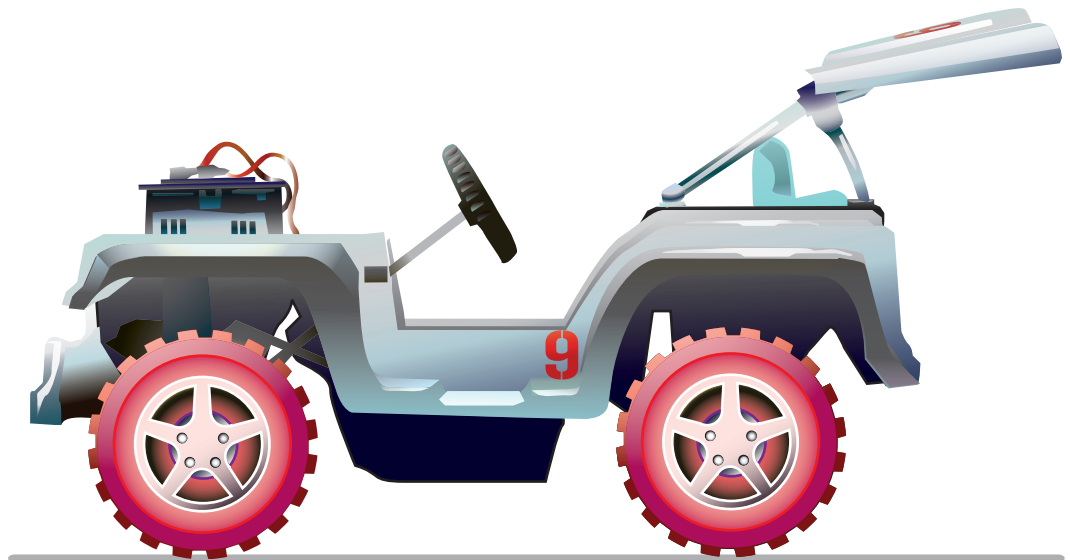
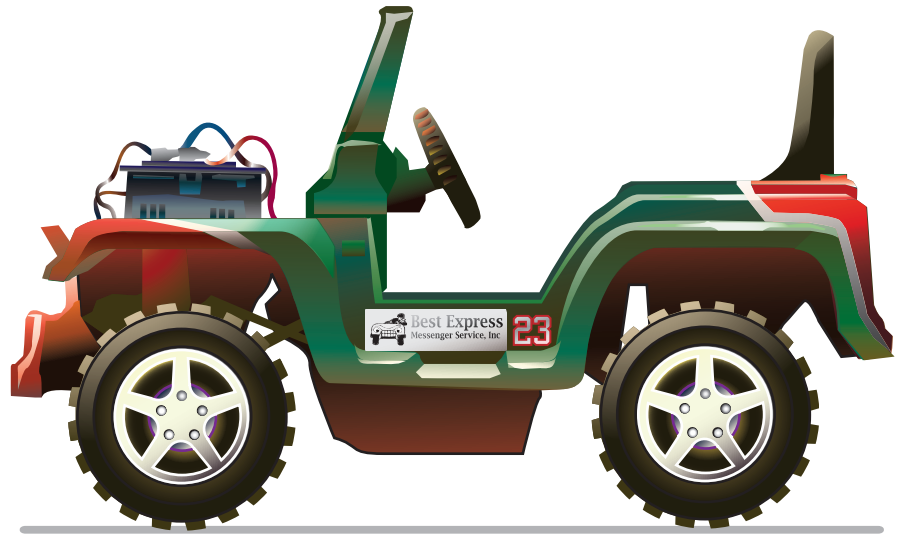


Electrical Fires and You: The Power Racing Series Guidebook





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Introduction

You Are a Hackerspace. Be A Part of the Movement!

Over the past few years, the hackerspace community has swelled nationally and globally, with more hackerspaces forming every month. Many of these spaces are grass roots but share a common goal of providing a place for members to create, socialize and expand ideas. Many hackerspace members travel individually to other spaces bringing with them their creative experiences.

This should happen more often, and to an extent, does. There are a constant round of Conventions that are hacker and maker related that so happens to cater to your typical hackerspace member. However these people usually travel on their own, or in very small groups. This is fantastic, but should happen on a much larger scale.

