If we ever plan to go to Rome Airstrip testing

Sunday, May 26, 2024 3:27 PM

(Aero testing + accel/lc, autox, enduro?)

Cost Down testing

Flow viz (put on car and run nonspecific)
Yarn Tuff (put on car and run nonspecific)

Accel testing (conclusions from 5/29 Accel testing, tested on a different surface)
Speed limit Testing
Autox/endurance

We need the car packed, the trailer ready, and the truck hooked up the night before 5/29. Grab bread and peanut butter to make sandwiches for lunch, or bring your own food.

-Be at the shop by 7:00 am

-The truck will leave by 7:15 am to go to Hytech's shop (trailer will not wait)

-Leave at Hytech's shop by 8am

-Aim to be at Rome airstrip by 10 am , check in at Little house

Do testing (split airstrip in half?)

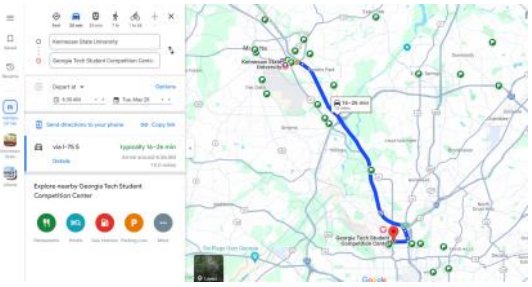
Car dies = Lunch time, charge car while eating

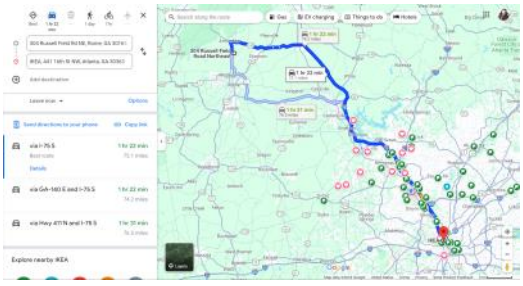
More testing maybe (depends on Hytech) hang behind so we can continue testing?)

Site closes at 8 pm

How to get to the airstrip
304 Russell Field Rd NE, Rome, GA 30165

Hytech wants to run autox/endurance their car till it dies and then they are done for the day
they said we can splt the usabe track in half so we don't have to cordanate stoping cars





Morning of
Emil
Bray
Jonathan
Abri (meet @ gt)
David

Pulling up later
Val (lunch?)
Chance

Cannot
Mihai
Sammy
Brenden
Nate
Matthew

Pre-check 2024 Endurance

Monday, May 27, 2024 11:27 PM

Master checklist

- [ ] Packing list
- [ ] VD
- [ ] EV Driveline
- [ ] LV
- [ ] Aero/Composites
- [ ] Tech Inspections

The General Packing list for a Test Day:
MUST HAVE:

- [ ] Test Day Box (bruh)
  - [ ] Tire pyrometer
  - [ ] Toughbook
  - [ ] Toughbook charger
  - [ ] Tire pyrometer
  - [ ] Longacre (red) tire pressure gauge
  - [ ] HV Gloves
- [ ] Test Day Documents
  - [ ] Test Plan/Proposal
  - [ ] Results logging (excel or paper)
- [ ] Two Jack Stands
- [ ] Timing Gates
- [ ] Cones
- [ ] Tools
  - [ ] HV Tools Box
  - [ ] 7/16 Wrench or Socket
  - [ ] 5/16 Wrench or Socket
  - [ ] 5/8 Socket
  - [ ] 3/16 Allen
- [ ] Fire Extinguisher

VD checklist

Ffs please check this shit before we take the car out, it's a fucking bolt- sammy (I think -J)
SUSPENSION BOLTS CHECK
FRONT LEFT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

FRONT RIGHT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

RIGHT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

LEFT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

Toe Alignment:
 # Whenyou do this please record who did it

- [ ] With tape measure, measure the tie rod (not the toe rod, rods coming out of steering rack) length and make it equal left right and paint marker a line where the tie rod and steering rack meet
- [ ] Ensure shims are correctly at zero amount (5 shims on the front, 3 shims in the rear) everything should b in the green suspension box and tire pressures are at 12 (sidewall deflection with pressure is real)
- [ ] Undo jam nuts on toe rod and using toe plates (ensure they are centered with each other) tape measure front and rear of each tire)
- [ ] Ensure the length front to rear of the tire is the same
  Rinse and repeat for rear

Corner Balance:
Record names of who did it and make sure to save this for last

- [ ] Fill tires to 12 psi, get a person in the car
- [ ] Loosen jam nuts on the push rods
- [ ] Put scales next to each side, turn on, ZERO BEFORE PUTTING CAR ON, put the car on
- [ ] I would take a pic here before doing anything to see the difference of before zeroing and after zeroing
- [ ] When corner balancing think about it as legs on a table, they work diagonally so try to corner balance across the car (guessing and checking is also fine as well). You do need to make sure to avoid bottoming out the push rod (you are pre loading it when adjusting which can be bad for the push rod under load)
- [ ] I try to get it to within 5 lbs of each corner but **when you're done take a picture** and put it in car-testing channel or in here (in here is preferred)
- [ ] Lock jam nuts and pack it up
  Measurements before taking car out:

Corner Balance
LF Weight:
RF Weight:
LR Weight:
RR Weight:

Camber
LF:
RF:
LR:
RR:

EV Driveline checklist

Each main item should be checked off if it is present and ready to go. If any sub-checks apply when inspecting, also check off. It is assumed that if any of the sub-checks apply, they are written in the blank below and corrected before checking off the main item. Pictures of failures/more information beyond a basic description is not required, but recommended.

Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- [x] **Left emrax mounting plate**
  3x 1/4-28 bolts
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
    Top rear bolt
    Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

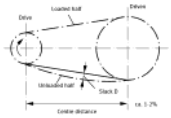
- [x] **Left emrax mounting plate**
  3x 1/4-28 bolts
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] ***Right emrax bearing mounting plate***
  3x 1/4-28 bolts
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] **Yoke plate bolts (6x 3/8)**
  6x 3/8
  _ Hex and 1/2 wrench
  - [ ] Loose?
- [x] **Left bearing carrier**
  2x 1/4-28
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] ***Right bearing carrier***
  2x 1/4-28
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] **Rear sprocket bolts**
  8x 10-32
  _ Hex and 5/16 wrench
  - [ ] Loose?

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- [x] **Emrax mounting bolts**
  6x M8
  - [ ] Loose/missing safety wire?
- [x] **Emrax sprocket adapter bolts**
  6x M8
  - [ ] Loose/missing safety wire?
- [x] **Inner/spool left tension cap**
  3x 10-24
  - [ ] Loose/missing safety wire?
- [x] ***Inner/spool right tension cap***
  3x 10-24
  - [ ] Loose/missing safety wire?
- [x] **Outer/hub left tension cap**
  3x 10-24
  - [ ] Loose/missing safety wire?
- [x] ***Outer/hub right tension cap***
  3x 10-24
  - [ ] Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- [x] **Left emrax mounting plate**
  - [ ] Bent?
- [x] ***Right emrax bearing mounting plate***
  - [ ] Bent?
- [x] **Front sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [x] **Front sprocket spacer**
- [x] **Rear sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [x] **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - [ ] < +/- 1/4th chain width
  - [ ] > +/- 1/4th chain width
- [x] **Chain tension**- check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the chain upwards and measure the distance, recording it below appropriate checkbox
  - [ ] < x inches
  - [ ] > x inches



- [x] Left bearing carrier
  - [x] Installed in correct direction (bearing retained)
  - [x] Bearing fully seated and in working order
- [x] *Right bearing carrier*
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LV checklist

@LV fill this guy in more but this is what I can think of

- [ ] Fully charge both LV batteries
- [ ] Check and see if any loose/ USB cables are lose
- [ ] Turn LV on-off to generate fresh log, check that SD card is logging
- [ ] Insatll any daq (will flush more out)

Aero checklist

@Aero @Composites fill this guy in more but this is what I can think of

- [ ] Front wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon?(Check after each run)
- [x] Rear wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
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- [ ] Undertray
  - [ ] On?
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  - [ ] Bolts tight?
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  - [ ] Any cracks in carbon?
- [x] Swiss Cheese
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] Floor Pan
  - [ ] Bolts tight?
  - [ ] Cracks in carbon?
- [x] Tools
  - [ ] FW tools
  - [ ] RW tools
  - [ ] UT tools

Tech

(did we doing any Tech inspections before going out, any issue/ illigal write below each catogory)

- [ ] Mechnical
  -
- [ ] Acc tech
  -
- [ ] Ev active
  -

1/1 Template

Monday, June 26, 2023 8:48 PM

Copy test overview from testing plan to here day of test

Pre-check

Monday, May 27, 2024 11:27 PM

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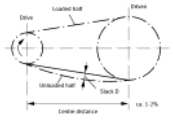

- [ ] Left bearing carrier
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  - [ ] Bearing fully seated and in working order
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LV checklist

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Aero checklist

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- [ ] Front wing
  - [ ] On?
  - [ ] Level?
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  - [ ] Any debonding on mounts? (Check after each run)
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- [ ] Side body
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] Swiss Cheese
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] ECU mount
  - [ ] Any cracks in carbon?
- [ ] Floor Pan
  - [ ] Bolts tight?
  - [ ] Cracks in carbon?
- [ ] Tools
  - [ ] FW tools
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Tech

(did we doing any Tech inspections before going out, any issue/ illegal write below each category)

- [ ] Mechanical
  -
- [ ] Acc tech
  -
- [ ] Ev active
  -

Details

Monday, May 27, 2024 11:28 PM

Critical Issues:

-

-

Future to-do:

-

Full description & sequence of events:

4/2/24 First Drive Shakedown

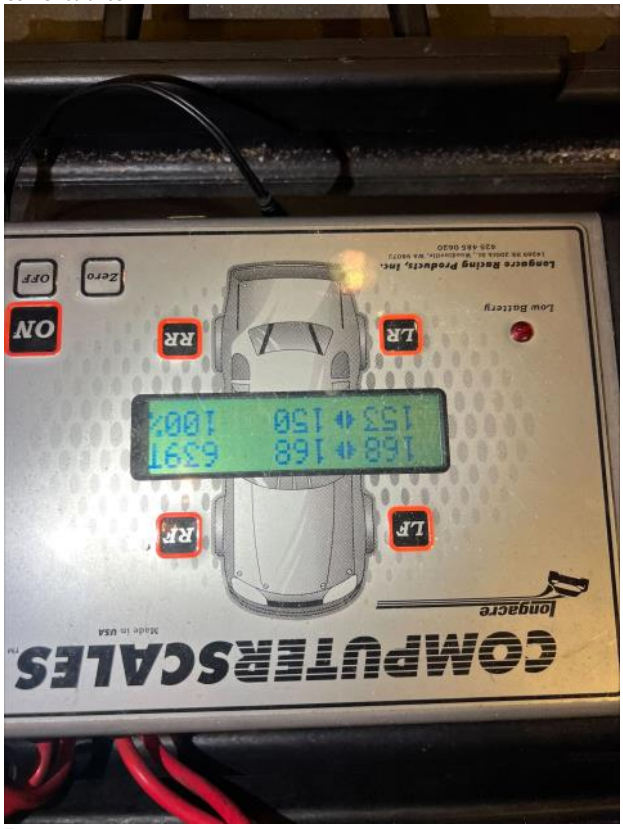
Tuesday, April 02, 2024 1:04 AM

Went out to east lot to do brake test and shakedown testing
-axles are stiff
-when trying to jack up bar it broke off (pic 1,2)
-need to tighten chains and upright
-swap axles
-machine new pulling fittings

Pic 1,2

Time:
12:30am

Prep:
Corner balance



Toe
Charge to 280v

Testing:
Car faulted on drive to lot and back from lot, maybe apps with light on dash? But required entering RTD again so possibly not.
FL tire would not lock in 120nm
Tried 180nm, did hard launch/burnout and noticed chain sounded funny, noticed axles were bound and would not move side to side
Attempted to lift car with Emil in it from jacking bar and it broke
However, axles unbound after that.
Dialed in more front brake bias, and brakes passed/locked all 4 on the next run at 180nm
Axle locked again, so decided to drive it back, had same fault 2-3 on the way back up

Post Shakedown Problem Solving (4/2/24)

- Pulled both axles, tripods look fine and seem to be the exact same
- Note to replace the homemade gasket from last comp but we put it back in the car for now
- Inside of the hubs & spool both feel "grooved" when they were smooth before
- Cleaned out grease from spool and hubs, inside of both are ready to be filed back down to a smooth feeling (I don't trust myself to do it lol -emil)
- Phased tripods correctly
- Removed the two spacers on each of the axles
- Tightened chain slightly

-

4/3/24 Dyno Day

Thursday, April 4, 2024 5:56 AM

TS drops to 0V and pops out of RTD, avi and tsal go green.
BSPD lights are normal.
Only happens on sudden throttle or higher throttle, inverter current is super high but hall is normal.
Orion does not see different voltage and looks normal, so possibly an AIR opening?

Would like to check 12v supply to each air under load, then try older pigtail to inverter, then retrofit old airs possibly?

Also, axles did not seem to fully bind or anything but left axle has less movement that the other. Loud click present under throttle (but goes completely quiet under coast/no throttle) after a higher rpm pull (~70mph)

Fix for click in rear:

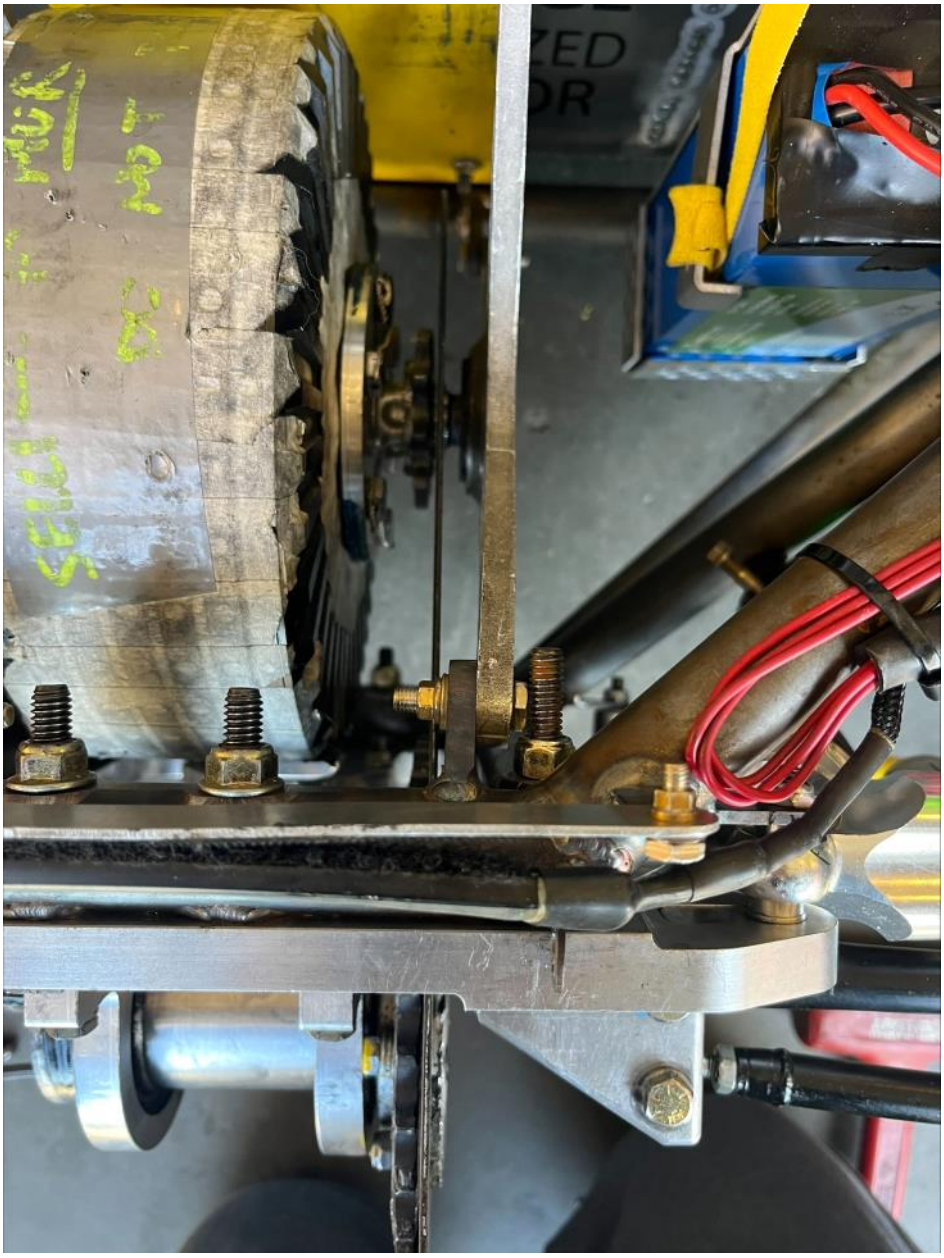
Could not tell if lose bolts contributed, a lot of items were lose, could have been others trying to investigate.
I was mistaken the car does have the alignment feature on the output shaft.

