

2019 PRS Rules for the Terminally Humorless

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1. Car Construction Rules

1.1. Car Body

Each car shall have a body that consists of one of the following:

- A children's ride-on toy or a recognizable portion thereof
- Something that looks like it could conceivably be or have been a children's ride-on toy or a recognizable portion thereof
- Each car must have a body at the start of each race.
- If a car's body falls apart during a race and cannot be repaired the car may continue that race IF no required safety systems (which includes bumpers and proper driver protections.) are affected by the body's absence.

1.2. Drivers

Each car shall be controlled only by one human driver seated in or on the car.

1.3. Car Egress

Each car shall be constructed such that an uninjured driver can exit the car unassisted in 5 seconds or less.

1.4. Car Size

- Each car shall not be longer than 62"
- Each car shall not be wider than 36"
- Each car, including the driver seated and dressed per the rules, shall not be taller than 72", blame the Banana Car for this one.

1.5. Wheels and Tires

- With the exception of treaded tanks and walking/shuffling carts, each car must have a minimum of three wheels that support the weight of the car.

- Any wheel driven by a motor shall not be allowed to swivel like a caster wheel. Exceptions considered upon a 1 month notice to the Sanctioning Body prior to event.
- The minimum wheel track (wheel-to-wheel width) allowed is 12".
- The minimum wheelbase (axle-to-axle length) allowed is 18".
- Each wheel that supports the weight of the car must have a tire mounted to it.
- With the exception of treaded tanks and walking/shuffling carts, all forces to drive the car during the race must be transmitted through one or more tires.
- As long as wheels and tires meet budget requirements, any type of tread pattern, or lack thereof, is allowed.

1.6. **Steering**

- No car may be steered by remote control or by anyone besides the driver(s) onboard at any time. Save that for our Autonomous league.

1.7. **Motor Propulsion**

- Each car shall be propelled only by one or more electric motors.
- Each motor must have a maximum RMS input voltage not greater than 48V from the motor controller.

1.8. **Battery**

Each car shall have at least one battery with a nominal voltage less than or equal to 48V that supplies traction current to the controller and motor

Each battery in the car shall be of one of the following chemistries:

- SLA: Sealed Lead-Acid
- AGM: Absorbed Glass Mat Lead-Acid
- Ni-Cd: Nickel-Cadmium
- Ni-MH: Nickel-Metal Hydride
- LiFePO4: Lithium Iron Phosphate
- LiPO/Li-Ion Lithium Polymer/Ion*

***WARNING:** Teams running any lithium chemistry other than LiFePO₄ (IE aircraft or EV type batteries) will need to demonstrate safe handling and charging procedures, and have batteries stored safely in a durable metal container on the vehicle. (EV batteries that are already in a metal enclosure do not require an additional containment). The sanctioning body must approve each car's implementation of Lithium batteries. Do not be the "this is why we can't have nice things" dude. Do not mess this up, cut corners, or be the amateurs who "think" they know how this works. This is dangerous, you've been warned. See Dunning-Kruger Effect if you believe you are perfectly competent without peer review.

- Any team utilizing LiPO/Li-Ion should plan to provide a means of extinguishing lithium fires (a bucket of sand is sufficient but a Class D extinguisher would be ideal, please consider donating one to the league).
- Capacitor banks (100,000uF or more of parallel capacitance) are not considered batteries and are not allowed. No switched capacitor system whose purpose is to supplement the battery power or capture braking energy is permitted. Advanced power storage systems can be considered by the Sanctioning Body with prior notice. They also can be vetoed by other teams under safety premises.

1.9. Controller

Each car shall have a throttle-controlled motor controller to transfer power from the battery or batteries to the motor(s).

Spark plates are banned.

1.10. Transponder

Each car must have a PPRS-supplied transponder affixed to it for timing and scoring purposes.

- Transponders must face upward and have a clear line-of-sight.
- Transponders must be returned to Race Control at the end of each race weekend.

- Transponders cost \$30 to rent for a race weekend for each car.

After renting a transponder 5 times, you will no longer be required to pay a rental fee in future events. By default the Sanctioning Body will hold transponders during the off-season unless a special request is filed with the Sanctioning Body for testing purposes only. They cost us money to replace.

1.11. Numbering

Each car shall have a unique number somewhere on its body. The number shall be 1-5 digits long and the lettering shall be at least 1.5" tall.

1.12. Moxie Label

Each car shall have a label for the moxie board, and its size shall be 6 inches across by 1.75 inches high. DO NOT IGNORE THIS. It's the only way the audience knows you exist. Vague labels that are not iconic or in alignment with your design will totally screw you over. If you are the red Ferrari car, for example, your label could simply be a red label stating "Ferrari." Simple is good. Flashy is better. Remember most people have no idea who you are. Clueless in-jokes will not work, random number scribbled on paper will not work effectively. Do not half—ass this. Use full ass.

The label shall contain the car or team name and the car number.

1.13. Required Safety Systems

The following features of your car are required for safety purposes, and the implementation costs of these systems do not count toward your \$500 budget:

1.13.1. Bumpers

Bumpers are required safety systems

- Each car shall have bumper—like structures in the front and rear of the car.