Hackathon is an event that creates this connection. Instead of individuals submitting talks, hackerspaces will be submitting events. It is an opportunity for spaces to come together to socialize and share their creations to each other face-to-face. It is an opportunity to be a part of something bigger than all of us by congregating together under the banner of our perspective hackerspace. All the while we can meet, make contacts, reinforce past contacts, and be friendly neighbors. Much to our culture, we are hacking the Olympics for the sake of creativity.

We wish to have this event at Maker Faire in order to share our efforts to the public, to emphasize our experiences and show them that they too, can learn and build. We want to show the world what we can do for communities, then our combined presence will only solidify how vast our ideals are.

So with this I invite you to Hackathon, and urge you to submit an event, and sign up the ours, The Power Racing Series. Have fun with us.

Happy Making,

-Jim Burke



FAQ

Why Am I Reading This Packet?

You are an ambitious and aspiring Hacker/Maker/Whats-a-space that feels the need to go to Maker Faire only to make an impression with the public by “competing” with other Hackerspaces in tiny, heavily modified child’s toy cars.

Wait, What is This?

The Power Racing Series (PPRS) is an event where Hacker/Whateverspaces turn those toys cars that everyone wanted but only stupid Brad from down the street only owned (even though everyone hated him), into highly competitive sort-of racing machines. Teams are allowed quite a few liberties (motors, batteries) but we also made a few restrictions so you masochistic engineers can pleasurably cry yourselves to sleep at night. You have \$500 to do this with (aside from safety equipment, cause we don’t want to mop you up either). You also compete in four events, and you’ll have to do more than just drive fast (re: be entertaining) to win points. After all, it’s not like we want an actual race to break out. Oh and it is rather unsafe, so you’ll sign a waiver. You built it, so we knew you’d understand.

How Do I Get Involved:

If you read this far, I’m going to assume you’re a part of an organization geared to making cool things. If this is so, get a few of your members involved, and do the following:

- Buy a used or new PowerWheel or Little Tikes
- Modify it to haul your “big bones”
- Report and post your progress on your website (give yourself a pat on the back and all)
- Come to Detroit for Maker Faire on July 31st to see how awesome you are.

Why would I dedicated my spare time/money/sanity to compete for something so absurd?

The Hackerspace movement is a growing world-wide community and we at PPRS would like for all of us to get together and play nice. It’s one thing to talk online but there’s some huge value in good ol’ face-to-face contact. Share ideas, be friendly and get out of that pizza box basement and if it takes fulfilling life-long childhood dreams in front of thousands of confused spectators, so be it.

Do I Need Anything Super Special?

Are you a Hackerspace? Cool. A lot of the stuff you need to pull this Spartan madness off is already around you. If you’re lucky, you might even have a few of the things on our safety list that you need too. You might also have to dig around a few dumpsters, landfills, junkyards but whatever, if you’re anything like us you do that crazy riff-raff already

You have \$500 to spend on your vehicle. You can go crazy spending on your safety stuffs (including things like brakes!) If you are resourceful enough your space will have enough of the stuff sitting around to severely cut costs. Keep in mind you'll also need secondary things like batteries and chargers. You'll also have to figure out how to get the monstrosity to Detroit, but most PowerWheels can squeeze in a medium sized car (especially unassembled). We know it's not cheap, but you'll have months to get your act together, and the expenses are spread out over your membership however you wish. You can also seek sponsorship to recoup costs (There's a packet for that). End of day it'll be pricey but consider it a small expense to a life-affirming experience.

Some of them do, but you'd be surprised how some cheap some sweet rides are (pro-tip Stinger XS = metal frame). There's also no limit of hapless parents that practically give them away when the battery goes south. One year we bought 8 of them for \$120. You'll be cool beans for anywhere around \$40-\$100 for a used one, any more than that and you might be getting ripped (unless you be ridin' spinnaz)

Cause our clever panel of PPPRS judges will see beyond your Capone Book keeping and Flim-Flam proof-of-purchase. If your car is suspected of being way more expensive than it should be PPPRS will then force you to sell them the car to them for \$100. So keep honest.

So you're taking these tiny little plastic cars and modding them with motors that push them near 20mph and you're asking me if this is safe? Methinks you need to wear the helmet outside of the track. Racing is dangerous, sign a waiver, and wear protective gear. We'll be working to make sure the track is as safe as possible so if something does happen it'll just be a flesh wound.