Main cause of click is a rolled tooth on the drive gear, it causes the chain to stay engaged on the drive gear till the tension pulls it off.

Axles we're pulled, spool bearings checked, and motor bearing support plate pulled. All bearings felt ok.

Sprocket was filed to taste and sounds ok when chain is slack, with high chain tension it sounds great. This permanently moved matériels and I removed matériel to get there shape back. This component is on its last leg.

When aligning and checking everything, the spool is on its last leg. The holes for sprocket to spool are not strait, and the flange appears to have some angular run out (I'd like to measure with the indicator)



4/8/24 Dyno fault testing

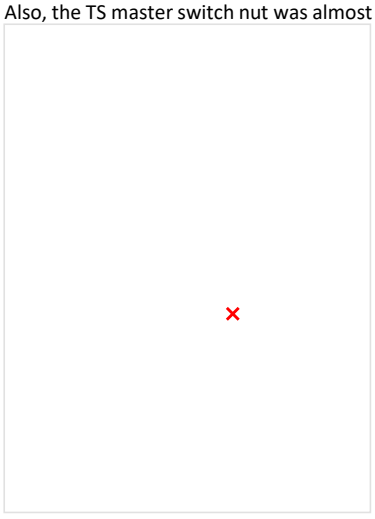
Tuesday, April 9, 2024 1:14 AM

Critical Issues:
BMS turns current limit to 0A
-Faulty cell tap on #7 causes error code which sets the current limit
SDC inconsistent
-TS master switch nut was almost completely backed off

Full description & sequence of events:
Fault still occurring on light throttle inputs on the drive down. Same symptoms where the TS goes to 0v and the dash shows green and then back to red for inverter state, requiring re-entering RTD to get driving again.

BMS current limit goes to 0A driving up and down, which is most likely causing the fault. The faulty cell tap on cell #7 causes an open circuit fault and overvoltage fault, which then induces the fault.

Also, the TS master switch nut was almost completely backed off, which also could have induced SDC related faults.



Future to-do:
- [x] Fix cell wiring fault
  - [x] Pull acc
  - [x] Recrimp pins
  - [ ] Reinstall acc
- [x] Tighten master switch nuts
  - [x] blue loctiteeeeee

Enduro prep:

4/9/24 dyno fault testing

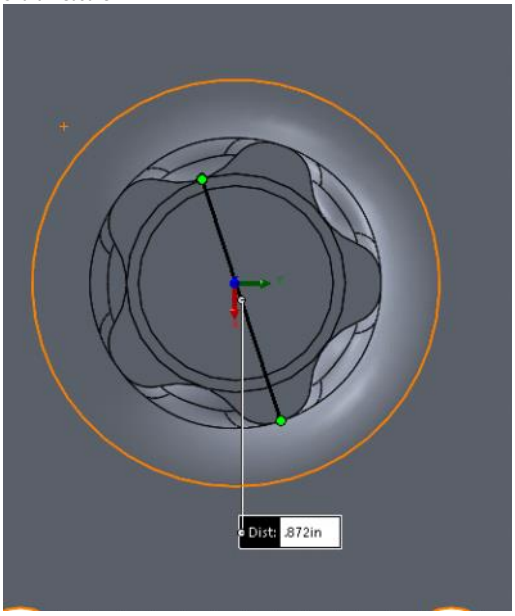
Tuesday, April 9, 2024 8:49 PM

Fixed before running. Re did Module 1 cell harness ,

Saw Green tsal flixer when messing with rear area, Power not getting to car
LV PDU GND was not connected and appeared to be root casue
This was proably why the dash would reset while driving

Axils locked up again after giving it gass , made a lout mechnical noise lol chain iss still there .
Shorting issuse dosn seem to be there

Shaft Measure:



.872+.495 Gauge pin = 1.367
Measurements of Each Boss to Gauge pin
1: 1.370
2: 1.372
3: 1.376
4: 1.372
5: 1.372

Note: Splines have marring and shaft is twisted/yielded slightly. This is most likely throwing measurements off as the gauge pin is likely not sitting flush

Notes on making driveline parts:

Sprocket adaptor is twisted on the splines
Will need new soon.

When pressing on sprockets we need to measure old shaft and Mach to fit.

10is minim chain will fit on drive sprocket

Need to check min in rear

We should check for tooling to make diffrebt spokl for ev. Current it tired.

Random notes:
Tooth sheared off of front sprocket

Tripods are riding on tension caps

Axles biding on dyno kinda makes sense
Axles have bound in the lot too

Widths wouldn't change bc yoke plate references

Runout on the adapter?
Interference fit, need make new sprocket adapter, must measure the old vs the new and make sure it'll fix. Brenden said no math for pressing it onto the sprocket adapter. John said guessed on contact piece

Definitive notes:
Sprocket is done and sheared
Modify the internal spline of the new sprocket to fit the pressed/used sprocket adapter
Fixture exists for the internal
Fix misalignment of front to rear sprocket
Use new sprocket adapter only, 10 thou run out shouldn't affect it

Replace rear sprocket when do front to have even wear
Fenders
Could put longer axles into the rear end since they might be binding/hitting

Tension cap to tension cap
RL 19 3/8"
RR 19 3/8"
Thus it's likely that 20" axles in the car.

Going forward rolling the wheels slowly does not cause the wheels to bind, but rolling backwards causes the axles to bind but only in a certain degree of rotation

Same point where it locks, only forwards really
CVs would lock up a slight bit under motion anyways
Have someone load wheel and see if the other wheel binds
Stick other ratchet onto the guy

4/11/24 Dyno again hopefully

Thursday, April 11, 2024 1:04 PM

To-do list:

SPROCKET

- [x] Locate CAD in PDM
- [ ] ~~Modify the internal spline of the new sprocket to fit the pressed/used sprocket adapter~~
  - [ ] ~~Pull motor out~~
  - [ ] ~~Measure the current sprocket adapter~~
  - [ ] ~~Modify the CAD~~
- [x] Machine sprocket
- [x] Press onto sprocket adapter
- [x] Reinstall motor

HUBS/AXLE BINDING

- [x] Pull axles
  - [x] Cut safety wire
  - [x] Unbolt tension cap
  - [ ] Label axle directions
  - [ ] Label tripods to hubs
- [x] Clean grease out
- [x] Inspect and deburr hubs?
- [x] Grease hubs
- [x] Install axles
- [x] Install tensions caps AND rear wheel speed sensor tooth rings

CAR SETUP

- [ ] Charge accumulator
- [ ] Check brake fluid levels
- [ ] Corner weight
- [ ] Set toe front and rear
- [ ] Inflate tires
- [ ] Clean up dyno

4/12/24 Friday Invitational Notes

Friday, April 12, 2024 1:10 PM

- Acc needs critical fasteners on mounts

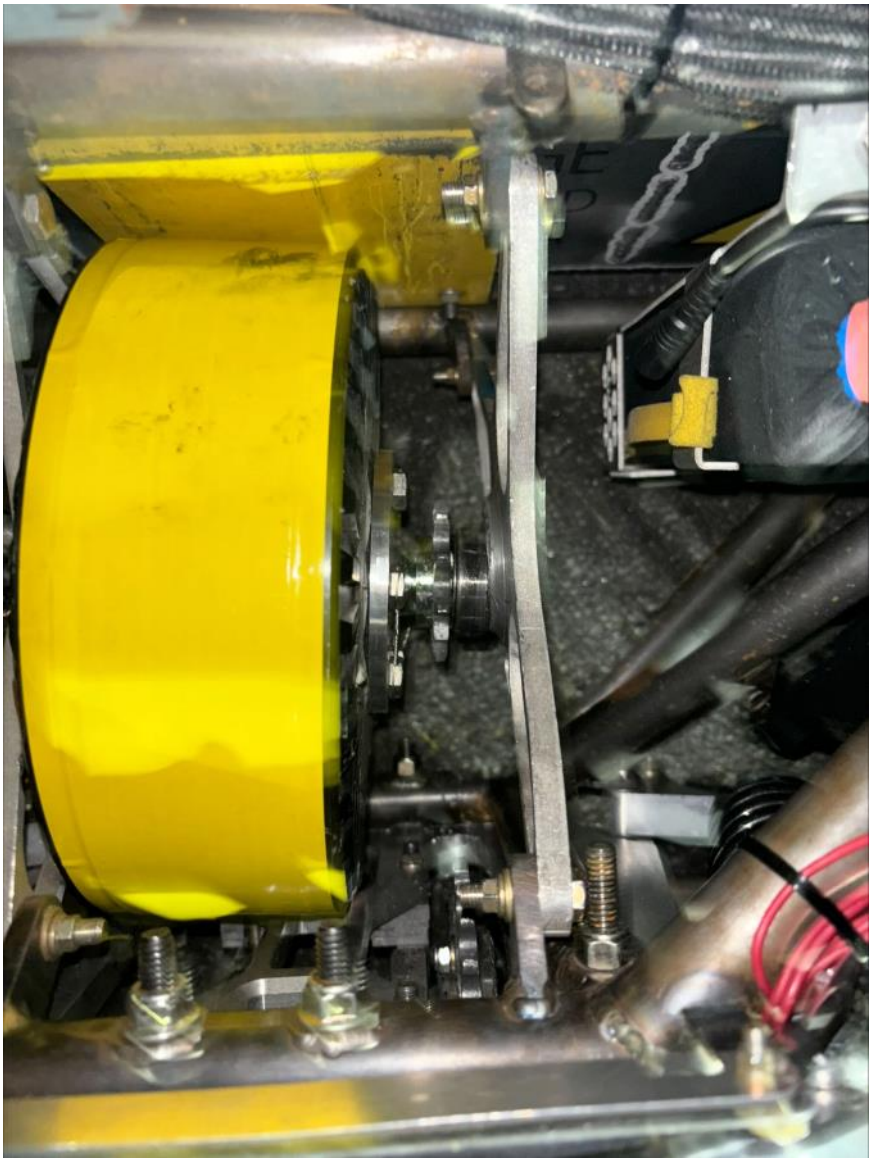
4/13/24 Lot testing & driveline explode

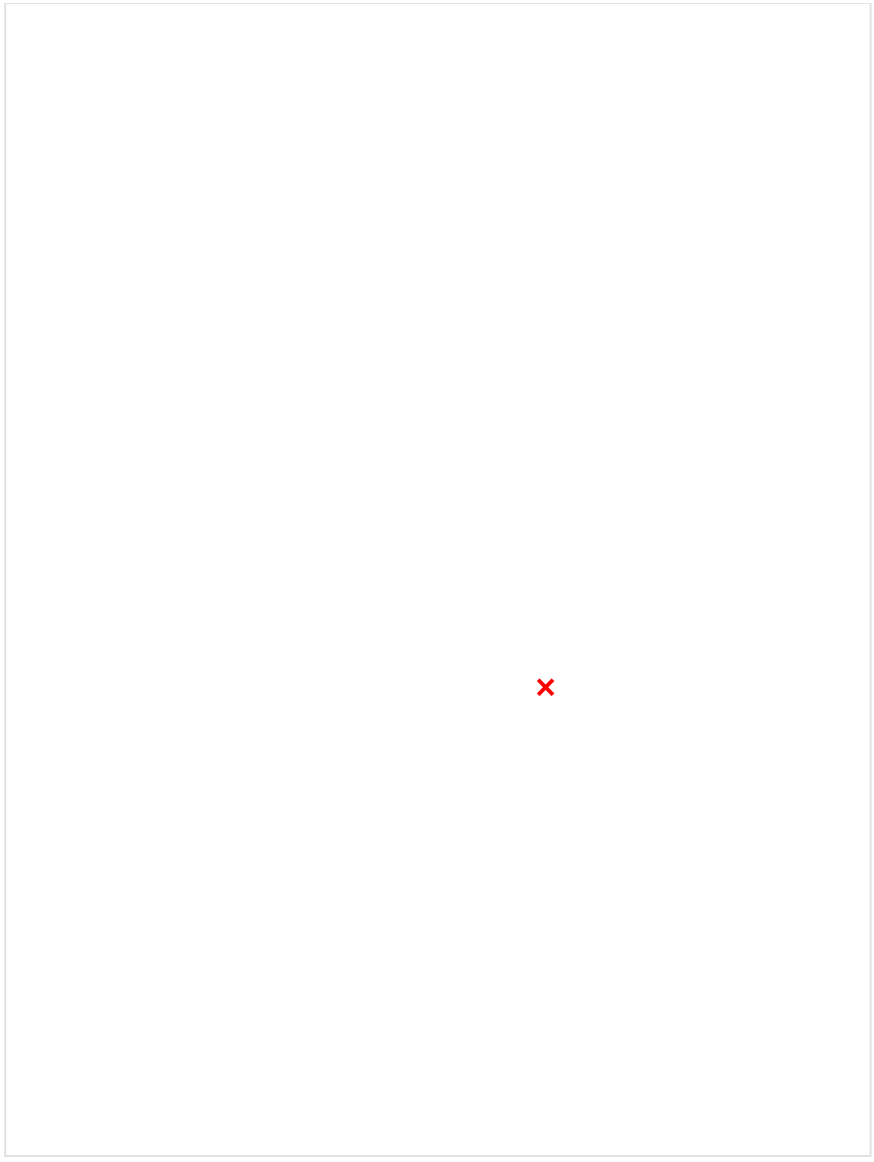
Monday, June 26, 2023 8:48 PM

Critical Issues:
-Motor mount plates bent
-Front sprocket lost a tooth
-Bearing came out of plate and cracked outer race

Future to-do:
D
-P

Full description & sequence of events:
New uprights were installed on the car, as well as the new sprocket adapter and 10 tooth front sprocket. Toe was set for front and rear, and then car was driven to the lot. Plan was to test brakes and then do a shakedown.
Inverter fault happened after brakes launch, so fault code was pulled and shown to be hardware overcurrent. Chain was also inspected as a spark was seen from the rear end, however the chain seemed to be fine and only a bit loose, which was theorized to be the sprocket wearing in. It was then decided to switch to 180nm to avoid the overcurrent fault, and to do a few laps to check if the driveline made any noise or if any other issues developed. After two laps and on a straight, the driveline exploded, which resulted both motor mount plates bending, front sprocket losing a tooth, and the bearing to fall out of the plate. Root cause is still unknown.





