4H LiveWire 3562
The Rookie Manual

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Purpose of this Manual

We hope that you will have a fantastic FIRST year! This manual is intended to give you some pointers and advice that we think may be helpful as you create your FRC Team. Although originally written for starting a Rookie team, this manual is very useful for a Rookie Coach of a Veteran (experienced) team as well! Good luck and let us know if there's anything we can help with during the year!

4H LiveWire Robotics at ISU
FRC Team 3562

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Before You Get Started

Go into the season knowing that this FRC team will take an incredible amount of work. Know that you will be exhausted, you will be addicted, and you will find yourself obsessing over your robot. Know that Build Season will consume all the free time that you have. Know that your teammates will become your family. Know that you will evaluate all things in light of how they will impact your team. Know that you will be inspired by what you and your team will do. Know that you will make a difference in the lives of students.

Realistically, before you begin…

- Learn more about *FIRST*, check out the ***FIRST* Things First Section** for more information.
- Do you have a core group of students who are eager to embrace the mentality of gracious professionalism? See our **Recruiting Section** for more information.
- Consider the time investment - does your team have approximately 1,000 hours to donate?
- Consider the support, do you have at least 2 (preferably 5) committed adults? Read our **Mentor Support Section** for some suggestions.
- Consider the finances - has your team developed a budget to cover registration, tools, building materials and travel? Need some extra help? Take a look at our Section on **Finances**.
- Do you have a safe workspace that is designated for the team's use? Read up on **Team Safety** if you need some tips!
- Do you have the tools that you will need to construct a robot? We've put together a list of the **Basic Tools** we'd recommend.

FIRST Things First

FIRST (**F**oundation for the **I**nspiration and **R**ecognition of **S**cience and **T**echnology) is an organization dedicated to spreading a passion for science opportunities and careers among young people, while promoting gracious professionalism and a spirit of "coopertition"™. There are four levels of competition that students can participate in; Junior *FIRST* Lego League (Jr FLL), *FIRST* Lego League (FLL), *FIRST* Tech Challenge (FTC) and *FIRST* Robotics Competition (FRC). This manual is designed to help first year (Rookie) teams as they participate in *FIRST* Robotics Competition.

Resources

- *FIRST*'s official website and home of TIMS (Team Information Management System) that will allow you to register your team: www.firstinspires.org
- LiveWire's website, regularly updated to include any good resources we find: www.LiveWireRobotics.com
- A forum with thousands of FRC participants (coaches and students) with threads ranging from mascot discussions to LabVIEW help: www.cheifdelphi.com
- A massive central database of old video and links to view live streaming during competitions: www.TheBlueAlliance.com
- www.TheFirstAlliance.com

Mentor Support

When it comes to mentors, the more, the better! Every team needs at least two committed adults who are willing to act as your team's primary coaches. The more mentors you have to offer time help and advice - the better off your team will be. Not all mentors need to be "tech-savvy!" There's plenty to do for everyone! We'd recommend that each sub-group of your team has a designated mentor who is available on the same schedule as the group. For example, LiveWire has 4 main sub-groups: Programming, Chassis/Build, Public Relations, and Web-Design. Ideally, LiveWire would have 4 mentors that are each dedicated to helping a particular sub-group and are there whenever the sub-group is meeting. Some seasons that's easier to arrange than others.

If you're in need of mentors - start recruiting! Some places to look for help:

- Parents of students
- Former students
- College students
- Math, science, professional technical high school teachers
- University professors
- Engineers in the community

Coaching or mentoring an FRC team can be a little exhausting. Networking helps! We recommend getting to know other coaches and mentors, trade e-mails and phone numbers as you meet other teams. Don't be afraid to ask for help, advice, or pep-talks! Start with us - please don't hesitate to contact our team for whatever you need. We would love to be a part of your rookie year!

Ready, Set, Go!

Contact the Regional Director

Your Regional Director is a great person! They will be able to put you in contact with veteran teams in your area, answer general questions, encourage your team, and suggest potential sponsors in your region.

Registering a Team (TIMS)

Once you're committed to coaching a team, one adult coach (who checks e-mails and will watch deadlines) needs to register the team with *FIRST* using TIMS. TIMS is accessed from www.firstinspires.org, under the registration menu, "Go Directly to TIMS." This is where you will be assigned your permanent team number, submit awards, and register for competitions.
If you're new to an existing team and taking over the role of "Main Contact" the previous coach will need to login to TIMS and "Invite a Replacement."