You're used to voiding warranties, so you understand the ramifications of making something do things well beyond what it is designed for. So expect some damage ranging from cosmetic to complete transmission failure. Consider this a rite of passage: improvise, mend what you can, get back out there and do it all over again. We didn't say it'd be easy, but it'll be fun. I promise, or you get a free cookie.

So What Will This Cost Us?

**So a \$500 PowerWheel?
Don't they cost that much
already?**

**Well That's Shit. Why Don't
I Just Cheat?**

Is This Safe?

**How Banged Up Are We
Going to Get?**

How Aggressive Can We Be?

Let's be reasonable here, we act the way you act. If you want to rough it up, beat and bang, we'll bring some hurt. If you continue to throw a fit on the field we'll make you drive Americar from last year's Team Unicorn USA. Americar is a Little Tikes Hummer H2 painted red white and blue, goes slower than your grandma reading a take-out menu and blasts Born in the USA. In MIDI. Don't make us use Americar.

What If We Don't Know How to Do Any of This?

You're not alone, we don't either. You can wing it. Isn't that the whole point of being a Hackerspace anyway?

What Kind of Events Will There Be?

Expect a road course, a tug of war, and a soccer match. The last event is a special surprise, and we promise it won't hurt too badly.

I Presume I Get Points For Winning, so What's With This Moxie Cup?

Consider it our style awards. Some of you folks aren't up for Days of Thunder, so we'll be awarding points for showmanship, generic cultural references, outright outlandishness, and epic failures. The crowd decides if they like you, and will shower you with Monopoly money which you can cash-in for cold, hard points.

When Can We Start?

Done reading the rules? Go for it. You have until July 31st, but don't make that the next time we hear from you. We want blog posts that you can either submit to us or we can link to on the Official PPPRS website documenting your progress and tomfoolery. We'll also bug the hell out of your mailing list to see your progress. The more you get done in advance before Maker Faire, the better off you'll feel. You might also feel more chipper, I don't know, maybe you'll get that promotion. Endless opportunities. Magic. Unicorns. PowerWheels.

Rules

The Power Racing Series (“PPRS”) is a competitive racing series that involves the modification of Power Wheels and Little Tikes brand vehicles for inter-hackerspace competition. It is the premier event of the inter-hackerspace Olympiad known as Hackathon.

Teams

Team Structure

Hackerspace teams may contain a minimum of three members. There is no upper limit to how many members a team may have. No person may be on more than one team. No matter where a team purchases its vehicle, it must conform to PPRS standards. Each team may enter up to two vehicles to use during a season, and must modify and repair them as necessary.

Team Budget

The total allowable budget for any individual vehicle is \$500. This does not include the cost for safety equipment or safety features such as helmets, brakes, and harnesses. This does not count tax, or shipping costs. It is required that teams provide paperwork to prove their vehicle is under budget. If proofs of purchase do not meet PPRS criteria they will be deemed suspect and are at risk of a PPRS buyout. PPRS officials will determine if teams have exceeded the budget and hold all rights to purchase a team’s suspected vehicle for \$100. This sale is compulsory for teams and any challenge of the rule will result in disqualification.

Sponsorship

Team sponsorships are allowed, and at each team’s discretion. However, an entity does not become affiliated with Pumping Station: One, NFP, Maker Faire, or Make Magazine by virtue of sponsoring a team in the PPRS. Teams may not represent to sponsors or potential sponsors that sponsoring a team in the PPRS will associate the sponsoring entity with Pumping Station: One, NFP.



Vehicles

Permitted Types of Vehicles

Only Power Wheels and Little Tikes brand vehicles will be allowed to enter competition. This includes any Fisher-Price brand Power Wheels, as well as Little Tikes Ride On toys. This also includes any Power Wheels brand vehicles manufactured before Fisher-Price acquired Power Wheels. No other brands are permitted. Neither Power Wheels nor Little Tikes with rubber wheels are permitted. The majority of the original Power Wheels body must remain functionally intact.

Vehicle Decoration And Engineering Modifications

Teams are encouraged to be imaginative when decorating and modifying their vehicles. However each team should take into careful consideration the potential of injuries or damage caused by external decorative items. Specifically prohibited are any decorative items that are sharp, pointed, obscuring, fragile, or that would otherwise cause injury or damage to the driver or other drivers and their respective vehicles during routine vehicle-to-vehicle contact or crashes. This rule also applies to structural, drivetrain or steering modifications to vehicle. PPPRS officials reserve the right to prohibit a vehicle from entering any race if the vehicle is deemed to be a hazard to its driver, other drivers and their vehicles or spectators.