Driveline Explode Investigation

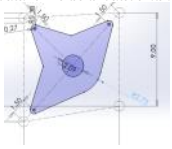
Monday, April 15, 2024 3:40 AM

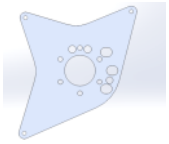
sproketyeet180

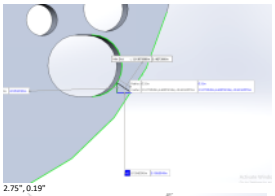
Motor mount was changed in the following ways:

-cooling fitting clearances were checked, should work just fine with the new press in fittings from emrax for the 208

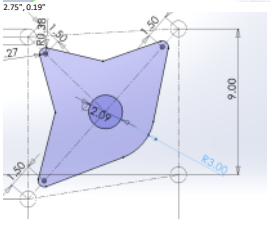
-The overall lightweight holes were suppressed/removed
-This dimension was increased from 2.75" to 3" to increase the material near the edge of the bottom of the phase lead

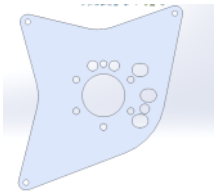


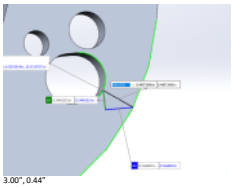




2.75", 0.19"

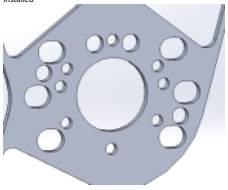


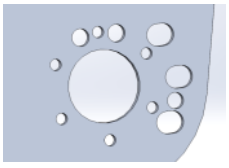




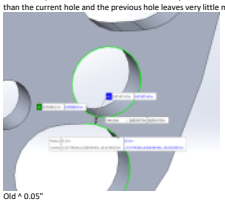
3.00", 0.44"

-The other set of holes for 2x UMW configuration motors was deleted as the current 228 and future 208 are both 1x UMW
-The two extra M8 holes right next to each other were removed as they are unused and too close together to be used once bolts are installed





-Motor temp sensor hole was decreased in size by 0.2" in diameter, as the two wires which pass through are significantly smaller than the current hole and the previous hole leaves very little material between it and the bottom phase lead hole

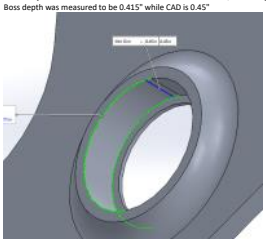


Old ^ 0.05"

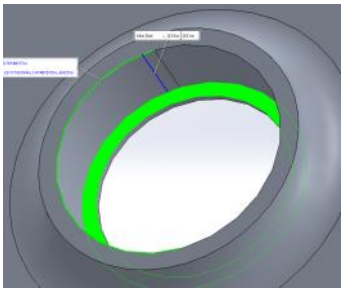
Bearing plate was changed in the following ways:

-lightweight features removed

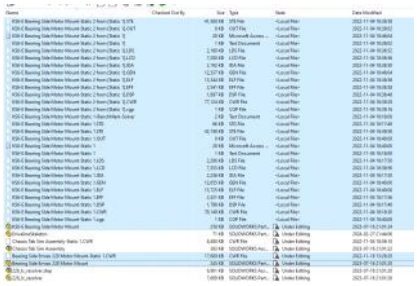
-height of boss that bearing sits in **was NOT** increased slightly to ensure the bearing fully seats inside of it, because it would put the stock at 0.560" which is a weird stock and better to just use 0.5. Not sure what the future solution is here, I assume just coping and using a thicker stock but this change was not made for now
Boss depth was measured to be 0.415" while CAD is 0.45"

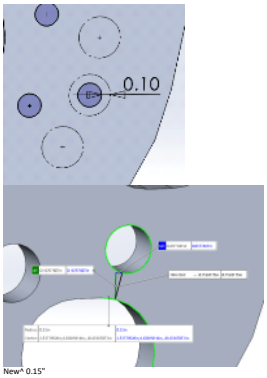


Bearing depth is 0.471" as measured in real life, vs 0.472" in CAD
thus 0.060" was added to the height to bring the boss up to fully seat the bearing in it



Failure noticed after machining part:
Mounting holes are larger than what was on the car. There are two files this part, both named similar- "KS6-E Bearing Side Motor Mount" with a 0.328in hole, and "Bearing Side Emrax 228 Motor Mount" with a 0.266in hole. Both were last edited the same day, but with one having a specific car name and many more FEA files attached to it. I did not check the hole size to the real part/notice the change, and that's on me, but we should avoid this in the future.





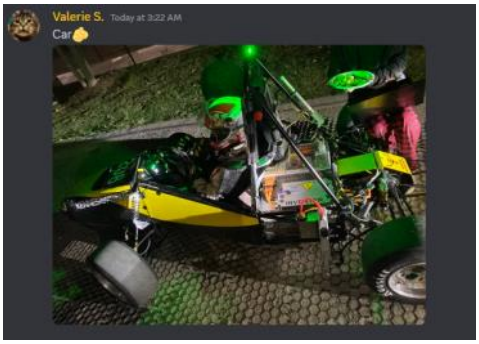
New^ 0.15"

Spacer for keeping the bearing in

lol

5/24/2024 Lot testing & front sprocket issue

Friday, May 24, 2024 3:42 AM



First drive after Ic comp and powder coating reassembly

<u>Set up</u>
Passed EV active
- Should adjust BSPD to be harder to trip to prevent accidental trips while driving

Set toe and corner balanced
- 147 140
- 139 142

Suspention / front steering area sounds like clown juice
- Someone should look into that a little more

^ this is referring to a squeaking noise that happens when the wheels are turned back and forth

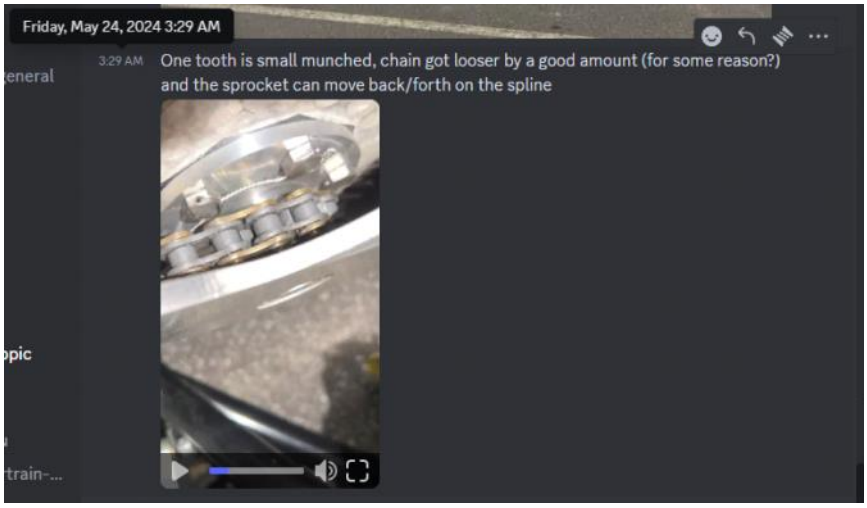
NEED TO ADD vinyl to switch panel ,, " some people don't know which Master switch is LV " That's kinda a saftery issue lol

In the lot/ride down

- Brake light was spazing out, looks like the break pedal is "draging"
- Should add return spring to brake pedal
  - (potentially, can hear the rotors dragging while rolling
- Need to adjust brake bias aren't all locking together

IMG_4751

Dope vid of car lol^^



^

IMG_4753

Video of sprocket moving back n forth on the sprocket adaptor
- Knew of issue of "not press fit" didn't think it would fail right away
- Need to machine a new front sprocket with less tolerance
- Look into loose chain
-

Loose chain:
-Chain was moderately tight before going out and appropriately set
-Loosened after running a bit
-Theory is that the mounts shifted (bolts are not an exact fit and thus might shift)

Front sprocket teeth
-Id limit was still high and introducing oscillations
-Might have been what munched some of the teeth in conjunction with a loose chain?

Loose front sprocket
-The press fit failed and allowed it to wobble back and forth

-Jonathan

- 
- 

Images from video of sprocket sliding back and forth

D-axis current was adjusted back to the stock limit

Besides issues above ^ car seems to be doing good. Cant wait to get this all sorted out and see how it performs - val

Testing plan 5/26 - 6/2

Sunday, May 26, 2024 3:24 PM

Car testing for 5/26-6/2

5/26 Sunday, East Lot
Shakedown and light endurance test
- **Prep:**
- Swap to not new hoosiers (we could run the new ones but erm)
- Bolt on front sprocket adapter
- Safety wire front sprocket adapter
- Bolt on motor bearing plate
- Install chain and shim
- Upload new ACU code with temp corrections
- Upload VCU code to enable EEPROM writing and distance tracker
- **Plan:**
- Do 1-2 laps of shakedown
  - recheck chain tension and set shims if loosened due to motor plates moving potentially as mentioned (if that is what is happening there isn't much we can do other than setting shims after the plates settle).
- If that goes well:
- Set up a quick endurance course and run the car until 20% or so while monitoring temps via telm. Could swap drivers, or let one person drive, does not affect test.
- This would:
- -discharge the pack to let us diagnose the potential charging issue we might have
- -ensure any small items are sorted before investing time setting up accel/skidpad/full autox/enduro courses
- **Analysis:**
- Bolts check and seeing if anything failed
- Check
- Check temperatures and use data as a baseline for endurance strategy testing
- Check distance tracker for functionality

5/28 Tuesday, East Lot
Shakedown and light endurance test
- **Prep:**
- Swap to not new hoosiers (we could run the new ones but erm)
- Bolt on front sprocket adapter
- Safety wire front sprocket adapter
- Bolt on motor bearing plate
- Install chain and shim
- **Plan:**
- Do 1-2 laps of shakedown again to confirm driveline at 180nm
  - recheck chain tension and set shims if loosened due to motor plates moving potentially as mentioned (if that is what is happening there isn't much we can do other than setting shims after the plates settle).
- If that goes well:
- Do 1-2 laps of shakedown again to confirm driveline at 240nm
- If that goes well:
- Set up a quick endurance course and run the car until 20% or so while monitoring temps via telm. Could swap drivers, or let one person drive, does not affect test.
- This would:
- -discharge the pack to let us diagnose the potential charging issue we might have
- -ensure any small items are sorted before investing time setting up accel/skidpad/full autox/enduro courses
- **Analysis:**
- Bolts check and seeing if anything failed
- Check
- Check temperatures and use data as a baseline for endurance strategy testing
- Check distance tracker for functionality

Wednesday, East lot
Acceleration/launch control testing
- **Prep:**
- Old LCOs? We plan on doing a good bit of pulls sooo…
- Check standard car setup (toe, corner balance)
- Charge pack to 100%
- Wing in open config
- Shockpots (for next day, but test/validate in lot)
- **Plan:**
- Run 3 accel runs with each accel driver to gather pedal input information and to test car's general ability to withstand an accel run
- If that goes well:
- Refer to test setup sheet/guide (going to update with PID and linear for test procedure)
- **Analysis:**
- Bolts check and seeing if anything failed
- Check data, see time reduction across different methods and repeatability and look into what method would be best to look at. Given that the air strip has a different surface, would be good to repeat the same tests there and see how the different methods react to more/less traction.

Skidpad tuning/driver practice
- **Prep:**
- New LCOs?
- Check standard car setup (toe, corner balance)
- Charge pack to 80%
- Aero on
- **Plan:**
- Let each driver perform multiple runs on the way the car is setup now to get them comfortable and familiar with how the car handles
- I would suggest letting emil drive a few runs as well to give feedback on setup changes to make
- Perform a set of runs and analyze tire temp, times, shockpots, etc to determine setup changes @VD
- **Analysis:**
- Bolts check and seeing if anything failed
- Review data and determine optimal skidpad setup

Rome air strip (not happening anymore)
Aero testing + accel/lc, autox, enduro?
- **Prep:**
- Old LCOs?
- Check standard car setup (toe, corner balance)
- Charge pack to 100%
- Aero on

General list of items to test:
Accel/LC
Skidpad setup
Autox setup
Endurance
- Thermal limits
- Power consumption (with different driver strats)
- Distance/energy tracker and communicating that to driver

Softer springs
Tire pressures (esp. for accel)
Dampening settings
- Would run through other tests first as we have not played around with it too much
- would heavily rely on emil feedback for initial tuning and then compare times
- Would like to change for accel and see if it makes a difference there

Other note/overarching testing methodology:
If on any of these days we've exhausted the test day plan/gathered the data we needed (and the pack has energy/thermal headroom left) then the rest of the capacity should be used to let general driver practice training happen with whatever event is setup. If we complete a test section and there is time left in the day to charge/setup another track/test, then we should move on to the next test. *This means we could/should potentially charge the car multiple times in a day.* Overarching goal is to run the car every single day and get driver practice in, as there is a (uncharacterized) points gain from the driver's abilities. If there are not enough people present to do a full test setup day (ie. Sammy, people to setup cones, etc.) then the car will be taken out with the minimum of 3 at least and a simple course setup to perform driver practice.

Getting new motor:

We got the 208mv on loan from hytech, so no worries about this anymore

If it is ready within this week like they said it would be, and john files out Wednesday, I off the hip say it'll probably be here Saturday/Sunday. We should be able to install it within a few hours, so most likely won't affect testing plan. If it does eat up a day, then simply just push the current plan back by a day, hence the 3 days of endurance strat testing which gives that buffer. Next week after that will also have a plan similar to this, and will account for trailer prep and what variables would change/need to be retested with new motor (not really anything but there is value in repeating similar tests what were listed here)

Shockpots (hopefully)
Plan:
@aero member
Aero validation would be prime to test here, but if not/we finish testing that:
Repeat accel testing above to gather more data on a different surface
Autox/endurance course?
Skidpad?
Analysis:
Bolts check and seeing if anything failed
@Aero

East lot
Autox tuning/driver practice
Prep:
New LCOs?
Check standard car setup (toe, corner balance)
Charge pack to 100%
Aero on
Plan:
Let each driver perform multiple runs on the way the car is setup now to get them comfortable and familiar with how the car handles
I would suggest letting emil drive a few runs as well to give feedback on setup changes to make
Perform a set of runs and analyze tire temp, times, shockpots, etc to determine setup changes @VD (pretty much same as skidpad lol)
Given
Analysis:
Bolts check and seeing if anything failed
Review data and determine optimal autox setup

East lot
Endurance strategy/driver practice
Prep:
New LCOs?
Check standard car setup (toe, corner balance)
Charge pack to 100%
Aero on
Have full test plan fleshed out
Plan:
Need to fully flesh out more, but thinking using the data from Sunday to get general idea of where our limits might be and doing another run with aero fully on and proper track setup. This would mostly just generate data to feed into a longer test day with multiple endurance runs and evaluating different thermal and power control strategies
Analysis:
Bolts check and seeing if anything failed
Review data and determine further enduro testing plans.