- Each bumper must cover at least 75% of the width of the car
- Each bumper must cover at least 1" of height within the vertical space **4-6"** **from the ground**
- Each bumper shall be constructed from a 2x4 or other wood product. No more of this "metal wrapped in fairy tales" – Bill French. Do not break the barricades. Do NOT break the barricades. Please for the love of Jim do not break a barricade with your bumper. Exceptions to the wood-construction of the bumpers will be considered by the Sanctioning Body with prior notice. 40 points to Scott Rizzo for every fixed barricade.
- Each bumper shall not protect any wheels of the car from side contact.

1.13.2. Driver Protection

The car must extend beyond the driver in every direction when viewed from directly above. This protection shall be sufficient to prevent direct contact between the driver and another car/barriers during an impact from any direction. This protection especially applies to feet, which may not dangle off the car. Occupants may not use the bumpers as a footrest. In the event of impact, drivers should not be the first point of contact with any outside intrusion of any other vehicle.

1.13.3. Brakes

Brakes are required safety systems.

- Each car shall have mechanical brakes capable of stopping the car in full per Rule 4.1.1.2
- Brakes that apply braking force directly to the tire of a car are not allowed to be the only source of mechanical braking.
- Brakes that apply braking force to the ground are not allowed.

1.13.4. Battery Retention

Battery Retention is a required safety system.

- Each battery must be secured so that it remains in its position relative to the rest of the car during normal operation and during a tip or rollover.
- Each battery must be secured with the appropriate amount of compression so that it may operate safely. The amount of compression you will need will

depend on your battery chemistry. (Lithium, I'm looking at you.) Know what you are doing before you do it.

1.13.5. Kill Switch

The kill switch is a required safety system.

- Each car must have a kill switch or removable link that stops all current flow from the battery or all batteries to the motor(s).
- This kill switch must be visible and accessible from the outside of your car.
- The kill switch should be yellow and/or red in color so someone other than you can shut your kart off in an emergency.
- The kill switch may not be your throttle.
- The kill switch should not disable any safety systems.

1.13.6. Fuse

The fuse is a required safety system

- Each car must have one PRS-regulation fuse in series with the battery or batteries such that all current coming from the battery or batteries passes through the fuse before reaching any active electrical component that makes the kart go, or go faster.
- It is recommended that the Fuse be located physically as close to the battery or batteries as possible.
- Each car may not have PRS-regulation fuses stored on the car or driver beyond the one required to be in the circuit.
- PRS-regulation fuses may not be actively cooled.
 - 'Active Cooling' is defined as cooling where energy (electrical, chemical, gravitational, dark, nuclear, thermal, temporal, etc) is expended in order to obtain some reduction in the temperature or rate of temperature rise of the fuse element.
- Should you blow a fuse on race day, the timing and scoring booth's fuse dispenser will be the only allowed source of replacement PRS-regulation fuses.

The PRS-regulation fuse that each car is required to run varies based on the car's nominal battery output voltage as follows, must be unmodified from its purchase condition, and must be installed in such a way that:

- The voltage at the fuse and the voltage at the batteries must be equal.
- All of the current moving to the motor controller must pass through the fuse before passing to the motor controller
- You really shouldn't have anything in between the fuse and the batteries.
- This is the bit that removes that one exploit Murry and Jeremy were talking about.

The fuse ratings for different nominal classes of battery systems are listed below:

- 48v = 30A Fuse (Digikey #F7139-ND) BF1 series
- 36v = 40A Fuse (Digikey #F3089-ND) MIDI series
- OR (Digikey #F6792-ND) BF1 series
- 28.8v = 50A Fuse (Digikey #F3090-ND) MIDI series
- 24v = 60A Fuse (Digikey #F3091-ND) MIDI series
- 18v = 80A Fuse (Digikey #F3092-ND) MIDI series
- 12v = 125A Fuse (Digikey #F1879-ND) MIDI series

Each car which makes use of walking mechanisms instead of wheels for propulsion is allowed to use a fuse with a current limit higher than the standard PRS-regulation fuse for that car's battery voltage.

If your nominal voltage is between ratings, you must use whichever current limit is lesser.

1.13.7 Low Voltage Alarm

A system that emits a sound, light, or other alarm to alert the driver of the kart that the batteries are approaching a dangerous low voltage threshold is required on all karts that are running non-lead-acid batteries.

- This system must monitor the batteries at the individual cell level, and not just at the full pack nominal voltage level. (Ask someone about San Mateo 2018)
- One kind of this system can be had from Amazon for ~\$2 per 6s, for example:
 - [amazon.com/CAMWAY-Battery-Voltage-Monitor-Checker/dp/B07DC3LH9C/](https://www.amazon.com/CAMWAY-Battery-Voltage-Monitor-Checker/dp/B07DC3LH9C/)
- All non-SLA packs MUST be charged with a system that monitors and balances individual cell voltage (either as a function of the charger, or a

battery management system incorporated into the battery pack) EXCEPT DANE. (Cue another chorus of “please don’t be the reason we can’t have nice things.”)

1.13.8 Lift Points

Each Kart must have lift points clearly marked if the lift points are not your visible bumpers. Expect that your kart will be lifted by two persons. If your kart is too heavy to be lifted by two persons, clearly indicate your kart “HEAVY” DO NOT LIFT. Plx no sharp/pointy/cutty bits near lift points.

