

Interconnect Maintenance Manual

ECE 492 Spring 2017

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Overview

This documentation is to provide guidelines for the responsibilities of the interconnect team. It will give a general overview of the way we accomplished our goals along with helpful insight for future teams.

What's the point of having an interconnect team?

Having common colors of wire and connectors throughout the system is a requirement for the car. Interconnect helps the subsystem teams think about how their design will fit in physically with the car. Also, cable making is time consuming and there are a lot of competition rules to consider.

How are wires determined?

Wires are chosen based on current requirements for the particular cable. The current carrying capacity of a wire is called its "ampacity". Ampacity is normally determined by steady state heat transfer considerations with constraints such as burn safety and the melting point of insulation. Fusing current is normally determined by transient or adiabatic heating considerations with constraints such as the melting point of the conductor. The "rating" of a fuse is how much current it can handle without blowing in infinite time. In a sense, the usual fuse rating is its steady state limit for ampacity. Transient heating depends on total energy, so fast fusing depends on $I^2R \cdot T$, where T is Time in seconds. Thus, the I^2T product is a critical specification for fuses.

How were lengths determined?

We originally asked the Mechanical Engineers to help us with measurements since they are in charge of mounting boxes to the car. None of them seemed to know so we estimated ourselves with a measuring tape. We added a few feet of slack to each wire just to be sure it wasn't too short.

What were the biggest challenges that were faced?

The biggest challenge was tracking all the changes made to the cables over the semester. Every week as the teams got a handle on what they needed the overall system diagram a handful of cables were changed. This meant we had to update the BoM to ensure its accuracy. Then we would change the amount of a part we were purchasing. We spent most of our time figuring out what we needed to buy. Making the cables themselves was the easy part. We also spent many weeks on finding a properly shielded battery cable for competition, which slowed us down a lot.

What would you have done differently?

I think it would have been helpful to have more parts in stock from the beginning. We went so over our budget at the end because every week there was always something else we needed. There were so many things we didn't have that we wasted a lot of time waiting for so my suggestion is to more heavily rely on the current version of the first overall system diagram and order extra connectors and cable early.