East lot
Endurance strategy/driver practice
Prep:
New LCOs?
Check standard car setup (toe, corner balance)
Charge pack to 100%
Aero on
Have full test plan fleshed out
Plan:
Perform multiple full endurances while testing different strategies to find optimal, and by testing throughout a full day (starting at 9am let's say) we will get a sweep of ambient conditions (though we would be changing other variables so it's not a 1-1)
Analysis:
Bolts check and seeing if anything failed
Review data and determine further enduro testing plans.

East lot
Endurance strategy/driver practice
Prep:
New LCOs?
Check standard car setup (toe, corner balance)
Charge pack to 100%
Aero on
Have full test plan fleshed out
Plan:
Depends on previous two days, but if we've got a strategy fully figured out by now, then we should just perform as many runs as we can for driver practice. Could vary the course between each full charge to help get wide range of situations.
Analysis:
Bolts check and seeing if anything failed
Review data and determine further enduro testing plans.

5/26 Shakedown, driveline failure

Link to Data Folder in teams 5_27_Chain yeet spoki munch

Sunday, May 26, 2024 3:27 PM

General carlog by val

Life time distance = km counter (distance driver on car)

Life time distance Start: @ 0 km (first time implemented

Life time distance End :2.171 km

Installed Milakie light & GoPro to video the driveline (lol came in handy)

BMS Staring Picture

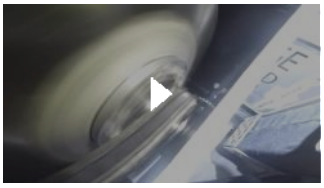
Fault code Present before running : no thermistor on module 1 available

Car went out @ 12:12 am

Things broke around 1:30 - 1:40 am

SO, bearing on the right side spool carrier slipped out due to bearing carrier being installed backwards and allowing the bearing to be unconstrained and work its way fully out of the carrier***(Figure 1)*** causing something in the chain to break apart its master link, most likely due to the spool being able to oscillate as one side is no longer constrained. ***(Figure 2 & 3)*** Chain lodged itself in the drive line and grinded against the motor while the motor began to cost down after estoping, The Chain then was stuck in the corner and grinded on the Emrax side casing ***(Figure 4 & 5)***. It than fell and land on the sprocket adapter bolts breaking the safety wire and unscrewing the one of the bolts ***(Figure 6 and 7)***. Other damage is to the rear sprocket ***(Figure 9)***, front sprocket ***(Figure 12 & 13)*** & yoke plat ***(Figure 10)***. We also noticed that more of the bolts holding on the rear sprocket is missing now after this ***(Figure 11)***

Explode.mp4 Sniped Video of drive line exploding



Slightly longer explode.mp4

GOPR0201.MP4 Full video (Skip to 5:00)

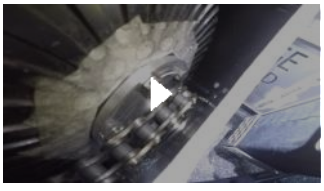
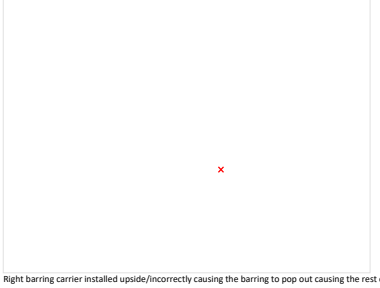


Figure 1 : Theorized root cause.

Figure 8



Right barring carrier installed upside/incorrectly causing the barring to pop out causing the rest of the damage bellow

Figure 2 : Chain Damage

Jonathan notes:
Test day overall went better than the last, but still cut short.

Bray was able to drive a few laps while we monitored chain tension, and it did loosen more over time. We paused testing and added more shims which brought the chain tension to nearly perfect (had slack, but not much- eyeball says 1/8th) which took ~20 minutes. Would like to revise the design for next year to improve shim accessibility.

After tightening, he got maybe a lap or two before the driveline exploded again as noted on the side.

I believe the failure to be caused by the bearing carrier being flipped on install (rip) and bearing walking out, which loosened the chain and caused that series of events. This sucks because the driveline might have been okay otherwise, and this was easily preventable by triple checking work on install or someone else double checking before going out to the lot.

I'm reasonably sure it was initially installed correctly, but as they can slip on/off by hand I probably flipped it before it got bolted into the car.

We also noticed the rear sprocket bolts were eating into the carrier, and thus loosening and losing them. A total of 3 were noted to be missing at time of failure.

I plan to change the following items on the spool CAD before remanufacturing the design-
-10-24 tension cap holes become 10-32 to match rest of driveline
-bolt pattern corrected to what is in real life/matches IC
-Decrease room for head of shoulder bolt to sit in (because we can buy 0.125 low profile instead of grinding them down to 0.135 like rn) which will gain us some threads

ACU Code changed to support 10bit readings.
Parsing of the 10bit readings from the new CAN frames seems correct, however the actual data seems malformed. Need to investigate
Temporary fix is to ignore values which deviate >70% from the avg

Slight tele yap by chance

So the Pi has no fucking clue what time it is, so time stamped logs are worthless (at least for name and documentation, eveLogger is still right), yoinking Johnathen's RPi 5 with rtc to use going forward which may also help with the real time py parser not being able to keep up with the VectorNav @ 400 HTz (for now the VN is limited to 100hz (the mcap files disagree with this btw not sure why other than I didn't actually push the code??????)).

As for the Bullets I am extremly disappointed with their range right now, there are some optimizations to make in the config of them, but it will kill everyone ability to connect straight to the car and will require another router as a middle man if more than 1 person wants tele. (Turning on airmax with PtP optimizations on).

Should also investigate new antenna for better placement so its not greeted by RF blocking carbon the second it turns away from us (rear wring (fuck I am tired))

TL:DR

- Pi 3 cannot time stamp as it has no RTC (Fix with Pi 5)
- Pi 3 cannot parse a full 1MB CAN bus (Fix with Pi 5 and/or better code)
- Bullets need optimization (Better config and better antenna placement)

So currently a skill/budget issue

Pi 5 stuff coming 5/29 I think -jonathan

Sharp material on the chain itself ,

Figure 3: Master link damage

Seems to have been stretched

Figure 4: Damaged on the emrax from the chain rubbing on it after snapping

Figure 5

Figure 6

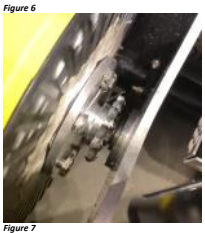


Figure 7

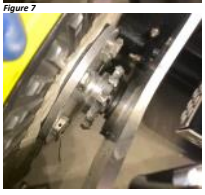


Figure 9: Other side or rear sprocket, very much munched because of the chain

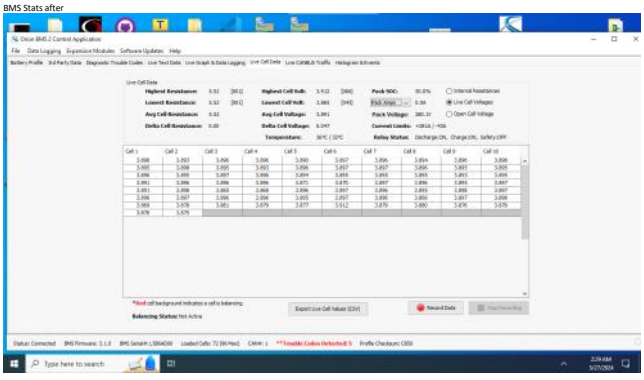
Figure 10 Yoke plate

Poor yoke plate getting more munched

Figure 11

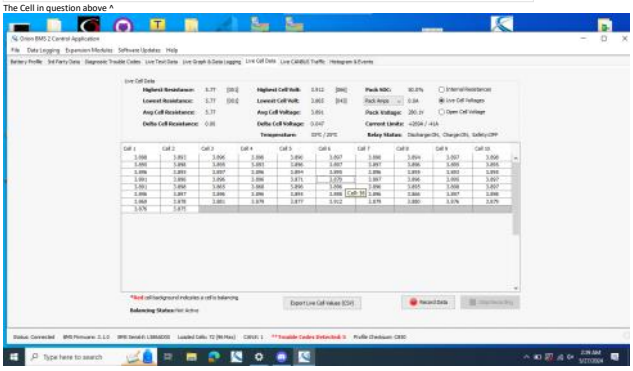
Figure 12 & 13

BMS Stats after



BMS fault codes after

The Cell in question above ^



5/27 No shop day

Monday, May 27, 2024 7:03 PM

Shop was locked, unable to do any work so focus was put elsewhere for now

5/28 Shakedown and light endurance

Monday, June 26, 2023 8:48 PM

Copy test overview from testing plan to here day of test

Pre-check

Monday, May 27, 2024 11:27 PM

Master checklist

- [x] Packing list
- [ ] VD
- [x] EV Driveline
- [ ] LV
- [x] Aero/Composites
- [ ] Tech Inspections

The General Packing list for a Test Day:
MUST HAVE:

- [ ] Test Day Box (bruh)
  - [x] Tire pyrometer
  - [x] Toughbook
  - [x] Toughbook charger
  - [x] Tire pyrometer
  - [x] Longacre (red) tire pressure gauge
  - [x] HV Gloves
- [ ] Test Day Documents
  - [ ] Test Plan/Proposal
  - [ ] Results logging (excel or paper)
- [ ] Two Jack Stands
- [ ] Timing Gates
- [ ] Cones
- [x] Tools
  - [x] HV Tools Box
  - [x] 7/16 Wrench or Socket
  - [x] 5/16 Wrench or Socket
  - [ ] 5/8 Socket
  - [x] 3/16 Allen
- [x] Fire Extinguisher

VD checklist

FFs please check this shit before we take the car out, it's a fucking bolt- sammy (I think -J)
SUSPENSION BOLTS CHECK
FRONT LEFT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

FRONT RIGHT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

RIGHT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

LEFT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

Toe Alignment:

- [ ] **# Whenyou do this please record who did it**
- [ ] With tape measure, measure the tie rod (not the toe rod, rods coming out of steering rack) length and make it equal left right and paint marker a line where the tie rod and steering rack meet
- [ ] Ensure shims are correctly at zero amount (5 shims on the front, 3 shims in the rear) everything should b in the green suspension box and tire pressures are at 12 (sidewall deflection with pressure is real)
- [ ] Undo jam nuts on toe rod and using toe plates (ensure they are centered with each other) tape measure front and rear of each tire)
- [ ] Ensure the length front to rear of the tire is the same
  Rinse and repeat for rear

Corner Balance: Last done previous test day... lol sorry
Record names of who did it and make sure to save this for last

- [ ] Fill tires to 12 psi, get a person in the car
- [ ] Loosen jam nuts on the push rods
- [ ] Put scales next to each side, turn on, ZERO BEFORE PUTTING CAR ON, put the car on
- [ ] I would take a pic here before doing anything to see the difference of before zeroing and after zeroing
- [ ] When corner balancing think about it as legs on a table, they work diagonally so try to corner balance across the car (guessing and checking is also fine as well). You do need to make sure to avoid bottoming out the push rod (you are pre loading it when adjusting which can be bad for the push rod under load)
- [ ] I try to get it to within 5 lbs of each corner but **when you're done take a picture** and put it in car-testing channel or in here (in here is preferred)
- [ ] Lock jam nuts and pack it up
  Measurements before taking car out:

Corner Balance
LF Weight:
RF Weight:
LR Weight:
RR Weight:

Camber
LF:
RF:
LR:
RR:

EV Driveline checklist

Each main item should be checked off if it is present and ready to go. If any sub-checks apply when inspecting, also check off. It is assumed that if any of the sub-checks apply, they are written in the blank below and corrected before checking off the main item. Pictures of failures/more information beyond a basic description is not required, but recommended.

Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- [x] **Left emrax mounting plate**
  3x 1/4-28 bolts
  7/16 wrench and 5/16 wrench
  - [x] Loose?
    Top rear bolt
    Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

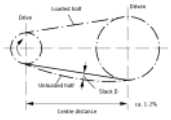
- [x] **Left emrax mounting plate**
  3x 1/4-28 bolts
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] ***Right emrax bearing mounting plate***
  3x 1/4-28 bolts
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] **Yoke plate bolts (6x 3/8)**
  6x 3/8
  _ Hex and 1/2 wrench
  - [ ] Loose?
- [x] **Left bearing carrier**
  2x 1/4-28
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] ***Right bearing carrier***
  2x 1/4-28
  7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] **Rear sprocket bolts**
  8x 10-32
  _ Hex and 5/16 wrench
  - [x] Loose?
    Lol yeah can't tighten some of em bc stripped

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- [x] **Emrax mounting bolts**
  6x M8
  - [ ] Loose/missing safety wire?
- [x] **Emrax sprocket adapter bolts**
  6x M8
  - [x] Loose/missing safety wire?
    Yeah I didn't put any on it lol
- [x] **Inner/spool left tension cap**
  3x 10-24
  - [x] Loose/missing safety wire?
    Do not have right bolts
- [x] ***Inner/spool right tension cap***
  3x 10-24
  - [x] Loose/missing safety wire?
    Do not have right bolts
- [x] **Outer/hub left tension cap**
  3x 10-24
  - [ ] Loose/missing safety wire?
- [x] ***Outer/hub right tension cap***
  3x 10-24
  - [ ] Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- [x] **Left emrax mounting plate**
  - [ ] Bent?
- [x] ***Right emrax bearing mounting plate***
  - [ ] Bent?
- [x] **Front sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [x] **Front sprocket spacer**
- [x] **Rear sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [x] **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - [x] +/- 1/4th chain width
  - [ ] +/- 1/4th chain width
- [x] **Chain tension**- check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the chain upwards and measure the distance, recording it below appropriate checkbox
  - [x] x inches
    1/8th in
  - [ ] x inches



- [x] Left bearing carrier
  - [x] Installed in correct direction (bearing retained)
  - [x] Bearing fully seated and in working order
- [x] *Right bearing carrier*
  - [x] Installed in correct direction (bearing retained)
  - [x] Bearing fully seated and in working order

LV checklist

@LV fill this guy in more but this is what I can think of

- [x] Fully charge both LV batteries
- [x] Check and see if any loose/ USB cables are lose
- [ ] Turn LV on-off to generate fresh log, check that SD card is logging
- [ ] Install any daq (will flush more out)

Aero checklist

@Aero @Composites fill this guy in more but this is what I can think of

- [ ] Front wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon?(Check after each run)
- [ ] Rear wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [ ] Undertray
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [x] Body
  - [x] Pushpins tight?
  - [ ] Any cracks in carbon?
- [x] Side body
  - [x] Pushpins tight?
  - [ ] Any cracks in carbon?
- [x] Swiss Cheese
  - [x] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] ECU mount
  - [ ] Any cracks in carbon?
- [x] Floor Pan
  - [x] Bolts tight?
  - [ ] Cracks in carbon?
- [ ] Tools
  - [ ] FW tools
  - [ ] RW tools
  - [ ] UT tools

Tech

(did we doing any Tech inspections before going out, any issue/ illigal write below each catogory)

- [ ] Mechnical
  -
- [ ] Acc tech
  -
- [ ] Ev active
  -

Successful test, brakes, tilted carrier

Monday, May 27, 2024 11:28 PM

Critical Issues:
-Brakes smoke, smell bad, and feel worse
-Left bearing carrier looks slightly tilted in
-Seat is awful (sliding all around)
-Steering feel is heavy still

Full description & sequence of events:
Got car ready and lightly prepped- enough for car to go out and test.
Spool bolts are pretty much all stripped out and awful lol, none of them tighten. They were not spec'd properly for the spool in the first place, and do not want to tighten even after grinding
Chain was cut down links for the new front and rear sprocket, was very annoying to cut but it's good now
I HATE SHIMS (sorry, they're just really annoying to set tension with since you have to fully bolt down everything. There's not a good way to estimate how many shims you will need before doing so since very tiny shim amounts = large chain tension amounts and we don't have small enough intervals. The bolts/nuts are hard to access and it eats away time, I'd say we spend 2-3 hours on shims this test day alone- ~1 hour setting them up and another 2 fiddling with them to fix tension/carriers)

Sprocket adapter bolts are nice and tight but not safety wired bc not needed for rules, and tbh, too tired/other priorities

Car was tested in 120 for a pull or two, checked chain tension which looked good, about 1/8th (not tight but nice)
Same for 180, but noticed left carrier looked crooked
Thought it might be bc tightened down tension caps before carriers
- Unbolted tension caps and carriers
- tightened carriers
- tightened tension caps
  - NO CHANGE

Measured shims and found bottom right to be one of the slightly thinner ones
- Removed and replaced with same size as others
  - CHAIN TOO TIGHT

Tired, so removed top two bolts, removed one shim, slipped a thinner open ended one on each top
- CHAIN TOO LOOSE (but we still ran it so not like too too too loose, but more than usual)
- Also, carrier still looks to be tilted in some, not sure how to fix that one but it's held up so far...?

