, |err|<3V

Voltage measured across the load resistor is equal to the output of the merge circuit, |err|<.1V

1. **Instructional Team Notes:**
2. **Test outcome and what was learned (toward finalizing design):**

Teams should briefly describe what the actual PoC Test revealed, and how it will affect design decisions going forward.

The team should also explain this to instructors during the demo presentation.