1.14. Optional Safety Systems

The following features of your car are optional safety features. They are not required, but the implementation costs of these systems do not count toward your \$500 budget

1.14.1. Lights

Lights are optional safety systems for daytime races

Front and rear lights are required safety systems for nighttime races

1.14.2. Reverse

A reversing system is an optional safety system. It is strongly recommended that you implement a method to put your car into reverse operation without exiting the vehicle.

1.14.3. Horn

A horn (or similar noise-producing device) is an optional safety system for daytime races.

A horn (or similar noise-producing device) is a required safety system for nighttime races.

1.14.4. Wiring

Properly-sized wires and connectors are an optional safety system and do not count toward the \$500 budget. This should cut down on expected fires.

1.15. Budget

Each car has an allowable budget of \$500.

Use this neat table as a quick-start guide only to determine how to count various items in your budget:

Full price/FMV	Half price/FMV	Free
Motor, (a junkyard alternator as a motor counts \$10 on BOM) Motor Controller, Transmission, Sprockets, Chain, Belts, Pulleys, Gears, Frame, Bumper substructure, Wheels, Tires, Tubes, Axles, Hubs, Bearings/bushings, Steering Shaft/Arm, Tie-Rods, Spindles, Steering Wheel, Seat, Sensors (current, fuse/motor temp, steeringz, speed, etc) Performance enhancing Moxie, Active cooling for motors or controller.	Almost all Batteries. Leaf cells BOM Price \$21 per 2s Chevy Volt cells BOM Price \$100 per 12s LiFe LiPo (with pre-approval + fire extinguisher) NiMh NiCd FeMn Zinc Air HgZn Alkaline Radioactive- Thermoelectric- Generators Other??	Sealed Lead Acid Batteries, Brakes, Physical Throttle linkage, Emergency power Disconnect, Lights, Horns, Transponder, Non-performance enhancing Moxie (Paint, bondo etc), The plastic bits from an actual Power Wheels toy, Chargers, Spare parts not in car during race, Battery box or strap (thing that permanently around it) Battery BMS (in-car alarm) Power distribution Ketchup; Mustard Glitter (Wires, connectors etc) The Rick Dance Avocados

- This budget covers only items that are a part of the car as it sits on the grid of any race, and does not include the cost of spare parts or development costs (except where those development costs are also part of the price of car components as it sits on the grid)
- Each component of the car must be totaled in the budget according to the components' Fair Market Value. Fair Market Value is the cost someone could reasonably expect to pay for that item in similar condition elsewhere without a relationship to the seller/donor. The FMV of a used part worth

\$100 new and \$25 used, that you got for \$10 because your buddy owns a shop is \$25. The FMV of a used part worth \$100 new and \$25 used, that your hackerspace got for free is \$25. The FMV of a part bought on ebay (etc) from a seller who is not giving you preferential treatment is whatever you got it for, since anybody could have bought that part.

- Cars that use shuffling and/or walking mechanisms for movement will be given a 500% increase in budget.

1.15.1. Bill of Materials (BOM)

Each car is required to have a BOM submitted at the beginning of each race weekend that includes the costs of parts on the car which count toward the budget.

The minimum items to be included in the BOM are:

- Motor(s)
- Motor Controller(s)
- Wheels
- Tires
- Batteries
- Other drive train components
- Other items which increase your race performance

Full BOM submissions are highly encouraged

Race points may be awarded for exceptionally well-documented BOMs, subject to TBD determinations made by TBD judges at TBD times.

1.15.2. Excluded Items

The following items are excluded from the budget:

- All items whose primary purpose is for a safety system.
- Physical throttle components and linkage.
- Transponder.
- Original ride-on toy price.
 - Don't be *that person* that tries to make a teenager ride-on kart or atv with a real metal chassis count as free. We're talking only the decorative plastic bits from the ones for 5-9 year olds. Yes you

actually do have to put your chassis on your BOM. No this rules is not a way around that.

- Shipping costs, taxes, and customs fees for parts/hardware/materials.
- Lead-acid batteries installed in vehicle.

1.15.3. Partially Excluded Items

The following items are counted at a fraction of their fair market value:

- Non-lead-acid batteries installed in vehicle (counted at 50% their Original FMV for the most expensive configuration used)

EV LEAF CELL NOTE: Each individual 7.2V Leaf Module is valued at \$42FMV, or \$21 after the 50% budget exclusion.

CHEVY VOLT CELL NOTE: Each individual 48V Chevy Volt Module is valued at \$200FMV or \$100FMV after the 50% budget exclusion.

1.15.4. Budget Enforcement and Penalties

In the event that PPPRS officials or a majority of teams believe a team has greatly exceed the \$500 limit, they will be deemed suspect and are at risk of a PPPRS buyout. PPPRS officials comprising of our team-submitted volunteers and event organizers will determine if teams have exceeded the budget and hold all rights to purchase a team's car for \$500. By entering into an event, a team consents that their car could potentially be bought out at the end of the event for \$500. A team may redeem their car and re-enter in the next event if they agree to remove the suspected over—budget component(s).