Did 120, 180 sequence again, chain didn't get much looser but still wasn't good, but sprocket teeth looked great so popped it into 240nm and did a few laps
Determined acc voltage was getting low, and brakes were smelling absolutely toxic and smoking so we decided to call it there

Driver feedback was that
the brakes felt like they barely worked and felt like they might be warped
The seat allows a fuck ton of movement (going to put gopro facing driver and monitor later)
Steering effort is heavy and uncommunicative
Car feels kinda slow, at least esp at low end lol...
Good otherwise, setup feels fine

Future to-do:

- [ ] -Safety wire sprocket adapter
- [ ] -Tension chain slightly more (see teams for videos where it looks too loose at end)
- [x] -Charge acc/check charger
- [ ] -Clean rotors/investigate warping
- [ ] -Look at left bearing carrier and see if tilting is a real issue
- [ ] -set steering rack preload...? Maybe
- [ ] -flash vcu with sprocket data
- [ ] -

Side note:
Adding the LEDs to the chain guard was suchhhhh a good idea, even just for working on driveline in the dark. Going to look at adding them to other areas potentially, at least for after comp when weight doesn't matter. Plug into LV battery is convenient bc car doesn't need to be on, and no one has to hold dim flashlight at correct spot for like 2 hours while doing shims

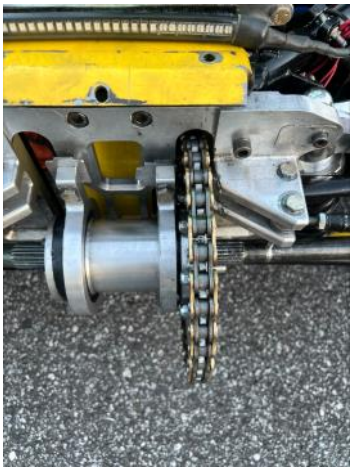
Photos:

Crooked maybe?

More photos:

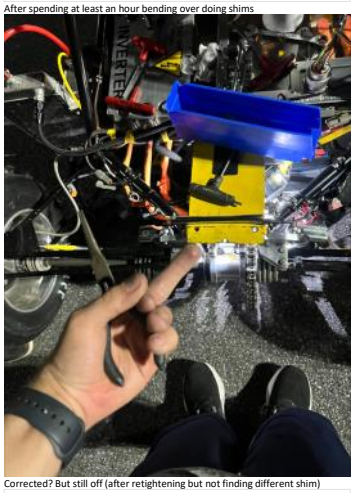
Ah ha, slightly different thickness

Fixed? Looked better at least ig



Morning test day

After spending at least an hour bending over doing shims



Corrected? But still off (after retightening but not finding different shim)

KSU worker wanting a photo of the car for son (it's the guy that sees us early at 5am when they whip the lil trash carts around)

Hopped a ride all the way from the shop and was chillin on the car for like 2 hours, emil wasn't a fan though so middle way through smacking driveline with a hammer he had to get a lil bonk (don't ask why rad is dented near that spot now)


7:09
Discord
cdn.discordapp.com

5/29 Accel/LC testing and Skidpad tuning/driver practice

Need to change date and title ?

Sunday, May 26, 2024 3:27 PM

5/29 Wednesday, East lot

Acceleration/launch control testing

Prep:

Old LCOs? We plan on doing a good bit of pulls sooo…

Check standard car setup (toe, corner balance)

Charge pack to 100%

Wing in open config (or no aero)

Shockpots (for next day, but test/validate in lot)

Plan:

Run 3 accel runs to test car's general ability to withstand an accel run, gather pedal input information, and check that slip parameters are setup correctly

If that goes well:

Refer to test setup sheet/guide

Analysis:

Bolts check and seeing if anything failed

Check data, see time reduction across different methods and repeatability and look into what method would be best to look at. No more air strip, but would be good to repeat the same tests there and see how the different methods react to more/less traction.

Skidpad tuning/driver practice

Prep:

New LCOs?

Check standard car setup (toe, corner balance)

Charge pack to 80%

Aero on

Plan:

Let each driver perform multiple runs on the way the car is setup now to get them comfortable and familiar with how the car handles

I would suggest letting emil drive a few runs as well to give feedback on setup changes to make

Perform a set of runs and analyze tire temp, times, shockpots, etc to determine setup changes @VD

Analysis:

Bolts check and seeing if anything failed

Review data and determine optimal skidpad setup

1. Prep car
    a. Fully charge car to 100 SOC (302.7V)
    b. Fully charge LV battery
    c. Test lora logger and ensure it is logging
    d. Plug in water pump & make sure it is filled
    e. Set up accel timing gates
        i. First gate 0.3m (11.8in) from starting car (front of the nose or wherever it is going to break the gate at)
        ii. Second gate 20m (65.6ft) from first gate
        iii. Final 75m (246.063ft) away from first gate
2. Stage car for control run (no LC)
    a. Record ambient and SOC level
    b. Have driver launch car without launch control & record acceleration times
    c. Record SOC level and save data log
    d. Repeat above until all 3 runs are completed
3.

If SOC drops below 80% after a 3 run group, recharge car back to 100% SOC

Pre-check

Monday, May 27, 2024 11:27 PM

Master checklist

- [x] Packing list
- [ ] VD
- [x] EV Driveline
- [ ] LV
- [ ] Aero/Composites
- [ ] Tech Inspections

The General Packing list for a Test Day:
MUST HAVE:

- [x] Test Day Box (bruh)
  - [x] Tire pyrometer
  - [ ] Toughbook
  - [ ] Toughbook charger
  - [x] Tire pyrometer
  - [x] Longacre (red) tire pressure gauge
  - [x] HV Gloves
- [ ] Test Day Documents
  - [ ] Test Plan/Proposal
  - [ ] Results logging (excel or paper)
- [ ] Two Jack Stands
- [ ] Timing Gates
- [ ] Cones
- [x] Tools
  - [ ] HV Tools Box
  - [x] 7/16 Wrench or Socket
  - [ ] 5/16 Wrench or Socket
  - [ ] 5/8 Socket
  - [ ] 3/16 Allen
- [x] Fire Extinguisher

VD checklist

FFs please check this shit before we take the car out, it's a fucking bolt- sammy (I think -J)
SUSPENSION BOLTS CHECK
FRONT LEFT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

FRONT RIGHT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

RIGHT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

LEFT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [x] **TORQUE WHEEL (40 ft/lb)**

Toe Alignment:
if Whenyou do this please record who did it

- [ ] With tape measure, measure the tie rod (not the toe rod, rods coming out of steering rack) length and make it equal left right and paint marker a line where the tie rod and steering rack meet
- [ ] Ensure shims are correctly at zero amount (5 shims on the front, 3 shims in the rear) everything should b in the green suspension box and tire pressures are at 12 (sidewall deflection with pressure is real)
- [ ] Undo jam nuts on toe rod and using toe plates (ensure they are centered with each other) tape measure front and rear of each tire)
- [ ] Ensure the length front to rear of the tire is the same
- [ ] Rinse and repeat for rear

Corner Balance:
Record names of who did it and make sure to save this for last

- [ ] Fill tires to 12 psi, get a person in the car
- [ ] Loosen jam nuts on the push rods
- [ ] Put scales next to each side, turn on, ZERO BEFORE PUTTING CAR ON, put the car on
- [ ] I would take a pic here before doing anything to see the difference of before zeroing and after zeroing
- [ ] When corner balancing think about it as legs on a table, they work diagonally so try to corner balance across the car (guessing and checking is also fine as well). You do need to make sure to avoid bottoming out the push rod (you are pre loading it when adjusting which can be bad for the push rod under load)
- [ ] I try to get it to within 5 lbs of each corner but **when you're done take a picture** and put it in car-testing channel or in here (in here is preferred)
- [ ] Lock jam nuts and pack it up

Measurements before taking car out:

Corner Balance
LF Weight:
RF Weight:
LR Weight:
RR Weight:

Camber
LF:
RF:
LR:
RR:

EV Driveline checklist

Each main item should be checked off if it is present and ready to go. If any sub-checks apply when inspecting, also check off. It is assumed that if any of the sub-checks apply, they are written in the blank below and corrected before checking off the main item. Pictures of failures/more information beyond a basic description is not required, but recommended.

Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- [x] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [x] Loose?
    - Top rear bolt
    - Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

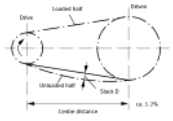
- [x] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] ***Right emrax bearing mounting plate***
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] **Yoke plate bolts (6x 3/8)**
  - 6x 3/8
  - _ Hex and 1/2 wrench
  - [ ] Loose?
- [x] **Left bearing carrier**
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] ***Right bearing carrier***
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] **Rear sprocket bolts**
  - 8x 10-32
  - _ Hex and 5/16 wrench
  - [ ] Loose?

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- [x] **Emrax mounting bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?
- [x] **Emrax sprocket adapter bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?
- [ ] **Inner/spool left tension cap**
  - 3x 10-24
  - [x] Loose/missing safety wire?
- [ ] ***Inner/spool right tension cap***
  - 3x 10-24
  - [x] Loose/missing safety wire?
- [x] **Outer/hub left tension cap**
  - 3x 10-24
  - [ ] Loose/missing safety wire?
- [x] ***Outer/hub right tension cap***
  - 3x 10-24
  - [ ] Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- [x] **Left emrax mounting plate**
  - [ ] Bent?
- [x] ***Right emrax bearing mounting plate***
  - [ ] Bent?
- [x] **Front sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [x] **Front sprocket spacer**
- [x] **Rear sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [x] **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - [x] +-y/- 1/4th chain width 1/16in
  - [ ] +-y/- 1/4th chain width
- [x] **Chain tension**- check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the chain upwards and measure the distance, recording it below appropriate checkbox
  - [x] + x inches 1/32
  - [ ] + inches



- [x] Left bearing carrier
  - [x] Installed in correct direction (bearing retained)
  - [x] Bearing fully seated and in working order
- [x] *Right bearing carrier*
  - [x] Installed in correct direction (bearing retained)
  - [x] Bearing fully seated and in working order

LV checklist

@LV fill this guy in more but this is what I can think of

- [x] Fully charge both LV batteries
- [x] Check and see if any loose/ USB cables are lose
- [x] Turn LV on-off to generate fresh log, check that SD card is logging
- [ ] Install any daq (will flush more out)

Aero checklist

@Aero @Composites fill this guy in more but this is what I can think of

- [ ] Front wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon?(Check after each run)
- [ ] Rear wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [ ] Undertray
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [ ] Body
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] Side body
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] Swiss Cheese
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] ECU mount
  - [ ] Any cracks in carbon?
- [ ] Floor Pan
  - [ ] Bolts tight?
  - [ ] Cracks in carbon?
- [ ] Tools
  - [ ] FW tools
  - [ ] RW tools
  - [ ] UT tools

Tech

(did we doing any Tech inspections before going out, any issue/ illegal write below each category)

- [ ] Mechanical
  -
- [ ] Acc tech
  -
- [ ] Ev active
  -

Details

Monday, May 27, 2024 11:28 PM

208 mv

Critical Issues:

-

-

Rear left upright camber adjustment loose, whole upright would move
Had to add some thin shims all around to tighten chain
Made 55kw on dyno and seems to run well
Had to calibrate pedals

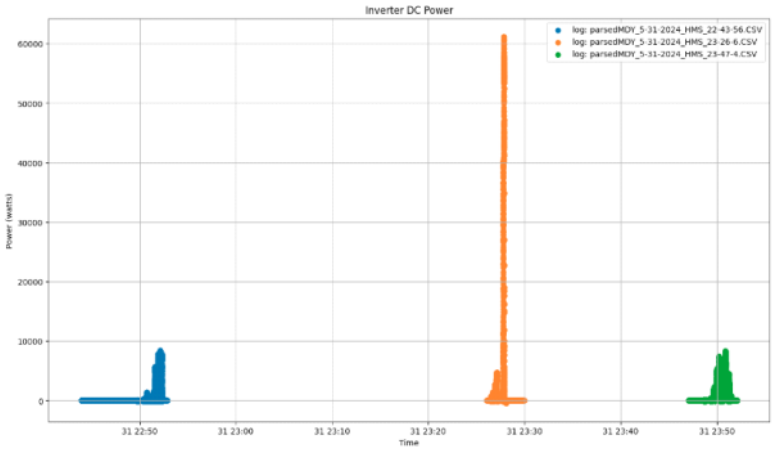
Got some good testing, didn't see much improvement but the straight to pedals or ramp worked somewhat well

Full description & sequence of events:

Fully charged

Future to-do:

-



6/1 Skidpad driver practice & undertray shake down

Sunday, May 26, 2024 3:27 PM

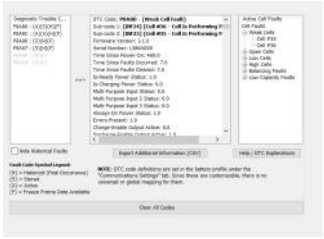
Ran skidpad with mihai to fimiliziz with the car
Also put undertay on the car, Scrapes like a mother trucker

Ran sidpad with meil , he wanted to see how much he would move in the seat , and how much more undertray would scrape

- Should ajust ride hights with front aero to see if the scraping issue gets better/sloved . But front wring and rear need to be in aero box

Befor charging

- Temps not working?