Stock Wheels

All vehicles must use Power Wheels or Little Tikes brand plastic tires, wheels and hubs and power to the roadway must be driven to them. Modifications relating to mechanical traction will be allowed. During pre-race inspection if a PPPRS official determines that the wheel modifications to be potentially harmful to drivers, they will be asked to remove modifications or risk disqualification (see vehicle decoration limitations). There are no limitations to how the wheels can be modified to connect the chassis (internally or externally).

Drivers

All vehicles in any PPPRS event must be controlled and steered by one and only human driver seated in the vehicle. No remotely controlled vehicles are allowed in PPPRS events.

Battery

For safety reasons, PPPRS prohibits the use of liquid acid batteries but permits so called "sealed maintenance free" batteries. Due to the inherit risk of such batteries in the event of a flip over, any team using such batteries accepts all responsibilities of ensuring their safe application. PPPRS suggests the use of sealed gel-cell batteries or sealed absorbed glass mat (agm) batteries. Though not required, PPPRS strongly suggests that teams should be prepared to bring anywhere from 2-5 charged batteries with chargers for competition. There is no limit to the number of batteries PPPRS allows as long as it fits within team budget. PPPRS strongly urges teams to consider vehicle performance and run time to decide how many batteries they need and for at least four events with approximately 20 minutes runtime of each. With limited time between events, there will not be enough time to fully recharge a battery. Standard batteries will not be required and can be specific to the vehicle each team competes with. PPPRS officials will not supply spare batteries or chargers to the teams.

Motors

All motors must electrically powered by electricity stored in an electrolytic battery. Vehicles may not generate their own power. No hybrid or assisted engines are allowed. All power supplies must be limited to 24 volts RMS maximum input to the motors. Before each race, track officials will test the voltage to the motor of each vehicle.

Vehicle Size

Excluding the seat, the vehicle may not exceed 64" long by 35" wide. Height is not restricted. (These dimensions represent the size of the Jeep Hurricane, the largest Power Wheels vehicle on the market as of May 2009.) No part of the vehicle other than the seat or safety equipment may protrude past the dimensions enumerated in this rule. All vehicles will be measured by track officials before each race.

Any vehicle disobeying the dimension rule shall be banned from competition until it has been modified to fit within the dimensions of the box.

Safety Regulations

Helmets, Attire & Padding

All participating drivers are required to wear a helmet while on the track at any PPPRS event. Any time a driver is within track boundaries (as defined by the race information sheet distributed at the drivers' meeting) a driver must wear a DOT approved helmet. Helmets cannot be modified with after market owner applied solvent or water-based paints that can damage the integrity of the plastics. Unlimited pressure sensitive adhesive (PSA) decorative stickers and water slide decals shall be permitted. All drivers are required to wear full-length jeans or comparable sturdy work pants, long sleeve shirts and close-toe shoes or boots. Drivers must also wear mechanic or racing gloves during a race event. Safety glasses with retention straps are also required if helmets are open-faced but are not required for full helmets with a face visor. Any pit member who will go on the track to perform vehicle maintenance during a pit stop are also required to wear safety glasses as well. Elbow and Knee Pads are required for all drivers participating. All safety equipment herein mentioned are not bound to budget constraints.

On Track Safety

All PPPRS sanctioned events must have the following on track to ensure a safe event:

- An ABC fire extinguisher.
- A first aid kit stocked with at least the equipment suggested by the Red Cross
- (<http://www.redcross.org/portal/site/en/menuitem.d229a5f06620c6052b1ecfbf43181aa0/?vgnextoid=f247e8afd40ee110VgnVCM10000089f0870aRCRD>).
- A pace car with safety crew of 1-2.
- A Flag Marshal with event flags.
- Four Track Marshals who shall spot incidents and call forth any caution flags.
- All Flag Marshals and Track Marshals must have a cellular phone, in case it is necessary to call emergency personnel.
- A Kill Switch system will be required of all teams to adapt to their vehicles. (see kill switch)

Kill Switch System

All vehicles entered in the races must utilize an organizer supplied emergency kill switch system. This kill switch immediately isolates all voltage on the positive side of the battery (or batteries) from powering any on-board electrical system on the vehicle should the driver fall from the vehicle for any reason.