If the panel of officials determine the carto infringe on certain rules or bend said rules to a position that is beyond "the spirit of the series," then a completely arbitrary, painful, and time consuming penalty will be administered. If we get enough referrals from other teams for "breaking budget" and our tech inspector agrees, the sanctioning body has complete freedom to severely limit the car's performance, administer embarrassing penalties, or outright strip points to satisfy the masses. This penalty will most likely be made up on the spot, will cost you considerable ire and outrage and lifting this penalty will require considerable bribery (i.e. donations to the series).

1.16. Car Decorations and Modifications

Teams are encouraged to decorate and modify their cars in imaginative ways as long as the decorations and/or modifications do not present a risk of danger or injury to other participants or spectators above and beyond the risks and dangers inherent to the sport.

Vehicular weaponry is banned.

The sanctioning body reserves the right to examine your car and prevent your car from competing if they feel it poses a danger to you, the other competitors, or the spectators.

1.17. Team Secrets

To avoid the issue of race-day disqualifications, please contact the Sanctioning Body in advance to inquire if your modifications are legal.

Modifications that are “team secrets” will be kept in confidence and will not be shared with other teams.

2. Driver Rules

2.1. General Driver Rules

- Each driver must have a valid driver’s license and be at least 16 years of age.
- Each driver under 18 years of age must also have a signed release from a parent or guardian.

2.2. Helmets

- Each driver shall wear an approved helmet whenever they are on track to race or to practice. Helmets shall be subject to inspection and approval by race officials.
- An approved helmet shall be a 3/4: or full-face motorcycle, motocross, or automotive racing helmet that meets or exceeds DOT, SNELL, or ECE standards.
- Drivers who wear helmets that do not cover the eyes are required to wear DOT approved eye protection.

2.3. Other Attire

- Each driver is required to wear closed-toe shoes.

It is SEVERELY recommended that each individual on the track (driver, pit crew, marshals) wear abrasion-resistant gloves and full-body clothing including long pants and a long shirt. Members of the pits can be provided safety glasses and are SEVERELY recommended to be worn. Pairs can be provided by the Sanctioning Body (we have only 140 of them, first come first serve--they must be returned) but you are responsible for their use and proliferation. Bring your own if you have limitations, wear them when you should. Be adults about this. It's not our fault that you are irresponsible. **The Sanctioning Body will award -20 points for failing to follow the close-toed shoe rule, retroactively applied, as they see fit.**

2.4 Practice Laps

All Drivers are required to drive multiple practice laps of the course before they drive during a race. These laps may be made during qualifying, moxie round, or free practice, and are preferably made in the vehicle driven in the race. However, they may be made in any PPPRS—legal vehicle. Any driver with 0 practice laps IS NOT allowed to drive in any race. The pre-race formation lap does not count.

3. Team Rules

3.1. Team Structure

3.1.1. Drivers/Participants

- Each Hackerspace or other organization may enter as many teams as they wish.
- Each team must consist of at least one member more than the number of cars the team will run.

3.1.2. Car Entries

Each team may submit any number of car entries to a race. It is recommended that teams submitting more than two cars register twice for Maker Faire. Entering in more than once in a maker faire ensures more available maker passes for your

team, and it may help get you (though it does not guarantee) additional pit row space.

3.2. Team Volunteer

Each team is required to submit at least one member as a volunteer for the weekend. This member can rotate duties with other team members throughout the weekend, as long as a volunteer is **always** available.

Failure for enough volunteers to be present to run every event during a race weekend will cause the race weekend to not count officially for total winds or championship points, at the Sanctioning Body's discretion. (Jim likes this idea.)

The volunteer's duties include:

- Track setup
- Race-day operations
- Flag/course marshalling

You may be worried about your ability to have a volunteer present for the race weekend. If you are having difficulty finding a volunteer to travel with you to a race, reach out on the Official Power Racing Series Facebook Group™ to find other teams that are attending, and coordinate with a team that would like to be able to bring additional volunteers, but who have capped out their Maker Faire ticket allotment.

- The Sanctioning Body may or may not compel your team to have the team volunteer pick up your transponder for the race weekend. In this event: no volunteer, no transponder.

3.3. Team Sponsorship

- Team sponsorships are allowed, and the terms of individual sponsorships are at each team's discretion.
- However, an entity does not become affiliated with Pumping Station: One, i3 Detroit, CCKC, Maker Faire, or Make Magazine by virtue of sponsoring a team in the PPRS, or any host of a Maker Faire.
- Teams may not represent to sponsors or potential sponsors that sponsoring a team in the PPRS will associate the sponsoring entity with any of these organizations, including Power Racing Series, LLC.

- Sponsors may sponsor the PPPRS in addition to specific team sponsorships.

4. General Event Rules

4.1. Event Structure

The General structure of a race weekend includes 7 events in the following order:

- Saturday:
 - Qualifying
 - Sprint 1
 - Relay Race
 - Sprint 2
 - Optional Night Race
- Sunday:
 - Sprint 3
 - Endurance Race

4.1.1. Qualifying Round

If the number of entries to an event exceeds 24, the race organizers may modify or add to these qualifying rules as they see fit in order to reduce the number of race entries to 24.

Qualifying consists of two laps of the track plus a brake test.

Cars that have yet to qualify will line up single-file in pit row.