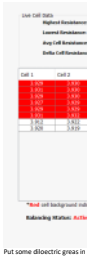


https://www.orionbms.com/troubleshooting/generic-onoff-charger-charging-for-standard-orion-bms/

Conclusion form this / working theroy

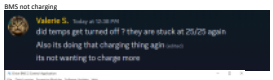
The BMS white connector has a fulty crimp. The BMS dosnt seem to be dammagemed because it is still abale to read the cell voltage of the eniter module Cell 36 on module 3 is the boi in question. When the individual cell voltage is above a certinein % the inrush when shargingspikes it above the voltage limit we set in the BMS, killing charging. My thorenty that we were able to charge the other day is because the individual cell voltagewas low enuight, so that when the voltage spike happened it was under the limit we set and letting it continue to charge.

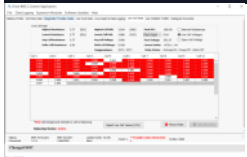
So if we dischgare enough we should be able to charge up to what ever voltage we want. We just cant top off at a starting higher voltage



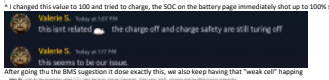
Put some dlioectric greas in

BMS not charging

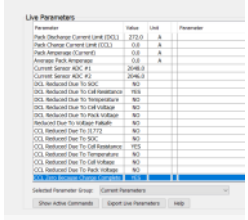


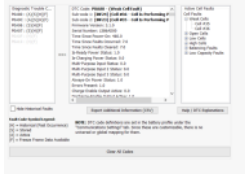


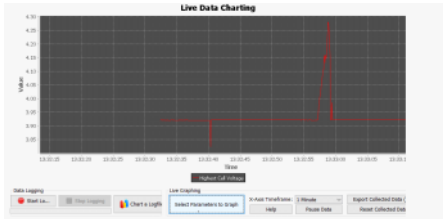
* i changed this value to 100 and tried to charge, the SOC on the battery page immediately shot up to 100% soc , the BMS still thinks it its "fully charged"

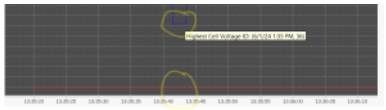


After going thu the BMS sugestion it dose exactly this, we also keep having that "weak cell" happing

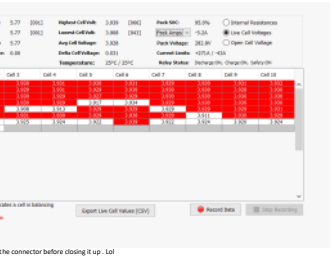




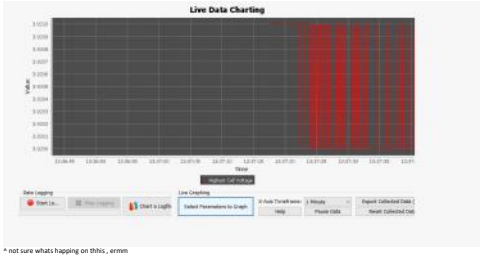




Matches cell 36



the connector before closing it up . Lol



^ not sure whats happing on thhis , ermm

Pre-check

Monday, May 27, 2024 11:27 PM

Master checklist

- [ ] Packing list
- [ ] VD
- [ ] EV Driveline
- [ ] LV
- [ ] Aero/Composites
- [ ] Tech Inspections

The General Packing list for a Test Day:
MUST HAVE:

- [ ] Test Day Box (bruh)
  - [ ] Tire pyrometer
  - [ ] Toughbook
  - [ ] Toughbook charger
  - [ ] Tire pyrometer
  - [ ] Longacre (red) tire pressure gauge
  - [ ] HV Gloves
- [ ] Test Day Documents
  - [ ] Test Plan/Proposal
  - [ ] Results logging (excel or paper)
- [ ] Two Jack Stands
- [ ] Timing Gates
- [ ] Cones
- [ ] Tools
  - [ ] HV Tools Box
  - [ ] 7/16 Wrench or Socket
  - [ ] 5/16 Wrench or Socket
  - [ ] 5/8 Socket
  - [ ] 3/16 Allen
- [ ] Fire Extinguisher

VD checklist

FFs please check this shit before we take the car out, it's a fucking bolt- sammy (I think -J)
SUSPENSION BOLTS CHECK
FRONT LEFT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

FRONT RIGHT

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Steering Tie rod
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

RIGHT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

LEFT REAR

- [ ] Bellcrank chassis
- [ ] Control arm
- [ ] Toe rod
- [ ] Toe rod shims
- [ ] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

Toe Alignment:
if Whenyou do this please record who did it

- [ ] With tape measure, measure the tie rod (not the toe rod, rods coming out of steering rack) length and make it equal left right and paint marker a line where the tie rod and steering rack meet
- [ ] Ensure shims are correctly at zero amount (5 shims on the front, 3 shims in the rear) everything should b in the green suspension box and tire pressures are at 12 (sidewall deflection with pressure is real)
- [ ] Undo jam nuts on toe rod and using toe plates (ensure they are centered with each other) tape measure front and rear of each tire)
- [ ] Ensure the length front to rear of the tire is the same

Rinse and repeat for rear

Corner Balance:
Record names of who did it and make sure to save this for last

- [ ] Fill tires to 12 psi, get a person in the car
- [ ] Loosen jam nuts on the push rods
- [ ] Put scales next to each side, turn on, ZERO BEFORE PUTTING CAR ON, put the car on
- [ ] I would take a pic here before doing anything to see the difference of before zeroing and after zeroing
- [ ] When corner balancing think about it as legs on a table, they work diagonally so try to corner balance across the car (guessing and checking is also fine as well). You do need to make sure to avoid bottoming out the push rod (you are pre loading it when adjusting which can be bad for the push rod under load)
- [ ] I try to get it to within 5 lbs of each corner but **when you're done take a picture** and put it in car-testing channel or in here (in here is preferred)
- [ ] Lock jam nuts and pack it up

Measurements before taking car out:

Corner Balance
LF Weight:
RF Weight:
LR Weight:
RR Weight:

Camber
LF:
RF:
LR:
RR:

EV Driveline checklist

Each main item should be checked off if it is present and ready to go. If any sub-checks apply when inspecting, also check off. It is assumed that if any of the sub-checks apply, they are written in the blank below and corrected before checking off the main item. Pictures of failures/more information beyond a basic description is not required, but recommended.

Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- [x] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [x] Loose?
    - Top rear bolt
    - Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

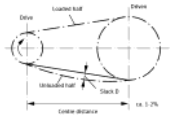
- [ ] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [ ] ***Right emrax bearing mounting plate***
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [ ] **Yoke plate bolts (6x 3/8)**
  - 6x 3/8
  - _ Hex and 1/2 wrench
  - [ ] Loose?
- [ ] **Left bearing carrier**
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [ ] ***Right bearing carrier***
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [ ] **Rear sprocket bolts**
  - 8x 10-32
  - _ Hex and 5/16 wrench
  - [ ] Loose?

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- [ ] **Emrax mounting bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?
- [ ] **Emrax sprocket adapter bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?
- [ ] **Inner/spool left tension cap**
  - 3x 10-24
  - [ ] Loose/missing safety wire?
- [ ] ***Inner/spool right tension cap***
  - 3x 10-24
  - [ ] Loose/missing safety wire?
- [ ] **Outer/hub left tension cap**
  - 3x 10-24
  - [ ] Loose/missing safety wire?
- [ ] ***Outer/hub right tension cap***
  - 3x 10-24
  - [ ] Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- [ ] **Left emrax mounting plate**
  - [ ] Bent?
- [ ] ***Right emrax bearing mounting plate***
  - [ ] Bent?
- [ ] **Front sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [ ] **Front sprocket spacer**
- [ ] **Rear sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [ ] **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - [ ] +/- 1/4th chain width
  - [ ] +/- 1/4th chain width
- [ ] **Chain tension**- check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the chain upwards and measure the distance, recording it below appropriate checkbox
  - [ ] x inches
  - [ ] x inches



- [ ] Left bearing carrier
  - [ ] Installed in correct direction (bearing retained)
  - [ ] Bearing fully seated and in working order
- [ ] *Right bearing carrier*
  - [ ] Installed in correct direction (bearing retained)
  - [ ] Bearing fully seated and in working order

LV checklist

@LV fill this guy in more but this is what I can think of

- [ ] Fully charge both LV batteries
- [ ] Check and see if any loose/ USB cables are lose
- [ ] Turn LV on-off to generate fresh log, check that SD card is logging
- [ ] Install any daq (will flush more out)

Aero checklist

@Aero @Composites fill this guy in more but this is what I can think of

- [ ] Front wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon?(Check after each run)
- [ ] Rear wing
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [ ] Undertray
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [ ] Body
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] Side body
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] Swiss Cheese
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] ECU mount
  - [ ] Any cracks in carbon?
- [ ] Floor Pan
  - [ ] Bolts tight?
  - [ ] Cracks in carbon?
- [ ] Tools
  - [ ] FW tools
  - [ ] RW tools
  - [ ] UT tools

Tech

(did we doing any Tech inspections before going out, any issue/ illegal write below each category)

- [ ] Mechanical
  -
- [ ] Acc tech
  -
- [ ] Ev active
  -

6/4-6/5 Breaks Shake down & Enduro/Autox

Wednesday, June 5, 2024 2:06 AM

Night of 6/4 into 6/5

Pre-check

Monday, May 27, 2024 11:27 PM

Master checklist

- [ ] Packing list
- [ ] VD
- [ ] EV Driveline
- [ ] LV
- [ ] Aero/Composites
- [ ] Tech Inspections

The General Packing list for a Test Day:
MUST HAVE:

- Test Day Box (bruh)
  - Tire pyrometer
  - Toughbook
  - Toughbook charger
  - Tire pyrometer
  - Longacre (red) tire pressure gauge
  - HV Gloves
- Test Day Documents
  - Test Plan/Proposal
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- Two Jack Stands
- Timing Gates
- Cones
- Tools
  - HV Tools Box
  - 7/16 Wrench or Socket
  - 5/16 Wrench or Socket
  - 5/8 Socket
  - 3/16 Allen
- Fire Extinguisher

VD checklist

FFs please check this shit before we take the car out, it's a fucking bolt- sammy (I think -J)
SUSPENSION BOLTS CHECK
FRONT LEFT

- [x] Bellcrank chassis
- [x] Control arm
- [x] Steering Tie rod
- [x] Toe rod
- [x] Toe rod shims
- [x] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

FRONT RIGHT

- [x] Bellcrank chassis
- [x] Control arm
- [x] Steering Tie rod
- [x] Toe rod
- [x] Toe rod shims
- [x] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

RIGHT REAR

- [ ] Bellcrank chassis
- [x] Control arm
- [x] Toe rod
- [x] Toe rod shims
- [x] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

LEFT REAR

- [x] Bellcrank chassis
- [x] Control arm
- [x] Toe rod
- [x] Toe rod shims
- [x] Upright bolts
- [ ] **TORQUE WHEEL (40 ft/lb)**

Toe Alignment:
if Whenyou do this please record who did it

- [ ] With tape measure, measure the tie rod (not the toe rod, rods coming out of steering rack) length and make it equal left right and paint marker a line where the tie rod and steering rack meet
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- [ ] Undo jam nuts on toe rod and using toe plates (ensure they are centered with each other) tape measure front and rear of each tire)
- [ ] Ensure the length front to rear of the tire is the same
- [ ] Rinse and repeat for rear

Corner Balance:
Record names of who did it and make sure to save this for last

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Measurements before taking car out:

Corner Balance
LF Weight:
RF Weight:
LR Weight:
RR Weight:

Camber
LF:
RF:
LR:
RR:

EV Driveline checklist

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Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- [x] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [x] Loose?
    - Top rear bolt
    - Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

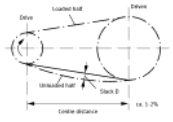
- [ ] **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [ ] ***Right emrax bearing mounting plate***
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] **Yoke plate bolts (6x 3/8)**
  - 6x 3/8
  - _ Hex and 1/2 wrench
  - [ ] Loose?
- [x] **Left bearing carrier**
  - A
  - j j. 912x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [x] ***Right bearing carrier***
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - [ ] Loose?
- [ ] **Rear sprocket bolts**
  - 8x 10-32
  - _ Hex and 5/16 wrench
  - [ ] Loose?

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- [ ] **Emrax mounting bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?
- [ ] **Emrax sprocket adapter bolts**
  - 6x M8
  - [ ] Loose/missing safety wire?
- [ ] **Inner/spool left tension cap**
  - 3x 10-24
  - [ ] Loose/missing safety wire?
- [ ] ***Inner/spool right tension cap***
  - 3x 10-24
  - [ ] Loose/missing safety wire?
- [ ] **Outer/hub left tension cap**
  - 3x 10-24
  - [ ] Loose/missing safety wire?
- [ ] ***Outer/hub right tension cap***
  - 3x 10-24
  - [ ] Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- [ ] **Left emrax mounting plate**
  - [ ] Bent?
- [ ] ***Right emrax bearing mounting plate***
  - [ ] Bent?
- [ ] **Front sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [ ] **Front sprocket spacer**
- [ ] **Rear sprocket teeth**
  - [ ] Missing?
  - [ ] Bent/chipped?
- [ ] **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - [ ] +/- 1/4th chain width
  - [ ] +/- 1/4th chain width
- [ ] **Chain tension**- check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the chain upwards and measure the distance, recording it below appropriate checkbox
  - [ ] = x inches
  - [ ] = x inches



- [ ] Left bearing carrier
  - [ ] installed in correct direction (bearing retained)
  - [ ] bearing fully seated and in working order
- [ ] *Right bearing carrier*
  - [ ] installed in correct direction (bearing retained)
  - [ ] bearing fully seated and in working order

LV checklist

@LV fill this guy in more but this is what I can think of

- [ ] Fully charge both LV batteries
- [ ] Check and see if any loose/ USB cables are lose
- [ ] Turn LV on-off to generate fresh log, check that SD card is logging
- [ ] Install any daq (will flush more out)

Aero checklist

@Aero @Composites fill this guy in more but this is what I can think of

- [x] Front wing
  - [x] On?
  - [x] Level?
  - [x] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon?(Check after each run)
- [x] Rear wing
  - [x] On?
  - [x] Level?
  - [x] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [ ] Undertray
  - [ ] On?
  - [ ] Level?
  - [ ] Bolts tight?
  - [ ] Any debonding on mounts? (Check after each run)
  - [ ] Any debonding on wing? (Check after each run)
  - [ ] Any cracks in carbon? (Check after each run)
- [ ] Body
  - [ ] Pushpins tight?
  - [ ] Any cracks in carbon?
- [x] Side body
  - [x] Pushpins tight?
  - [ ] Any cracks in carbon?
- [x] Swiss Cheese
  - [x] Pushpins tight?
  - [ ] Any cracks in carbon?
- [ ] ECU mount
  - [ ] Any cracks in carbon?
- [ ] Floor Pan
  - [x] Bolts tight?
  - [ ] Cracks in carbon?
- [ ] Tools
  - [ ] FW tools
  - [ ] RW tools
  - [ ] UT tools