Recruit, Recruit, Recruit!

Most of LiveWire's team members are recruited by word of mouth. Hanging posters in local high schools stirs interest, but excited students and a few teachers do more! LiveWire hosts a summer camp for younger students - it acts as our primary fundraiser and recruits future team members. Other strategies that have benefitted our team is recruiting former FLL participants and hosting an Open House to show what LiveWire is all about. Our team holds lots of showcases and demonstrations that show what *FIRST* Robotics and LiveWire involve. Team members answer questions, demonstrate the robot and share their experiences. Local schools, libraries, fairs and other public events are all fantastic opportunities to share about your team and recruit interested students and mentors.

Team Image

Standing out at the competitions creates a huge advantage for your team. See our **Competition Section** for details. Start thinking about what makes your team unique. Deciding on a team nickname, color, theme, mascot, logo, slogan, etc. helps these ideas come together. The earlier they form and stick, the easier it is to design things.

Fundraising

Decide on a few primary fundraisers that your team will have time for, we recommend being selective - the more money you can generate for your team's time commitment - the better! Our Robotics Summer Camp has been amazing! The

team loves hosting it, students get the chance to become mentors, it's fairly profitable and we get to spread the word of *FIRST* in our community.

Look around for local businesses that might be interested in sponsoring your team. It never hurts to ask and at the very least, you're sharing *FIRST* with your community. For more information, take a look at our **Finance Section**.

Organize

Organize everything. Your shop. Your ideas. Your team. Our build space is big enough that we can designate a programming area, a practice field for driving the robot, and a building zone. LiveWire is divided into 4 main sub-groups that focus on specific tasks: Programming, Chassis/Build, Web Design and Public Relations. Depending on the size of your team and your team's interests, your groups may be a little different.

Finances

Planning a Budget

To help you plan for the finances of your rookie season - take a look at our Rookie Year expenses…

$6,500	LiveWire Rookie Registration
$900	Additional materials for Robot
$400	T-shirts ($8 each, 50)
$5,000	Bus Rental for Travel to Regional
$5,000	Food and Hotel at Regionals
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$5,000	Registration for Championships
$7,000	Airfare for Championships ($350 x 20) - students paid
$3,500	Hotel for Championships
$33,300	Total

Realize that these costs are just a reflection of LiveWire's expenses. The only required costs are registration for the season and additional events (if any). Also, look for ways to make traveling cheaper - such as getting a company to donate a bus or selecting a close regional and staying with friends and family. Championships in St. Louis was a significant added expense – but we think it was worth every penny!!! To make it possible, each student paid airline ticket out of pocket and through individual fundraiser efforts.

Fundraising

Mentally split your fundraising into two groups and realize that both are very important and should be pursued - team organized "fundraisers" and sponsorships. Evaluate a fundraiser in terms of profits versus hours invested. We recommend that you find something well worth the time it takes to make the fundraiser happen!

Here's the overview of LiveWire's income during our rookie season:

$6,500	jcpenney Sponsorship
$5,000	MJ Murdock
$2,000	jcpenney additional Sponsorship (for Championship)
$3,600	Team Members' Participation fee ($200 x 18 students) (However – we no longer require a participation fee)
$2,900	Robotics Summer Camp (15 participants x $200 registration fee)
$750	Light Bulb Sales ($3 per bulb towards team x 240)
$7,000	Student Paid Airline Costs
$27,750	Total

Sponsors

Be sure to recognize your sponsors, putting their logos on your team shirts and the robot is a great start. If you're looking for sponsors be sure to check the FIRST website for information about Rookie grants.

Team Safety

A detailed Safety Manual is available on our team website at www.LiveWireRobotics.com under the Resources link.