Race organizers will call on cars one at a time to perform their qualifying laps and brake test.

4.1.1.1. Hot Lap

To start qualifying, you will take your car on a warm-up lap of the track.

- This warm-up lap allows the organizers to verify that your car's transponder is working.
- Once you cross the Start/Finish line at the end of the warm-up lap, your car's qualifying lap has begun.
- Provided your car passes the brake test, its qualifying time is the time of its hot lap.

- If you are not satisfied with your car's qualifying time, you may line up at the end of pit row and attempt to re-qualify if there is time.

4.1.1.2. Brake Test

At the end of the hot lap, your car will have to come to a complete stop within 18ft of when its transponder crossed the start/finish line.

- Deliberately skidding, swerving, or spinning out is not an acceptable method of braking for the brake test.
- Impacting the barriers is not an acceptable method of braking for the brake test (or ever).
- If you fail the brake test, you may line up at the end of pit row and attempt to re-qualify if there is time.
- Cars that do not pass the brake test are not allowed to race.

4.1.2. First Sprint Race

The first race of the weekend will be a sprint race with an approximate duration of 10 minutes. The set number of laps in this race will change based on qualifying times and track length.

Cars will start this race in their qualifying order.

The race ends when all cars cross the Start/Finish line after the first car to reach the target number of laps crosses the Start/Finish line.

4.1.3. Relay Race

Cars will be grouped into an arbitrary number of small groups of arbitrary size by the Sanctioning Body at their discretion. Expect that fast cars will be grouped with slow cars.

Drivers will determine amongst themselves what order they will race in.

The starting driver will run a predetermined number of laps around the course, as decided by the Sanctioning Body, with the Relay baton. During their approach from the exit of pit lane to the truss, the next car in line will exit pit lane and get up to speed. The first car will hand off the baton to the next car around the truss, and the second car will begin their number of laps, while the first car exits the course at the entrance to pit lane. Wash Rinse and Repeat for all the following cars.

4.1.4. Second Sprint Race

The second race of the weekend will be a sprint race with an approximate duration of 12-15 minutes. The set number of laps in this race will change based on qualifying times and track length.

Cars will start this race in their qualifying order.

The race ends when all cars cross the Start/Finish line after the first car to reach the target number of laps crosses the Start/Finish line.

4.1.5. Optional Night Race

Venue permitting, Saturday night will close with a night-time race, to start after the sun goes down. All of the “optional for daytime race, mandatory for nighttime race” safety items are mandatory to participate in this for-moxie-point-only event.

Cars will start this race in their qualifying order.

4.1.6. Third Sprint Race

The third sprint race of the weekend will be a race with an approximate duration of 10 minutes. The set number of laps in this race will change based on qualifying times and track length.

Cars will start this race in their qualifying order.

The race ends when all cars cross the Start/Finish line after the first car to reach the target number of laps crosses the Start/Finish line.

4.1.7. 75-minute Endurance Race

The final race of the weekend will be an endurance race with a duration of 75 minutes, regardless of lap count.

- Cars will start this race in their qualifying order.
- The race ends when all cars cross the Start/Finish line after the race time elapsed has reached 75 minutes.
- The winner is the car that did the most laps in 75 minutes.

4.1.7.1. Driver Changes

During the Endurance race, drivers will have to switch out on each car every 15 minutes OR perform a significant costume change.

- A long horn will sound when it is time for the drivers to switch.

- Teams must enter pit row as soon as possible after hearing the horn.
- Cars that have just passed pit lane when the horn sounds will have to complete their current laps before switching drivers.
- See Section 5.2 for pit lane safety rules.

5. Race Rules

5.1. On-Track Safety

5.1.1. Flags

During the course of the race weekend, several flags of varying colors will be displayed. Some will be accompanied by audible horn sounds as well.

Know them. Obey them.

5.1.1.1. Green

The green flag indicates that it is time to race. You will see the green flag at the start of the race, and you may see it once a yellow or red flag condition is cleared

5.1.1.2 Yellow

This flag indicates a local or full-track caution condition.

- A full-track caution will be accompanied by the sounding of the horn, as indicated below.
- While the course is under a full-track caution, passing is **generally** not allowed and drivers should remain in their current order unless instructed otherwise by **either: a course worker or the driver in front of you.**
 - **A note for very slow karts: You are encouraged to wave moderate and fast karts past you during an extended caution. Fast karts are not allowed to pass you during a caution unless you wave them on.**
- **All drivers are encouraged to indicate that they know a caution is underway by raising a hand as a signal. (This is different than waiving someone on.)**
- At all corners displaying a yellow flag for a local caution, passing is not allowed and drivers should remain in their current order until past the local caution area, unless instructed otherwise by a course worker. You may pass cars that have broken down or embedded themselves in the wall.

5.1.1.3. Red

This flag indicates a temporary pause to the racing due to something rendering part of the track temporarily impassable.

- While the course is under a red flag, slow down and prepare to stop. Passing is not allowed and drivers should remain in their current order unless instructed otherwise by a course worker.

5.1.1.4. Black

If you see The Grim waving this flag at you, make your way to the penalty box immediately. The Grim has something devious in mind to punish you for an infraction The Grim has noticed. Or you may be on fire. Don't worry, you'll probably know which it is.

