All the switches and buttons are rated for the correct current but there's no protection diodes on either of the master switches - Tim. If you pull one of those out it would be a problem

"A lot going bad during a car accident, don't want to be fumbling with a switch"
        Should have a button, not a key switch

A tilt sensor / accelerometer should be installed in the system so that if that car goes wheels up then safety loop can be opened

If we're gonna consider current as an indicator of torque then we might have to consider that in the model of the car

How much current draw are you getting out of your components? When you end up using a battery to provide your 24V it's important that you take into account that the battery capacity will not last forever.

In the ATP we have a GLV / safety loop test, as part of ATP are we recording the current? I think that we should record the current as part of that test so that we can see how much power draw we're getting in running the GLV systems. Usable to size a battery that we might need to buy next year.

Do you have any heat management on the raspberry PI? We should have some because there's a danger of them getting pretty hot.

Why did we switch to the Raspberry Pi? It might be a problem for maintainability.

What about the latency of sensors? Are we running software on the SCADA computer or can information be accessed directly through the CAN bus.

Raspberry Pi is a little bit hacky. Most SD cards that are sold on Amazon are not capable of handling the temperature that the Pi puts out.

ATP should record the temperature of the SCADA computer. If we get over 60C test should fail.

Address how devices will be mounted in the car, because vibration might be troubling.
        Helm - vibration isolation is not a thing that can happen in a racecar

All of the safety systems that are tied to relays that are tied to system computers are tied to the safety loop. If an error is seen in the PackMan all of the AIRs will open

No hard list of things that can trip the safety loop

Can I go anywhere to figure out what it was that broke the safety loop?

All of the computers that are tied to those relays can report on the CAN network, should be able to know in a minimal sense where the break is coming from.

We don't know why the safety loop trips, could be any one of 11 places. SCADA event logs will list which sensor tripped safety loop. We need to think through a better way of indicating how the safety loop was tripped

Might be better off booting off USB driver? Dongle with leverage might be an issue

Can connect to the car and GUI pops up if it's not on the track, but no way to check while car is on the track. Would have to inspect the relays to see what's going on. Want to be able to see specifically what's going wrong.

What kind of sample rate do you get out of Low Voltage Tractive System Interface board? Not a requirement for sampling rate or accuracy. Sampling rate requirement is at least once per second.
         In the ATP we should be measuring the LV TSI board sampling rate

Connection diagram is too complicated for the uninitiated, we should have high level as well as low level diagrams

Giant sharpie line across the screen would be useful in showing the distinction between high and low voltage

Any documentation on what the CAN bus lines look like, how things are interconnected on the CANbus?

Is the network then totally flat topologically? Brendon - yes

Using for physical layer: using cable that's designed for CAN communication, shielded twisted pair? We currently have no specced out wire length between systems, no hard numbers. The point is that CAN operates on differential pair, (Hi and Lo). As you run through wire, voltage is going to drop and message is going to get muddled. Concern yourself with how long the wires are (shouldn't be a problem though, the math was done last year)

What are we doing with the shield in the shielded twisted pair? Why two cables and one connector?

Make sure to have labels on all of the physical enclosures

Might be useful to have a number of network drops and estimation of distance of cable in our comms demo

Is CAN terminated at the end with some termination resistance? Yeah, 120 Ohm.
    Across the twisted pair, not between supply and ground

Why are we terminating the network in ending impedance, matches the characteristic impedance of the line.

Have you considered some sort of audible warning like a buzzer if the driver is distracted? Driver wouldn't interact with accumulator anyway.

During the course of using this vehicle you will be going through untold number of partial charge and discharge cycles. How are you going to handle drift? Is there a way to go to a known drift and start again?
    Recommendation would be to fully discharge periodically, calibrate at both ends of state of charge.

Can we reset it to 20% Or tell PackMan what you think the state of charge is?

Buck converter rated for 140V but flyback 42V. Chip is overspecced? Some of the parts were specced in older versions of design, Geoff hasn't bothered to reevaluate because he just wants to deliver something that works.

No resistance on inrush current, don't know if it's an issue

Are the fuses surface mount? Hope not. One of the fuses is surface mounted.

The part number on the transformer on the schematic does not match the bill of materials

LED resistors: thinks that the 1K resistors on the LEDs are too high, will you even be able to see the LEDs lit up at 3 Volts? May be possible in a classroom, but not out on the track
    Geoff says we don't need to check on the track, LEDs only useful for debugging purposes

Polling AMS boards with I2C, what happens if one of them doesn't respond?
    Geoff hasn't delved too deeply into the software, if don't receive info open the safety loop and display an AMS fault.