Safety Items
Eye protection for every team member
Extra safety glasses for visitors
Closed Toe Shoes
Caution tape
Fire extinguisher
Mini first aid kit for competition

In general, these important tips will go a long ways:

- Claim a workspace that is large enough for tools and students. Be creative and don't be afraid to ask! During our rookie season, our build space was an empty store that our local mall donated the use of.
- Keep your work area clean - it minimizes a lot of safety hazards!
- For competition, you will have to have a designated Safety Captain in your pit at all times. There's no rule that requires this be the same person the entire competition. We recommend rotating Safety Captains out on a set schedule, such as morning and afternoon shifts. This gives everyone a chance to participate; everyone gets a break, and promotes the mentality that safety is everyone's responsibility!
- Use the right tool for the right job. We've made a list of our minimum recommended tools. If you don't have something, try sending out an e-mail to everyone involved with the team. You never know what someone has for loan unless you ask!

Tool Minimums

Drill press (wood or metal)
2 power drill motors
Basic hand tools
Good hammer
Lots of Allen wrenches
Soldering iron
Band saw (wood or metal)
Chop saw

Basic Tools and Equipment

1/4 inch and 3/8 inch drive socket sets with metric and US customary sockets, extensions, and adapters
Combination metric and US customary end wrenches from ¼" to ¾" and 8mm to 19mm.
Standard and Phillips screw drivers
Hex wrench sets (Allen wrenches) US customary and Metric
Nut drivers metric and US customary
Vise grips, cutting pliers, tin snips, slip joint pliers, wire strippers,
Soldering gun and supplies
Hack saw
Files, round, mill, ½ round
6 to 8 inch vise with a solid bench
Tap and die set
Square
Machinist rule
Tape measure
Center punch
Cold chisels
Pin punches
Tapered punches
Hammers (used to lower stress level)
metal cutting band saw
"Pop" rivet gun kit
Tin snips
Air die grinder and burrs (carbide best)
Work bench chairs stools
Bench grinder
Bench belt sander disc combo
Welder, machine and person
Table saw
Lathe
Computers

The *FIRST* Year

Each team's schedule is a reflection of their team - you'll figure out what works best for you. This is the schedule that LiveWire followed for our first year. Visit LiveWireRobotics.com for our printable FRC calendar (team resources) to help you plan out your season.

September - Start recruiting! Hang posters up in your local high schools, get kids excited! Talk to existing teams in your area (if there are any) and see if they would be willing to host a robot showcase or pep rally at your school to build the team. Find local businesses that would be willing to mentor or sponsor your team.

October - Register your team on TIMS, register for your regional competition, register for a local Kickoff event. Recruiting continues… If your team has more than one regional within travel distances, there are factors to consider. See our Competition section for some advice.

November - Recruiting continues… We meet weekly for preseason team building activities.

December - Recruiting continues…. Sleep while you can!

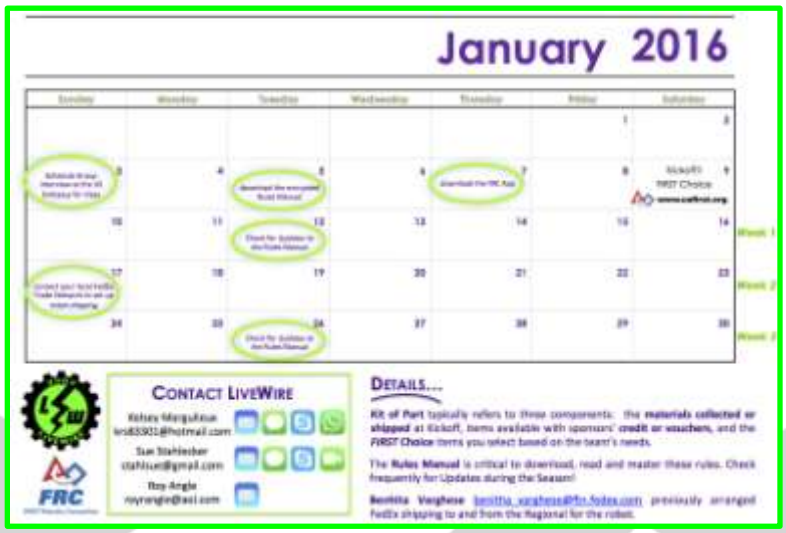
January - Kickoff will be held the first weekend in January, this is the official start of the Build Season. The 6-week Build Season is the most exhausting phase of the Season. Hang in there - you'll make it!

February - Deadlines for awards submissions, Team Essays for the judges' info packets are due, and Build Season usually ends the day after President's Day Weekend. Sleep for a day, and then prep for your upcoming Regional Competition(s)!