5.1.1.5. White

This flag signifies that the last lap of the race has started.

- This flag means that if your car is on fire and rapidly losing power, the end to its suffering is near, and you should push it as hard as it can go in the last remaining seconds of the race.
- This flag means that now is the time to attempt any heroic and inadvisable overtakes for finishing position.
- This flag means your brakes don't exist for the next 60 seconds and the only acceptable throttle position is MOAR POWER!

5.1.1.6. Checkered

The race is over. Finish your lap, then head back to the pits, or don't. Watch out for spectators, people driving slowly, people doing donuts, driving the course in the wrong direction, etc.

5.1.2. Horn

The horn has two purposes in a race.

- Its primary purpose is to sound the beginning and end of a full-course caution. One short blast indicates that the course is under a full-course caution, and you will see every flag station waving the yellow flags described above. There will be no full-throttle racing, there will be no

passing. Two short blasts indicate that the full-course caution is been lifted and you can go back to racing as normal. These two blasts are usually timed right as the current race leader is cross the start/finish line.

- The other use for the horn is to signify a mandatory driver change in the endurance race (Rule 4.1.5.1). When you hear this one long horn blast, you must pit immediately even if you have already done so and perform your mandatory driver change.

5.2. Pit Lane Safety

Cars and participants should not block the pit lane at any time during the weekend

- Reversing in pit row is not allowed during races.
- Driving the wrong way in pit row is not allowed during races.
- Cars should be stored with their kill switches off when not being raced or when unoccupied.
- NOTE: A brisk walking pace (5mph) should be maintained while driving in pit lane.
- WARNING: Humans shall not stand, loiter, or otherwise occupy the pit lane during practice/qualifying/race sessions. Please keep aware of vehicles around you. Stand inside your pit stalls unless you are servicing or retrieving your vehicle, or your team will face penalties. If there are people loitering outside of your stall not part of your team, you will be penalized as well. Police your areas. You have been warned.

5.3. Rules Infractions and Penalties

5.3.1. The Grim Reaper

One person, designated by the Sanctioning Body, will don black robes and carry a large black flag any time cars are on the track. Throughout each and every race over the course of the season, the Grim Reaper has supreme, unquestionable reign over the track. The Grim Reaper's job is to pick out violators. If the Grim Reaper sees you commit a misdeed, your car will be impounded in the penalty box and the Grim Reaper will determine your punishment. The Grim Reaper's

word is law. There is no arguing with the Grim Reaper. There's no reasoning with the Grim Reaper. The Grim Reaper was born of these rules and you shall worship the Grim Reaper.

5.3.2. Why am I Upside Down?

It's simple: if you flip your car and roll out of it during qualifying, race or any other point when other cars are on the track, you will get a penalty.

The Grim will determine the weight of this crime, varying from a qualifying penalty, a stupidly amusing penalty, or - if you are somehow a danger to everyone in a non-hilarious way - we'll even consider making you fix it or park it for the weekend. So test your car, make sure you know the limit. There's no reason for you to be ejected on the track for incompetence. Do that ahead of time in random parking lots. **Dane must explain 1 component of physics the first time he flips the kart at the Sanctioning Body's discretion.**

5.3.3. The "I Ain't Even Mad" Clause

We don't like people who half-ass things. If you are going to break one of our rules, we encourage you to go full ass, above and beyond the call of duty. We don't want cheap and sneaky exploits. We want clever hacks that will make great stories. If you feel like taking things too seriously, we want you to build something so blissfully impressive, so Adrian Neweyesque clever, or downright SpeedyCop crazy that your rule infraction gets an "I'm not even mad, actually I'm impressed" reaction from our judges. This may (or may not) exempt you from penalties.

5.3.4. The "Spirit of Power Racing" Clause

We're just a show. We're here to have fun. Rules will get bent, cars will break, so just relax and enjoy yourself. If you're reading line by line and looking for a 1/10th of a second lap time improvement, you're going to have a bad time. Aside from safety, not much else really matters. You don't race to win — you race 'til you break. Don't get too wrapped up in or obsessed with podiums or lap time records. Share tools. Be friends with rival teams. Have rivalries just because it's hilarious. Make friends. And most importantly, be excellent to one another.

5.4. Race Awards

5.4.1. Medals

5.4.1.1. Gold ‘Yes’

You are the Race Winner. You get a big ol’ Yes from us! You also get a hi-five.

5.4.1.2. Silver ‘OK’

You are the first loser, but that’s ok. You’re better than most so you get a low-five.

5.4.1.3. Bronze ‘No’

What, you get an award too? Geez, I guess so, but you get a big “no” from us. Also your low-five is down real low, and thus we will pull our hand away in a metaphorical nod to your performance: too slow.

5.4.2. Race Awards

5.4.2.1. The “Crash and Burn” Award

Congratulations! You have chosen to build an off-road vehicle. The only problem is that the PPPRS is an on-road racing series, which means you’ve spent more laps on the tire wall than actually on the track. You also might be Australian and have spent most of your time upside down. Luckily, there’s an award for that.

