MEMSDuino System Element Conclusions

**Rack Mount Wood Board**

The white oak we used might be better off in many cases being replaced by pine, since it’s easier to drill into. Also, it might be better to replace the 4 inch board with one that is exactly 3.5 inches to be an even 2u in the rack. The wood board is meant to be for rapid prototyping, and for any commercial product, the whole board might be replaced by a single metal panel with integrated annotation, signage, and branding.

**Custom Metal Box**

We have machined these boxes at NIST in the staff machine shop. However, this work is probably much better outsourced in almost all cases. The manufacturer of the boxes, Bud Industries, sells custom modifications of their products, and in any number greater than one or two, that is probably the most cost effective and simplest way to get these boxes made.

**3d printed parts**

These parts seem to perform well. Use of a soldering iron on a vertical rail can make it easier to put the thread inserts into the 3d printed parts. This is a very cheap and worthwhile investment which makes any 3d printer much more useful than it would be without the ability to easily place thread inserts into holes.

**5 V to 90 V boost**  
 This use of off the shelf cheap DC DC converters works. However, a single stage solution would be preferable if it could be found. Also, a stable part number from a reputable supplier would be helpful to replace the Amazon part numbers currently being used in the bill of materials.

**Arduino Shield Circuit Board**

This board is extremely useful. It could easily be repurposed for a vast number of potential product designs.

**DB 25 Relay Board**

This board works well. However, the fact that it is captive to the lid of the box after it is soldered to the DB25 board could be problematic. Also, the fact that if the board is either too close to the connector or tilted could potentially cause it to touch the lid is potentially an issue. Future versions might instead use jumper wires or a pigtail connector in some configuration that allows the wires to be disconnected from the front panel. However, this would also require adding a mount of some kind for the board. This might be done in future versions.

**Control Panel Circuit Board**

This is the human interface board. It’s design must represent both the state of the switch and the mechanism by which the switch state is changed in some simple way that is easy for a human operator to understand.

**SP6T control system**

This is an adaption of the MEMSDuino system to control the off the shelf SP6T switches available from Cryo-Elec.

**SP8T + E-Cal system**

**Micro D to Header Cryogenic Adapter Board**

Conclusion

**Cryogenic mounting Hardware**

Conclusion

**SP9T Switch Board**

Conclusion

**Calibration Circuit Boards**

Conclusion