

Alert Level: **IMPORTANT**

Instruments: MMP

Software Versions: All

Hardware Version: Rev D

Subject: MMP Motor Circuit

Summary: Excessive voltage is generated by the MMP motor when the drive wheel is forced at a steady-state rotation of more than 100 rpm -- but less than 200 rpm -- in “free wheel” mode. This voltage (back EMF) can damage the Zener diode protection on the MMP Interface Board and create a short to ground. This short to ground will most likely trip the battery pack fuse and protect the battery pack from excessive current drain, overheating, and possible explosion. The battery pack fuse is functioning correctly in this case.

Technical Details: Normal motor rotation is ~100 rpm and corresponds to 25 cm/sec of profiler movement. Motor rotation greater than ~200 rpm (~60 cm/sec of profiler movement) will cause the magnetic motor coupling to slip and protect the motor, circuit, and MMP electronics. Steady-state profiler speeds between 25 and 60 cm/sec with the drive wheel in contact with a taut mooring wire can generate back EMF voltage sufficient to damage the Zener diode on the MMP Interface Board. The MMP motor must be in “free wheel” mode, which is normally set during initial deployment (before profile Zero). If the profiler enters the water from high shipboard rigging (i.e. A-frame or J-frame) with no tag line to slow the descent, the MMP motor may reach the danger zone between 100 and 200 rpm and damage the Zener diode.

Potential Negative Effects: A damaged Zener diode will short the Lithium battery pack to ground, trip the pack fuse, and disable the profiler.

Action: An additional protection circuit has been designed to dissipate the energy generated by the MMP motor until the magnetic coupling slips. This circuit can be installed as a retrofit to existing Rev D electronic boards. The need for this protection circuit will be minimized by operations that limited profiler movements on a taut wire to below 25 cm/sec (~100 rpm wheel rotation).