5.4.2.2. The “Epic Fix” Award

You did what to get this running again? Holy crap. We usually would make fun of somebody trying this hard, but we can’t believe how many times you had to fix this heap. You did it though, and the car is limping around the track, barely moving but dammit, you’re going to finish. You scrounged parts from random strangers. You broke your transmission three times and still managed to get back on the track. Literally nothing stopped your team. You didn’t win, you didn’t even look good while losing, but you managed to pull through in the end. Here’s to you, crazy person.

5.4.2.3. The “Best In Show” Award

This is a prized treasure. You’ve built something so incredible we have to pause and collect our breaths. You’ve built a car that actually looks brilliant. It looks or drives so nicely that we actually felt bad when some team plowed it into the wall

on the way to winning another Crash & Burn. If you intend to win this award be sure to take a lot of pictures before race day, because she ain't going to be pretty after we're done. This award is also for vehicles who fall into the "Technically legal" category. We know you bent a rule to the razor edge, and we want to encourage that behavior (but it will probably be banned at the next race/end of season). Thus, we will award you for the brazen insanity for pursuing it in the first place. Consider this the PRS version of the Index of Effluency.

5.4.2.4. The Weekend Overall Winner Trophy

Each locale will provide a custom trophy based on the region. Ideally if you are reading this and are a local representative in your region, you are responsible for creating this custom trophy for the team that wins the most cumulative points in the entire weekend. Normally Power Racing would supply this prestigious award, but have you ever tried doing this and a full time job? Not easy. We could use some help. Jim can provide suggestions to assure your award won't be bitterly underwhelming.

6. Season Structure Rules

6.1. Schedule

For the 2019 Season, as of May of 2019 the current schedule is as follows:

Round 1: Bay Area
May 18-19

Round 2: Kansas City
June 22-23

Round 3: Detroit
July 27-28

Round 4: Fort Wayne
August??? TBD

Round 5: New York City
September 21-22

Round 6: Milwaukee
September 28-29

Round 7: Atlanta
October 27-28

Round 8: Orlando
November 9-10

There are tentative dates for Fort Wayne, but we advise you check the Facebook group for updates on the manner.

Find the schedule on the Powerwheels for Adults Facebook group, from another team (you got somebody's contact info right?) or by steaking out the race sight until the barricades show up. Do not ask Jim "Don't @ Me" Burke asking when the next race is.

6.2. Points

6.2.1. Season Points

The points system will reward the BEST 2 cumulative weekend points.

That means we take the sum of your points from your best 2 race weekends and tally them towards the championship. If you go to more than 2 events, you'll be able to throw away your worst weekend(s). So, if you say blow an engine in one race weekend, you won't be out of the championship, provided you attend two others. It also allows for some of the smaller teams to compete for the championship without having to go to more than two events.

6.2.1.1 Race Points

Race points are earned on a per—race basis by each vehicle's finishing position, according to the following table listed under 2018-Current. For historical purposes we have included previous season points rewarded just to confuse you new people.

Place	2011-2016	2017	2018- Current		
1	100	50	75		
2	72	40	63		
3	60	36	54		

4	48	32	45		
5	40	30	37		
6	32	28	30		
7	24	26	24		
8	16	24	19		
9	8	22	15		
10	4	20	12		
11	2	18	10		
12	1	16	8		
13	0	14	6		
14	0	12	4		
15	0	10	2		
16	0	8	1		
17	0	6	0		
18	0	4	0		
19	0	2	0		

Note: The Relay race awards both Moxie and Race points. Moxie points are awarded as always, to each individual car, while RACE points are awarded by Relay team. 75 points for first, 63 points for 2nd etc. Each car in each team gets those points.

6.2.2. Moxie Points

Moxie is that little extra spice that levels the playing field. Not only can you win race points, but you can also entice and rile up the crowd to win points from them. It will be your team's job to find ways to garner audience attention and keep it over your competitors. This is the ultimate pursuit of the weird. Giant boom-box cars, Lucha masked racers, pre-race dance party and confetti cannons are all par for the course. Consider this the social engineering section of your exam. Some teams will write this off, but we at PPPRS think you should take heed: this is where real champions are crowned. Underdevelop your car against your

rival hackerspace? Easy! Gain those points back by dressing up as a chicken. Your odds to win are good if your goods are odd. Consider it Halloween in July, and you have to get more candy bars than that kid next door.

6.2.2.1. Counting Moxie Points

An Arduino-controlled button board, the Moxie Board, tallies the votes of members of the public during races. The crowd is instructed to reward your spastic and odd behavior by pressing the button by your team's label. Next to each button is a 6x1.75 inch piece of space that is reserved for your team name and number. You are in charge of making a plaque that occupies this space and identifies who you are to the crowd. You can make it as fancy as you'd like, it can be lit up (you'll have to power it on your own), reflective, whatever, as long as it has the name of your team and your car number. I won't begin to lecture you on how many people royally screw this bit up. Do not do a last minute job on this one because it is the first thing the crowd sees when they are about to vote for you. There's nothing like setting your car on fire to the applause of an audience only to realize that you used duct tape and silver sharpie to identify yourself on the board and now no one knows who you are. This board responds to one button press with a one second delay. This is so you don't plant yourself or your teammates out there by the board and just sit on the button all day.