Tech

(did we doing any Tech inspections before going out, any issue/ illegal write below each category)

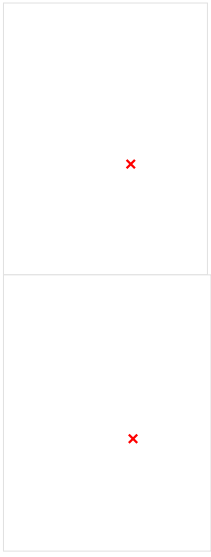
- [ ] Mechanical
  -
- [ ] Acc tech
  -
- [ ] Ev active
  -

Shakedown Details

Monday, May 27, 2024 11:28 PM

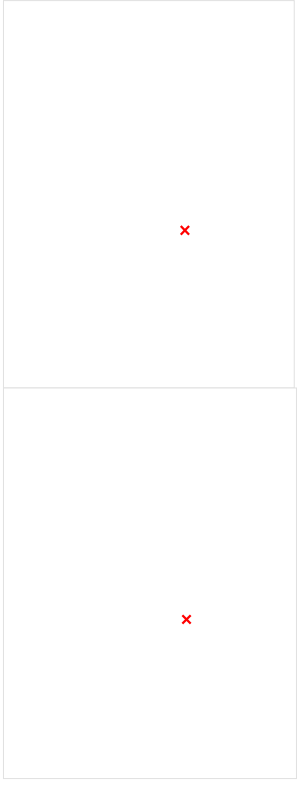
Before :

- All four corners had brakes dragging bad enough to glass pads consistently with very little runtime
- Front wheels were especially worse
- Pads were not wearing evenly on one corner as well, and rotors were misaligned
- Rotors had no movement in their "float" anymore
- Rotors also were severely warped and had varying thicknesses across their profiles
- Pads were low on life (Willwood Purple)



Fixes:

- Rotors were all removed and resurfaced on surface grinder to (insert thickness here later)
- Lightly used Wilwood Purples (almost full pad life) were installed as the current pads had almost material left
- 75 New brake buttons were machined
    - New rotors/buttons (2 different sized buttons) were installed on car and grinding seemingly improved/disappeared once the car started running



Shake down

Critical Issues:

- NEED ot make sure cooling is plug in
    - Cooling wasn't plug when we frist were down their
    - Motor conldent seem to cool down after wards, watched the temp with telem got perttey close to 70c
- Rear right tire ran over a pen cap and punctued the tire, thankfully it was the older set of LCO's but still tuff.
- Went up to shop and trying to patch the ture
- Cell 36 is still having that "weak" cell and will proably need to replace that harness to from the MDB to BMS kinda sucks ballz

Full description & sequence of events:

-

Future to-do:

-

Enduro/AutoX Details

Monday, May 27, 2024 11:28 PM

Critical Issues:

-

-

Future to-do:

-

Full description & sequence of events:

WOOO endurro

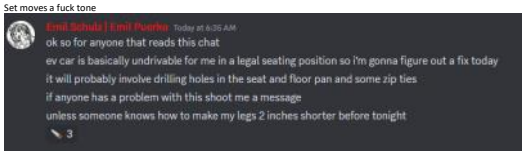
Emil yerns for more KWh

Car did ifnishsh enduro with emil being slitly pased and bray babying the car

Things to note :

- Motor was still getting very hot, with coling on the entire time
- Front aero was scraping verly hravely with car corner balanced and ride hight set

Set moves a fuck tone



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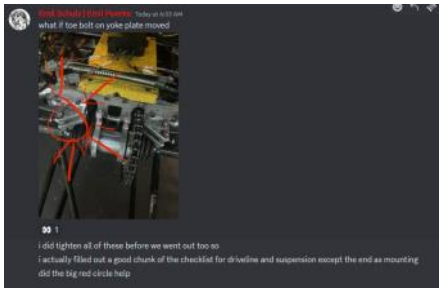
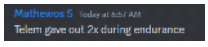




Acc before charging

Pack voltage @ 259.4V

Acc After Charging

Pack voltage @ 301.6V

Acc After Endurance

Pack voltage @ 231.6V

6/5 Skidpad and Enduracne with full aero

Wednesday, June 5, 2024 7:22 AM

D

What we are looking for in enduro

- If morot temps are sinigficantyl worse with the side wings
- Looking for debonding in the wings
- Viewing any scraping

Details

Wednesday, June 5, 2024 7:22 AM

Critical Issues:

-

-

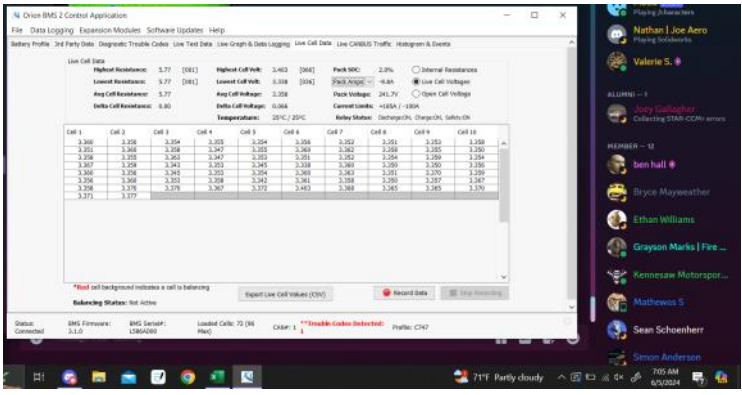
Future to-do:

-

Full description & sequence of events:

Acc before charging

Pack voltage @ 241.7V



7/6 Shock Pot Verification/Down Force

Saturday, July 6, 2024 12:42 AM

Quick Notes

- Undertray scrapes in rear

Pre-check

Monday, May 27, 2024 11:27 PM

Master checklist

- [ ] Packing list
- [ ] VD
- [ ] EV Driveline
- [ ] LV
- [ ] Aero/Composites
- [ ] Tech Inspections

The General Packing list for a Test Day:
MUST HAVE:

- Test Day Box (bruh)
  - Tire pyrometer
  - Toughbook
  - Toughbook charger
  - Tire pyrometer
  - Longacre (red) tire pressure gauge
  - HV Gloves
- Test Day Documents
  - Test Plan/Proposal
  - Results logging (excel or paper)
- Two Jack Stands
- Timing Gates
- Cones
- Tools
  - HV Tools Box
  - 7/16 Wrench or Socket
  - 5/16 Wrench or Socket
  - 5/8 Socket
  - 3/16 Allen
- Fire Extinguisher

VD checklist

FFs please check this shit before we take the car out, it's a fucking bolt- sammy (I think -j)
SUSPENSION BOLTS CHECK
FRONT LEFT
Bellcrank chassis
Control arm
Steering Tie rod
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

FRONT RIGHT
Bellcrank chassis
Control arm
Steering Tie rod
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

RIGHT REAR
Bellcrank chassis
Control arm
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

LEFT REAR
Bellcrank chassis
Control arm
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

Toe Alignment:
if Whenyou do this please record who did it
With tape measure, measure the tie rod (not the toe rod, rods coming out of steering rack) length and make it equal left right and paint marker a line where the tie rod and steering rack meet
Ensure shims are correctly at zero amount (5 shims on the front, 3 shims in the rear) everything should b in the green suspension box and tire pressures are at 12 (sidewall deflection with pressure is real)
Undo jam nuts on toe rod and using toe plates (ensure they are centered with each other) tape measure front and rear of each tire)
Ensure the length front to rear of the tire is the same
Rinse and repeat for rear

Corner Balance:
Record names of who did it and make sure to save this for last
Fill tires to 12 psi, get a person in the car
Loosen jam nuts on the push rods
Put scales next to each side, turn on, ZERO BEFORE PUTTING CAR ON, put the car on
I would take a pic here before doing anything to see the difference of before zeroing and after zeroing
When corner balancing think about it as legs on a table, they work diagonally so try to corner balance across the car (guessing and checking is also fine as well). You do need to make sure to avoid bottoming out the push rod (you are pre loading it when adjusting which can be bad for the push rod under load)
I try to get it to within 5 lbs of each corner but **when you're done take a picture**and put it in car-testing channel or in here (in here is preferred)
Lock jam nuts and pack it up
Measurements before taking car out:

Corner Balance
LF Weight:
RF Weight:
LR Weight:
RR Weight:

Camber
LF:
RF:
LR:
RR:

EV Driveline checklist

Each main item should be checked off if it is present and ready to go. If any sub-checks apply when inspecting, also check off. It is assumed that if any of the sub-checks apply, they are written in the blank below and corrected before checking off the main item. Pictures of failures/more information beyond a basic description is not required, but recommended.

Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- ✔ **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - ✔ Loose?
    - Top rear bolt
    - Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

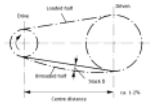
- **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - Loose?
- ***Right emrax bearing mounting plate***
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - Loose?
- **Yoke plate bolts (6x 3/8)**
  - 6x 3/8
  - _ Hex and 1/2 wrench
  - Loose?
- **Left bearing carrier**
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - Loose?
- ***Right bearing carrier***
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - Loose?
- **Rear sprocket bolts**
  - 8x 10-32
  - _ Hex and 5/16 wrench
  - Loose?

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- **Emrax mounting bolts**
  - 6x M8
  - Loose/missing safety wire?
- **Emrax sprocket adapter bolts**
  - 6x M8
  - Loose/missing safety wire?
- **Inner/spool left tension cap**
  - 3x 10-24
  - Loose/missing safety wire?
- ***Inner/spool right tension cap***
  - 3x 10-24
  - Loose/missing safety wire?
- **Outer/hub left tension cap**
  - 3x 10-24
  - Loose/missing safety wire?
- ***Outer/hub right tension cap***
  - 3x 10-24
  - Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- **Left emrax mounting plate**
  - Bent?
- ***Right emrax bearing mounting plate***
  - Bent?
- **Front sprocket teeth**
  - Missing?
  - Bent/chipped?
- **Front sprocket spacer**
- **Rear sprocket teeth**
  - Missing?
  - Bent/chipped?
- **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - <1/4-1/4th chain width
  - >1/4-1/4th chain width
- **Chain tension**- check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the chain upwards and measure the distance, recording it below appropriate checkbox
  - <1 inches
  - >1inches



- Left bearing carrier
  - installed in correct direction (bearing retained, bearing fully seated and in working order)
- *Right bearing carrier*
  - installed in correct direction (bearing retained, bearing fully seated and in working order)

LV checklist

@LV fill this guy in more but this is what I can think of
Fully charge both LV batteries
Check and see if any loose/ USB cables are lose
Turn LV on-off to generate fresh log, check that SD card is logging
Install any daq (will flush more out)

Aero checklist

@Aero @Composites fill this guy in more but this is what I can think of

- Front wing
  - On?
  - Level?
  - Bolts tight?
  - Any debonding on mounts? (Check after each run)
  - Any debonding on wing? (Check after each run)
  - Any cracks in carbon?(Check after each run)
- Rear wing
  - On?
  - Level?
  - Bolts tight?
  - Any debonding on mounts? (Check after each run)
  - Any debonding on wing? (Check after each run)
  - Any cracks in carbon? (Check after each run)
- Undertray
  - On?
  - Level?
  - Bolts tight?
  - Any debonding on mounts? (Check after each run)
  - Any debonding on wing? (Check after each run)
  - Any cracks in carbon? (Check after each run)
- Body
  - Pushpins tight?
  - Any cracks in carbon?
- Side body
  - Pushpins tight?
  - Any cracks in carbon?
- Swiss Cheese
  - Pushpins tight?
  - Any cracks in carbon?
- ECU mount
  - Any cracks in carbon?
- Floor Pan
  - Bolts tight?
  - Cracks in carbon?
- Tools
  - FW tools
  - RW tools
  - UT tools

Tech

(did we doing any Tech inspections before going out, any issue/ illegal write below each category)

- Mechanical
  - -
- Acc tech
  - -
- Ev active
  - -

Car before

j

Shock Pot Verification Details

Saturday, July 6, 2024 12:44 AM

Drag/Down Force Test Details

Saturday, July 6, 2024 12:57 AM

Test Summary

Testing was very smooth. We realized that for the E-Car, we were able to get both drag and down force data during the same run. One limitation was that we weren't able to set a speed limit via the pedal, so speed was "eyeballed." The undertray had significant contact with the ground and would have most likely caused a DQ during dynamic events at competition. This was primarily from the rear portion, where significant deflection resulted from little force applied and during acceleration.

Data Interpretation

- Removed 1st, 13th (1967s), 21st (2822s), 22nd, 23rd run shown in data

Assumptions/errors

- Some runs had small decelerations, so feedback force measured was slightly low.

The Data

- Runs 5-8 and 15-18 on Aero show difference between the speed/torque ratio.
    - There is a decrease in runs 15-18, assuming speed is constant, more torque is required, therefore more drag.

7/10/24 Inverter Tunning

Thursday, July 11, 2024 3:08 PM

Going in it was supposed to be a simple go out and tune Kp, Ki, and Kd on the inverter to get the D4 _iq_command to better match the D4_iq message and by the end of the night it was just slightly worse.

Only real notable event was setting the Kp to 50000 caused the motor to start torque shuddering horrifically, backing it down and slowing going back up we eventually got to 30000. (It appears to be just some rando number tho, as it being at 30000 didn't seem to do much)

The VCU still had its power limit set to 40kw so all the results are probably fairly inconclusive.

If all things mechanical are sound the E-Car can run with just a driver and some engineer, and a third person if you are feeling zesty and want to teach someone or something.

Other than the torque shudder tho the car was mechanically fine, nothing exploded, and nothing was gained.

For telemetry the Pi doesn't like the rapid power cycles and we often had to turn in on manually. Outside of that it functioned fine, eveLogger also seemed to be chillen. DAQ seems fine.

Womp womp

7/?/2024 Torque limit increased 160->200nm

Tuesday, July 23, 2024 1:54 AM

Theory that old 208 had higher kT so it
Had a lower current required to get 160
New motor is getting low torque bc the inverter thinks it's the old motor
We changed the max torque to 200Nm and saw the Iq we expect, so going forward we are going to have 200Nm as the max

7/31/24 - Aero On/Off Energy Limited Test 1 - Undertray Removed

Thursday, August 1, 2024 12:04 PM

Key Info:

Goal: Compare track time delta between High Downforce configuration and Aero Off.
Purpose: Verify whether or not aero has a direct benefit while energy limited in endurance.
Result: Inconclusive, test not fully performed

Lessons Learned:

1. Undertray scrapes consistently, enough for DQ.
    a. May be platforming/ride height related
2. UT Bolts very very difficult to remove, had to use angle grinder
3. Check charge and set up much earlier
4. Pack temps heated very quickly.
5. Define data collection workflow before car runs
    a. Who monitors energy, temp, time?

8/1/24 - Test 2 Aero On/Off Energy Limited

Thursday, August 1, 2024 7:13 PM

- Val ready to collect temp and energy, someone to collect lap time.