- All teams shall receive, via US Mail upon receipt of payment of their registration fee, a kit that they must complete and install onto their vehicles as per the included instructions supplied with the kit. All kill switch kits must be installed per supplied instructions unless PPPRS officials are consulted in advance regarding unique technical difficulties.
- It is the responsibility of the registering team to notify PPPRS officials at the time of their registration of which kill switch system is needed, either a 12 Vdc or 24 Vdc kit, based on their vehicle's electrical system.
- The team must supply either #10 or #8 insulated stranded wire, suitable electrical connectors, appropriate mounting hardware and tools to install the kit at their own expense. (Items purchased by the vehicle team and used exclusively to install their kill switch systems are considered part of safety equipment and are not subject to team budget restrictions.)
- The final mounting location of the switch at the discretion of and by the individual team but the selected location must allow for proper switch operation.
- All magnetic breakaway bar lanyards must be firmly attached via the kit supplied lanyard to the driver either to the driver's ankle (preferred), wrist, or to a sturdy belt worn by the driver at the waist.
- Prior to racing all vehicle kill switch systems will be tested by PPPRS officials for proper operation. Any vehicle found to have a defective, or incorrectly working kill switch system, will be disqualified from racing until the deficiencies are corrected.

Caution Flag Protocol

When a full course caution is called, all vehicles must stop immediately where they are on the course when a caution is signaled. Racing to finish line is not permitted when under a caution signal. Track officials must signal a full course caution by waving a yellow flag, turning on the yellow caution light on the racecourse, and yelling "CAUTION." Teams who disobey this rule will be disqualified from the race. Only track marshals are allowed to sanction movement of vehicles at their discretion. Additionally a powered air horn may be used as an audible caution signal in addition to, but not in replacement of, hand waived flags.

Drivers' Meetings

On the day of the PPPRS event, before the event begins, all present members of all teams must attend a drivers' meeting. (This includes drivers as well as non-drivers.) At these meetings, PPPRS officials will explain the races that will take place during the day, make clear all of the applicable race rules, and perform all checks on vehicles to make sure that they conform to PPPRS standards.

Vehicle Inspection will include a measurement of power to the motor, a dimensional measurement of the size of the vehicle and verification of stock wheels. Any team that does not pass pre-race inspection will be required to modify their vehicle until it complies or face disqualification.

Discretion of Track Officials

A vehicle may only participate in a PPPRS-sanctioned event if track officials determine that the vehicle complies with all PPPRS rules. Track officials have final discretion over whether a vehicle complies with PPPRS rules. If a vehicle is deemed to be over the \$500 budget the team will be involuntarily selected to "sell" their vehicle to PPPRS for the non-negotiable price of \$100.

Points

Championships

The PPPRS has two distinct championships:

- Constructors' Championship
- Moxie Cup

The Constructors' Championship is awarded to the team that amasses the most race points. The Moxie Cup rewards teams for creativity, performance, amusing antics, and other actions that benefit the PPPRS by making it more entertaining.

Race Points

These points are awarded based on how vehicles perform in each PPPRS race, and determine the winners of the Drivers' Championship and the Constructors' Championship.

Based on a twelve-team race, points will be awarded as follows:

Finishing place in a race

Place	Points
1st	100
2nd	80
3rd	64
4th	60
5th	56
6th	52
7th	50
8th	48
9th	25
10th	20
11th	10
12th	10

Points awarded for each place in a race will vary based on how many teams enter each race. Point tables for each race will be available no later than the Drivers' Meeting before the race.

Moxie Cup Points

The Moxie Cup is the "style points" part of PPPRS. Teams will be awarded by the crowd for creative decoration, costume (as long as the driver costume complies with safety rules) and for any off-track antics.

For each PPPRS race, each team may be awarded Moxie Cup points. Crowds will be given Moxie Points (usually fake dollar bills, each representing one point) and teams will have to "perform" to entice crowds to award them points. Crowds have complete control over whom they give Moxie Points to. PPPRS will issue at random anywhere from 50 to 200 Moxie points to an entire crowd at a time. PPPRS can determine how many points to give out at any point or time within prior listed limits, but not what team they can be given to.