It should be noted that this is considered a really lazy and not-creative way to cheat, and thus lame. Don't be a lame team. Moxie points will always total **300 per race. These 300 points are divided among the teams according to the percentage of button presses received from the crowd. Moxie points are added to race points to determine teams' overall winningness.** This season we are not messing around, which means you get to mess around on the track. Moxie will be very crucial to your potential victory and glorious bragging rights.

6.2.2.2. Suggestions to increase your Moxie Points

Are you a new team? How about an old team looking for some more points? Come here. Closer. Let me tell ya something. It'll be our little secret. You can get up to 150 bonus points if you make one of the cars below. Yeah. Seriously. I'm not messing around. Just try it. NOTE: these points will be awarded on a sliding scale of effort, as per the discretion of the judges. The more time you spend on making

these look good, the more points you get. If you duct tape a bunch of cardboard boxes and scream “THAT’LL DO,” we will reward you fewer points. Without further ado, here are the cars that could earn you up to 150 bonus points:

Jim’s 2019 Hit List:

- **Yo-Yo Ma’s Yo-Yo Car:** Giant Yo-Yo with a musician. Figure it out
- **Beast of Turin** (google it)
- **Food cars:** any kind of food. I’m hungry all the time now.
- **The Bay Bridge Car:** a car that looks like a bridge with tiny cars on it. I fucking hate that bridge.
- **Betty White. Or Golden Girls** themes. Think padded shoulders and florida jokes.
- **Dr Quinn: Medicine Car:** It’s a Moxie death sentence but you’ll be up for 150 bonus points each weekend? Ugh this is my throwaway idea.
- **Ben Hur chariot thingy.** Because I want this shit to be harder for y’all.
- **Moon Buggy:** Dammit Jamie, finish this build I want to see it.
- **A rubber duck.** I mean if battlebots can do duck stuff, why not.
- **The Beatles Yellow Submarine:** Because getting the 55+ older crowd to vote for ZZ Top wasn’t hard enough.
- **A ZX Spectrum.** Yeah. That’ll..track.

Hit List Hall of Fame

(Previous examples, so stop suggesting them)

- Back To The Future DeLorean (we already had one and it might be impossible to beat)
- Star Wars INCOM X-Wing Starfighter: Luke and R2D2 also needed (I’d love to see an A-Wing though)
- Every car from Jurassic Park (It’s starting to get old now)
- TIE Fighter (we will accept TIE Interceptor)
- Ecto-1 (still haven’t seen the new film version yet)

If you don’t have the necessary level of love or happiness in your life to create such masterpieces, rest assured because we have points for you lazy and crazy fools. A carbon-based swath of 3 judges including yours truly will score your car

on a completely arbitrary scale (see Chicago-style voting) to determine your entrants quality and, by proxy, your overall self-worth. One of those judges might be somebody remotely famous but we reserve the right to totally screw that part up. We will give a maximum of 100 points for tip top efforts. It'll have to be good though. Perhaps you want to build crazy parts of your car from under qualified materials, or perhaps you want a working 8 speed transmission. Maybe you wish to drive a rolling human ear that shoots earwax at the crowd. Your creativity will be rewarded, just be aware that sweat equity far outweighs making up some crap on the spot, unless it's really really clever crap.

Also if you are still reading I'll give 400 points to anybody who develops an open source 3 phase motor controller. Schematics need to be an open source format. Code has to be commented out and posted on github. Gotta spec out the cost of the parts, release the instructions online and have those ready at the moment of points rewarding. The design has to be proven and race winning. Yep. Totally for real here.

6.3. Season Awards

Three awards are given out each season.

- If a car wins more than one of these awards, that car's team will choose one award to keep, and the remaining award(s) will be given to the next-most-qualified team.
- Each award belongs to a car for one year.
- Each award must be modified by the winning car's team before the next season's giving of the award.

6.3.1. The Tesla Cup

The Tesla Cup is awarded to the car with the highest total moxie points plus race points in a season.

6.3.2. The Moxie Cup

The Moxie Cup is awarded to the car with the highest total moxie points in a season.

6.3.3. The Chapman Trophy

The Chapman Trophy is awarded to the car with the highest total race points in a season.

6.4. Misc. Notes

6.4.1. Track Marshal Cheat Sheet

The Sanctioning Body hereby assigns the community to develop and update a Track Marshal 101 guide for new marshals. The goal is to cover the basics of proper track marshalling and race safety.

6.4.2. NOOB (New Orientation for Overtaking Basics)

Team Orientation

This ruleset hereby deputizes Jeremy Bloyd-Peshkin (or the generic equivalent thereof) with driver and team orientation prior to each PRS event. The guidelines for this orientation involves proper driving etiquette and the basic racing guidelines that turns your new team into one that people will actually like and respect, because you didn't cut anyone faster than you off and ignore all the rules we wrote here. For example, Avocados are banned. Yup. They are not allowed. If you're reading this, you've read an important part of this rule. So important, that the first sentence to the Sanctioning Body is "I hate avocados." That way we know you read this, and the other lines in this ruleset. Get it? Good.

6.4.2.1 Avocados

Avocados are officially unbanned as of the End of the 2018 Season Summit at Pumping Station: One in Chicago.

6.4.3 Hovercraft

Hovercraft are allowed.