Is the hardware that interfaces safety loop to CANbus constantly pinging the sensors to make sure that everything is online?
    You specify in the configuration file your system architecture.
    Pi has the ability to trip the safety loop in addition to the other safety loop relays.

Is the pack is alive indicator going to be bright enough?

I2C bus: how are we handling addressing? Hot swappable? How are new addresses received?

> Haven't addressed that yet, boards have default address that needs to be changed
>> Update them individually by hand outside of pack

> How? Dipswitches? How are addresses assigned to boards?
>> John Gehrig designed a box that you plug an AMS board into that allows you to program address into an AMS board.
> Can also do it in pack?

If you have global address that you're assigned, what about the index of the cell? That's something that we're keeping track of.
> Would have to know beforehand

Diffed the old and new schematics: safety loop.
> Noticed that the old schematic had 14 pin TTL buffer on the bottom left, replaced it with exactly what you needed. Used to be spares and now there aren't. Had an experience where were able to ECO something because of some extra unused OR gates. Basically, might be useful for debugging somewhere down the line.

Mark on the CAN transceiver page "do not populate" make it bigger and more obvious

Do you guys know the power dissipation in the battery pack? Enclosed so might build up some heat.
> There are some openings where a fan is installed, should actually be ambient temperature inside of the pack.
> How much does a pack weigh?
>> We need to know exactly how much the pack weighs at this point.

Dangerous thing that's happening right now:
> Set a pretty high bar for boards, some boards may not be in the same state of readiness

When we first built the AMS boards from last year we used the BOM from last year, incorrectly sized heatsinks were used.

Are you calibrating data or calibrating measurands? Measurands

Is there any security in this SCADA system to prevent other groups from messing with this?
> We will have a password required to access and to change into drive mode
> Probably want to proxy this with a server that has SSL

Whatever passwords you have should be very easy to find so that we can find them for continued work next year

Did you use anything at all from the old code from previous years?

　　　John Gehrig wrote some useful modules for figuring out some of the arbitrary details of working with specific peripherals

Written in Python 3.5.

Why websocked over long polling? Web sockets easier to use in terms of phrasing. ON message just get stuff and handle it

Doing all of data transfer through websocked, variable synchronization API? Using react to render all of the views so easier to propagate down a tree, send entire subsystems at once (could be a very large object) look up a subsystem by name (all enumerated).

　　　Just updating massive chunks of data structure in client at a time.

　　　Not a whole lot of server side processing so having a lot of clients shouldn't be a huge problem.

Curious about the dyno USB PSU stuff, nothing in ATP about it, why do we have support for the dyno? Two main configurations (actual car at the racetrack vs. AEC401)

　　　Need to swap between these

　　　Adding new VSCADA with dyno to ATP

Framework for setting up battery packs with dynamometer would be useful even though we're not testing it in ATP

Code reviews for determining if spec is met? Emulating CAN traffic from systems, listening for them on the UI.

　　　Important to review the code and make sure that it does what we say that it does

No need to work on integrating scada with dyno unless we really plan on testing it in ATP

How sensitive is the system configuration to AIRS? Pretty forgiving, can use common character to make the config file self-documenting. Two points of error: error to parse and error to construct data object

　　　Should try to fail early and fail often

Is there a requirement for what happens in the case of a bad config file or no config file? YML issue, have to trick them into thinking you have an empty list. Just run and display empty system in GUI which is how you would know something is wrong. Otherwise get an error plan and also know something is wrong

　　　Not a hard spec for what happens, but it should get addressed in the maintainability plan

Looking ahead to description of CAN monitor, writing stuff to log files. What is the complexity of the overall log file system? Go looking for them? How do you know if there's something of relevance?

      System name and timestamp are used to find log files, actually is a document-oriented database that you would need to parse with a program

      Single log file for everything, how would you know that you should look at the log file because something go deposited which is important?

          Would need to know something went wrong either from GUI or elsewhere

      Analyzing the log file possible? How?

          Use the library that we used to generate the log file to import. There is no way to check this log file! That's a problem

      Logging data file from sensors or CAN message? Changed into usable data that makes sense and logged.

One file that keeps growing forever and partitioned by creation date.