8/28/2024 Dyno + Shakedown

Monday, August 26, 2024 11:14 AM

Goals:

Dyno Session

- Get measurement for power and torque curve for electric car with the new EMRAX 208 MV
- Should not expect huge deviation from previous dyno runs with the 208 MV from Hytech

Shakedown

- Ensure the car is ready for testing the next morning
- Mainly stress mechanical platform of the electric car by running it in straight line and cornering maneuvers

Pre-check

Monday, May 27, 2024 11:27 PM

Master checklist

- [ ] Packing list
- [ ] VD
- [ ] EV Driveline
- [ ] LV
- [ ] Aero/Composites
- [ ] Tech Inspections

The General Packing list for a Test Day:
MUST HAVE:

- Test Day Box (bruh)
  - Tire pyrometer
  - Toughbook
  - Toughbook charger
  - Tire pyrometer
  - Longacre (red) tire pressure gauge
  - HV Gloves
- Test Day Documents
  - Test Plan/Proposal
  - Results logging (excel or paper)
- Two Jack Stands
- Timing Gates
- Cones
- Tools
  - HV Tools Box
  - 7/16 Wrench or Socket
  - 5/16 Wrench or Socket
  - 5/8 Socket
  - 3/16 Allen
- Fire Extinguisher

VD checklist

FFs please check this shit before we take the car out, it's a fucking bolt- sammy (I think -j)
SUSPENSION BOLTS CHECK
FRONT LEFT
Bellcrank chassis
Control arm
Steering Tie rod
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

FRONT RIGHT
Bellcrank chassis
Control arm
Steering Tie rod
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

RIGHT REAR
Bellcrank chassis
Control arm
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

LEFT REAR
Bellcrank chassis
Control arm
Toe rod
Toe rod shims
Upright bolts
TORQUE WHEEL (40 ft/lb)

Toe Alignment:
if Whenyou do this please record who did it
With tape measure, measure the tie rod (not the toe rod, rods coming out of steering rack) length and make it equal left right and paint marker a line where the tie rod and steering rack meet
Ensure shims are correctly at zero amount (5 shims on the front, 3 shims in the rear) everything should b in the green suspension box and tire pressures are at 12 (sidewall deflection with pressure is real)
Undo jam nuts on toe rod and using toe plates (ensure they are centered with each other) tape measure front and rear of each tire)
Ensure the length front to rear of the tire is the same
Rinse and repeat for rear

Corner Balance:
Record names of who did it and make sure to save this for last
Fill tires to 12 psi, get a person in the car
Loosen jam nuts on the push rods
Put scales next to each side, turn on, ZERO BEFORE PUTTING CAR ON, put the car on
I would take a pic here before doing anything to see the difference of before zeroing and after zeroing
When corner balancing think about it as legs on a table, they work diagonally so try to corner balance across the car (guessing and checking is also fine as well). You do need to make sure to avoid bottoming out the push rod (you are pre loading it when adjusting which can be bad for the push rod under load)
I try to get it to within 5 lbs of each corner but **when you're done take a picture**and put it in car-testing channel or in here (in here is preferred)
Lock jam nuts and pack it up
Measurements before taking car out:

Corner Balance
LF Weight:
RF Weight:
LR Weight:
RR Weight:

Camber
LF:
RF:
LR:
RR:

EV Driveline checklist

Each main item should be checked off if it is present and ready to go. If any sub-checks apply when inspecting, also check off. It is assumed that if any of the sub-checks apply, they are written in the blank below and corrected before checking off the main item. Pictures of failures/more information beyond a basic description is not required, but recommended.

Example: Left emrax plate has a loose bolt on the top rear and bottom rear. Technician tightens the bolt and moves on.

- ✔ **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - ✔ Loose?
    - Top rear bolt
    - Bottom rear bolt

Bolt tightness (PUT A WRENCH ON IT)

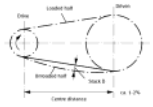
- **Left emrax mounting plate**
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - Loose?
- ***Right emrax bearing mounting plate***
  - 3x 1/4-28 bolts
  - 7/16 wrench and 5/16 wrench
  - Loose?
- **Yoke plate bolts (6x 3/8)**
  - 6x 3/8
  - _ Hex and 1/2 wrench
  - Loose?
- **Left bearing carrier**
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - Loose?
- ***Right bearing carrier***
  - 2x 1/4-28
  - 7/16 wrench and 5/16 wrench
  - Loose?
- **Rear sprocket bolts**
  - 8x 10-32
  - _ Hex and 5/16 wrench
  - Loose?

Bolt inspection (VISUALLY CHECK SAFETY WIRE)

- **Emrax mounting bolts**
  - 6x M8
  - Loose/missing safety wire?
- **Emrax sprocket adapter bolts**
  - 6x M8
  - Loose/missing safety wire?
- **Inner/spool left tension cap**
  - 3x 10-24
  - Loose/missing safety wire?
- ***Inner/spool right tension cap***
  - 3x 10-24
  - Loose/missing safety wire?
- **Outer/hub left tension cap**
  - 3x 10-24
  - Loose/missing safety wire?
- ***Outer/hub right tension cap***
  - 3x 10-24
  - Loose/missing safety wire?

Visual inspection items (LOOK AT ITEMS TO CONFIRM PRESENCE AND OTHER ASPECTS)

- **Left emrax mounting plate**
  - Bent?
- ***Right emrax bearing mounting plate***
  - Bent?
- **Front sprocket teeth**
  - Missing?
  - Bent/chipped?
- **Front sprocket spacer**
- **Rear sprocket teeth**
  - Missing?
  - Bent/chipped?
- **Chain misalignment** - looking from rear of car straight towards both sprockets, record estimate below appropriate checkbox
  - For 1/4th chain width
  - For 1/4th chain width
- **Chain tension**- check as using the image below (note flipped drive direction from our car), a straight edge placed on top tangent to both sprockets, and a small measurement device. Pull the chain upwards and measure the distance, recording it below appropriate checkbox
  - For inches
  - For inches



- Left bearing carrier
  - installed in correct direction (bearing retained, bearing fully seated and in working order)
- *Right bearing carrier*
  - installed in correct direction (bearing retained, bearing fully seated and in working order)

LV checklist

@LV fill this guy in more but this is what I can think of
Fully charge both LV batteries
Check and see if any loose/ USB cables are lose
Turn LV on-off to generate fresh log, check that SD card is logging
Install any daq (will flush more out)

Aero checklist

@Aero @Composites fill this guy in more but this is what I can think of

- Front wing
  - On?
  - Level?
  - Bolts tight?
  - Any debonding on mounts? (Check after each run)
  - Any debonding on wing? (Check after each run)
  - Any cracks in carbon?(Check after each run)
- Rear wing
  - On?
  - Level?
  - Bolts tight?
  - Any debonding on mounts? (Check after each run)
  - Any debonding on wing? (Check after each run)
  - Any cracks in carbon? (Check after each run)
- Undertray
  - On?
  - Level?
  - Bolts tight?
  - Any debonding on mounts? (Check after each run)
  - Any debonding on wing? (Check after each run)
  - Any cracks in carbon? (Check after each run)
- Body
  - Pushpins tight?
  - Any cracks in carbon?
- Side body
  - Pushpins tight?
  - Any cracks in carbon?
- Swiss Cheese
  - Pushpins tight?
  - Any cracks in carbon?
- ECU mount
  - Any cracks in carbon?
- Floor Pan
  - Bolts tight?
  - Cracks in carbon?
- Tools
  - FW tools
  - RW tools
  - UT tools

Tech

(did we doing any Tech inspections before going out, any issue/ illegal write below each category)

- Mechanical
  - -
- Acc tech
  - -
- Ev active
  - -

Car before

j

9/5/2024 Lot Shakedown

Friday, September 6, 2024 3:25 AM

Attempt to solve high speed fault and excessive APPS tripping seen on dyno (9/3).

Changes:

- Replaced main Fuse
  - Assumed failure in HV chain
- Replaced Accel pedal Pot w/ old one

1st lot sprints

- APPS failure ceased
- 512 hardware overcurrent fault

2nd lot (Fuse replaced)

- 512 Hardware overcurrent fault
- IQ limit set to 400amps
  - Previously 480
- Hardware overcurrent fault
- IQ limit set 320, ID set to 120
  - No Fault on first run
- Persisting run increased peak current seen on IQ until ~460 peak

9/29/2024 Checklist for Testing

Sunday, September 29, 2024 5:50 PM

List to get starting for Testing:

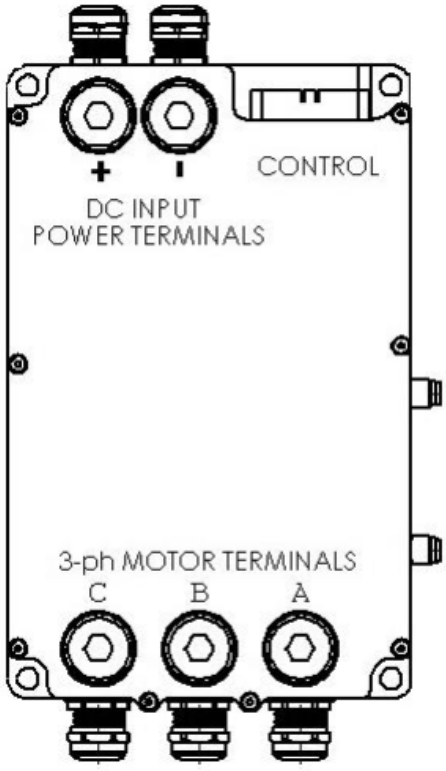
- [ ] Mechanical Tech Inspection (SAM)
- [ ] Paint Marker Suspension
- [ ] Reassemble RW
- [ ] Mount Two LC0s
- [ ] Leak Test Both LC0s

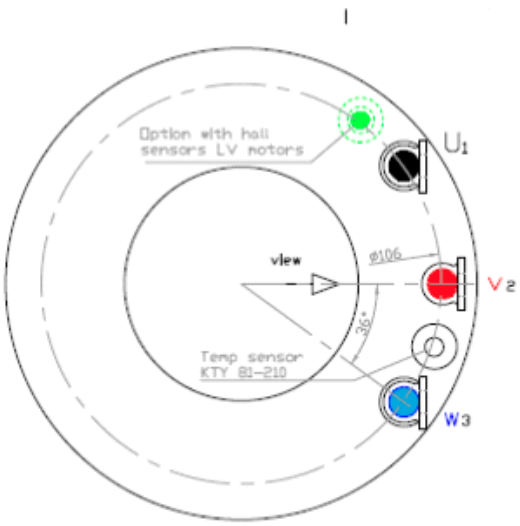
10/06/2024 Phase Lead Swapping

Sunday, October 6, 2024 1:07 AM

Swapped phase leads in attempt to remove software corrections for motor spin direction. Tried a variety of combinations and successfully concluded the following pattern turns the motor clockwise without corrections from the VCU. After a brief session in the lot, this combination also appears to have negated the overcurrent fault problems we were having with other combinations.

Car bit
The inverter tuning for the Kp, Ki, Kd, and Kq is ass, the car likes to violently oscillate at mid throttle. Outside of that it seems to make peak power around 5500 rpm, then starts to slow until it can give more power. Still can't break traction due to the aforementioned violent oscillations causing the car to just kinda skip, did fault once trying to do a pull from a stop, but rolling onto the throttle makes it a non-issue. Things to fix for Barnesville. All we did was a few pulls tho so can't say much about VD shit.




Option with hall
sensors LV motors
U1
ø106
view
V2
36°
Temp sensor
KTY 81-210
W3

10/06/2024 Phase Lead Testing Pt2

Sunday, October 6, 2024 7:06 PM

Pack Charged to ~290V and resolver was recalibrated:
Gamma adjust X 10 = -712

Took car back out and oscillation seen during previous test seemed to be resolved.
Torque feedback was matching torque command.
Car was going much faster than previously, car would get into the field weakening range ~47 kW without faulting.
Only thing that seemed odd was that the motor heated up much quicker than usual, but the car was also making
180 n-m of torque.
Car fault, didn't look like an inverter fault but we were unable to recreate it.

Other notes from Emil (driver):
When you heavily braked at a high speed there was some pretty aggressive vibration through the steering wheel.
Lugs were not torqued when we first drove down, apparently there was no issues with it last night.
Front left wheel would pick up off the ground on left hand turns, might just be because the surface was pretty not flat but this is something weve seen before. Could also have something to do with the cornerbalance since we've consistently had one wheel be much lighter.

Axles were bound when we got down to the lot.
Some functions of the dash still don’t display properly, driver can't tell which launch control mode they are using.

10/7/2024 Acceleration Benchmarking

Tuesday, October 8, 2024 1:45 AM

Wanted to get benchmarking of acceleration time before starting inverter tuning. Ran the car in wilder parking lot, seemed to be flatter and longer than what usually run in east lot. Chance had to brake before hitting the timing gate a couple of times. Car did break traction and car did burnouts.

AMBTMP: 60F

Time	Voltage	Lap Time
12:52	302	Fault - LC
12:53	302	Fault - Over Current
12:57	302	5.365
1:02	301	4.868
1:05	300	4.852
1:06	300	Fault

Bailey:
Car was able to break traction on fist few runs, followed by faulting (Iq ~ 494)
Consistently faulting on full power excel runs from dig, reduced torque command to 160nm
Torque limit reduced faulting rate, still rolled on the throttle
Car drove untimed from 295-250v

Chance:
As bailey said it was able to break traction, from a stop and mid accel run
Setting torque mode to 160 nm it still would fault at the end of a run
Car was very loose under breaking and I would have to steer to break in a straight line so that with the very short run off meant I was too uncomfy to do a proper accel run
When depleting pack could not get it to fault again no matter how fast I got it going, but was still in 160nm mode so may not entirely be SOC dependent.
Did not try to do a burn out at low SOC, was on LC0s

11/1- 11/2 Barnsville

Monday, June 26, 2023 8:48 PM

Copy test overview from testing plan to here day of test

Details

Monday, May 27, 2024 11:28 PM

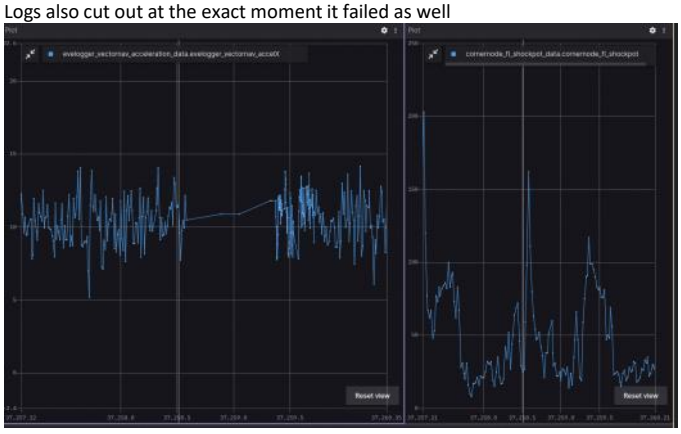
Critical Issues:

- Charging at the site wasn't easy. The Lights were running on the site, so the AC plugs were only outputting under 120v. The charger wont turn unless it gets 120v

- Current Pack on the Barnsville track pulls a lot more amps than what we see at competiton. Casuing a 15 degree increase after each lap. We had to keep sitting and waiting for the pack to cool down after each run.

- Steering pickup (sheered?, snapped?) on the front left upwrite.

Logs also cut out at the exact moment it failed as well



- Car faulted after upwitres was swapped , would get into RTD but would go into tractive . Concluded it is the precharge not working in some fashion still investing

Full description & sequence of events:

Future to-do:

- Drop the acc and diagnose the Precharge issue