Resources

In order to get yourselves started, here's a list of links and resources that can help you build your machine. If you have any questions feel free to email us for advice on vehicle buildout or what kind of car to purchase. Remember, your \$500 budget includes the machine, so spend carefully!

As for finding a Powerwheel, you can check craigslist or eBay, or find a close out sale at Toys R Us.

- **Electric Motor Animations:** very cool electric motor animations but be sure to check all the other stuff out too!
<http://www.educyclopedia.be/electronics/javamotor.htm>
- **Electric Scooter Parts:** A one-stop source for homebrew electric vehicle drive systems. Location: Boulder Creek, CA
<http://www.electricscooterparts.com/>
- **DiscoverCircuits.com** has 28,000+ electronic circuits, cross-referenced into 500+ categories.
<http://www.discovercircuits.com/>
- **MPJA:** Surplus electronics and related tools. Location: Lake Park, FL
<http://www.mpja.com/>
- **Craigslist** has a „Free“ section oddly located in the „For Sale“ section.
<http://www.craigslist.org/>
- **McMaster-Carr:** The source for EVERYTHING industrial! Raw materials to finished items, copy paper to robot brains to left hand threaded screws, no minimums. And they'll sell to anyone! One of the best sales websites on the internet that you can use for idea generation and physical specifications. Lots of cross ref charts.
<http://www.mcmaster.com/>
- **Motion Industries:** Wide range of industrial supplies with a focus on power transmission equipment and parts. Locations: See website for your nearest local retail store
<https://www.motionindustries.com/>
- **Bearing Headquarters:** Suppliers of power transmission supplies, electric motors and shafting. Locations: See website for your nearest local retail store
<http://www.bearingheadquarters.com/>
- **Harbor Freight:** Cheap Chinese tools and machinery, cheap. Locations: See website for your nearest local retail store
<http://www.harborfreight.com/>
- **The World Of Timing Belts:** A complete primer on all things timing belt and timing belt related.
<http://www.sdp-si.com/D260/PDF/part1.pdf>
- **Mechanical Engineering Design Guide:** The Engineer's Handbook: Tables, charts and formulas.
<http://www.engineershandbook.com/>
- **VXB Bearings:** A source for inexpensive bearings used in homebrew machines and gizmos. Also hybrid ceramic bearings. Location: Anaheim CA
<http://www.vxb.com/>
- **Metal Supermarkets:** A source for metals, all kinds and shapes, no minimums. Locations: See website for your nearest local retail store.
<http://www.metalsupermarkets.com/>
- **MetalsDepot:** A source for metals, all kinds and shapes, no minimums. Location: Winchester, KY
<https://www.metalsdepot.com/index.phtml>
- **On Line Conversion:** Convert just about anything to anything else. Over 5,000 units, and 50,000 conversions.
<http://www.onlineconversion.com/>
- **WebCalc.net:** Need a specific or unusual calculator? Will be changing to <http://www.calcenstein.com/>
<http://www.webcalc.net/index.php>
- **eFunda:** The Ultimate Engineering Fundamentals Site: eFunda stands for engineering Fundamentals. Its mission is to create an online destination for the engineering community, where working professionals can quickly find concise and reliable information to meet the majority of their daily reference needs.
<http://www.efunda.com/home.cfm>
- **Small Drive Parts** Reference from Stock Drive Products.
http://www.sdp-si.com/web/html/reference_library.htm
- **Technologystudent.com:** The information sheets cover a wide range and include, the design process, gear systems, electronics, cams, printed circuit boards, PIC microcontrollers/computer control, key words/phrases, structures, vocational work, technology and cultures, basic CNC work. They are intended to provide a valuable resource for teachers and pupils AND they are free.
<http://www.technologystudent.com/index.htm>
- **Partsforscooters.com** provides replacement and aftermarket parts to consumers who service Asian-made power sports and transportation products. Location: St. Petersburg, FL
<http://www.partsforscooters.com/>

Contacts & Deadlines

To sign up your Hackerspace fill out the form at:
www.powerracingseries.org

Contacts

PPPRS Manager and Organizer

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Photos By

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Dates to Remember:

- Team Signup Period: March 10th - May 31st, 2010
- Last Day to Opt Out: June 5, 2010
- First Team Progress Report (submit blogpost about progress): April 20th, 2010
- Maker Faire 2010: July 31st- August 1st