No limit to the growth of the stuff that gets dumped into the log file, client never wants anything omitted in the future once it starts getting in there, complexity of the log file tends to grow without bound. Easy to say get into log file and analyze it later, but if you keep dumping stuff into there and you don't keep up, it becomes impossibly difficult to read and understand your log file.

Would have to build a tool just to look at the log file, now if it's a database have to do some work just to look at it.

Can I assume you have virtually infinite memory in this machine?

      We have 1 GB memory, 64GB storage. Not going to fill up more than a GB every 24 hours, so works within the spec for the maintainability test.

Computer is running on GLV low power, roughly gonna run for 2 hours before needs to be recharged.

2 modes here: runninng for days/weeks/months/years, or running in practical environment.

What's the point of having all of this data? For modeling team.

Do we really need to store all of that data all the time on the car just so we can look like 2 months down the line at what happened during some logging?

      In the requirements was that logging actually works

      NEED TOOL FOR ADJUSTING THE SAMPLING, HOW TO DECIMATE THE DATA, ETC

          How to modulate amount of data that's required and how do we control

What is this data logging for?

You could SSH in and move the files, but we need to have a tool provided because it's a database otherwise you would have to pull out and reinitialize the database. Loops overwriting FIFO.

Can you separate this for modeling team? Option already exists

You've always got the spectre of transient or non-deterministic faults, if you weren't recording data at the time then you never found the issue.

Maintenance mode would be great for displaying logs and adjust data acquisition, trim logs, set models / different conditions, sample this or that, stop sampling etc.

If I'm driving the car and the software hangs or crashes or the Pi goes down what happens?
        Purposely have no critical systems running through SCADA software, throttle controlled by microcontroller.
        So you would just lose your dashboard, but could still continue driving without DAQ

How does the real time system keep the SCADA out of everything when it's not supposed to be in maintenance mode but it actually is?
        Controlling throttle boots up in hardware mode (drive mode) takes samples from the throttle, send CAN message saying switch to software throttle mode.

The device that is supposed to be disabled is declaring whether it is disabled or not, easy route for screwing up (declaring it's not disabled when it should be)
        Should have signal independent of SCADA tells everything else what mode we're in
        SCADA has no ability to contradict if we're put into drive mode

Worst case scenario allowing hackers to get on system during race and control the throttle for you

Charge state is a dead end, transition is missing in the diagram

Are there grounding points on this case? Somewhere to attach a grounding wire
        No

How close are you guys to having packs?
        Last week been getting tons of edits, once parts are finalized we can send them to the shop

Don't have an exact date when there is a trial pack or test assembly, needs to be added to the schedule

Don't have all of the parts now, everything but panel has parts and is together

We will know date that all parts will be back from shop before we leave for spring break

Confidence that all redesigned components will work and play well together. No mistakes?
    98%

Can you create a pack with the old patterns that will not accommodate the new electronics?
    No, cutout on new panel is larger

Nadovich would really like if the top panel of the packs was milled similar to the designs on the diagrams.  Also maybe say mechanical engineering in addition to the electrical engineering.

Make schedule for successful pack electrical integration, mechanical integration, schedule items are required
We'll talk to the shop before spring break, we'll get you a date when everything will be delivered

Motor and motor controller together produces  data

Varied loads

Wiring error that needs to be fixed, "solenoid" data

Did you make a graph of the data you found?

Error bars?

When are you going to take real data?

Did you guys try to do things with a frequency response, fourier

Efficiency numbers? Why are you getting such a range in efficiency?

Load efficiency number not motor efficiency?

Was the torque value correct - yes the gear ratio is correct

Car weight, battery weight, drag coefficient, frictions

Don't use the huff box

Which encoder, dyno encoder not accurate under 1000rpm

TSI is a high voltage thing, do we have a plan for dealing with the TSI? Yes
     What did we make new safety plans for?

Is the safety plan going to get communicated to the ME team, are they going to look at it?
     We need to ensure that they have read over

Need more testables? Make sure you have a logical statement with a truth value and ensure that it is verifiable

Two questions: Don't use red to represent how much money you still have. Do we have a prediction for how much money you'll be spending, will you be under budget

You need to add schedule for the documents
Fifth pack made
What happens to the voltage when using the packs?
How long can you run the batteries?
The schedule needs to be about accomplishment dates
Large schedule revision, brendon, waste time on schedule??