March - Regional events are held every weekend, we attend one event but recommend watching as many as possible, either in-person or making use of Webcasts (usually links are posted on NASA's Robot Alliance Coalition website or at TheBlueAlliance.com)

April - Regional events are held through April with Championships the last week of April.

May thru August - The "Off-Season" as we jokingly call it is great for team activities, fundraisers, planning sessions, and Robotics Summer Camps. Robotics Summer Camps serve as our primary fundraiser for the season, and promote our team in the community.



Build Season

Every year the game is unique, and prior to the unveiling, is open to wild speculation! You will be able to download the rules in an encrypted PDF format. This is highly recommended as the website inevitably crashes when hundreds of teams attempt to simultaneously download the game information. The Kickoff broadcast will include the encryption key. Kickoff is the official release of the year's game and the beginning of the Build Season. You will register for a local Kickoff event on TIMS. Your Kit of Parts is then available for pickup at your Kickoff event, at which you watch the unveiling of the game animation, share in the excitement and collect your Kit of Parts. Your Kit of Parts includes items that usually prove very useful in building for the year's challenge, as well as some critical game pieces for testing. Your Kit of Parts will include a detailed inventory summary. Go through the list item by item and check it against your inventory. The *FIRST* e-mail blasts will provide details about how to replace any missing pieces, as well as the deadline for doing so. Usually this is within a week of Kickoff.

The Build Season tends to be fast, overwhelming, not long enough, way too long, exhausting and so much fun - all at the same time! Some things that we recommend that will help you survive (and enjoy) the season:

- Have your build space organized and ready to go.
- Watch the Kickoff video and be excited, then take a break to read and study the rules before you start discussing design and strategy.
- Brainstorm the first day, talk ideas through, think outside the box, and if possible - **keep it simple!**
- Start building your robot as early as possible and put as much time in early on as possible. Even though finishing and bagging your robot with 4 seconds left on the Bag and Tag deadline is exciting - it's better to have time to practice.

- Know who is responsible for what tasks.
- Find a mentor team that is eager to answer your questions and help out. Don't have one? Visit www.firstinspires.org and look for teams in your area. Send them an e-mail, it's nice to have someone local(ish). If that fails, **e-mail us!** Or, post on Chief Delphi.
- Programming and chassis are the most crucial aspects of building your robot. Be sure that you have dedicated groups working on each, with an experienced mentor to assist them.

Competition

FIRST Things First

Gracious Professionalism is not just a cute phrase. Things get heated and stressed and intense. Everyone MUST keep their cool. Gracious Professionalism refers to how you should interact with one another and with other teams. Don't be afraid to ask for help. Every team loves helping - this sounds like an idealistic generalization but it's true. Anyone who can, will help you.

Choosing a Regional

LiveWire attends one regional each year. Many teams do more than that but each additional regional costs $5,000 so consider your budget. Things to consider as you select your Regional:

- Travel - Which events are close to you? You will be transporting your team, robot, pit accessories, possibly parents, loyal sponsors, etc. Close events tend to simplify some things.
- Dates - Are there any weekends that will not work for crucial members of your team? For example, many of our team members and coaches participate in Skills USA, State Debate, State Dance. We have to exclude any Regionals that occur during those times.
- Weeks - The earlier the Regional occurs, the less experience teams have had from competing at multiple events. As you watch Regionals that occur later in the competitions, you will see significant improvements that come with teams' experience and practice. Selecting an earlier regional puts everyone on closer footing.
- Size - The more teams at an event, the more competition. It's easier to stand out at a smaller event. Larger regionals have more teams and people there! Some venues are better than others. Chief Delphi is a forum for all things *FIRST*; you can peruse it for teams' comments on previous Regionals. Every event is fun, and you're in the running wherever you go. Enjoy it!
- Register - As soon as registration opens, events begin to fill up. Plan on registering the very minute it opens. Login to TIMS ahead of time and baby-sit your connection so that you aren't logged out after 15 minutes of inactivity. Have a list of your top 3 competitions just in case your first choice of event is already full.
- Championships - As a Rookie team, there are two ways that you could qualify for the Championship Event in St. Louis, Missouri: your alliance wins the Regional event, or your team is awarded Rookie All Star at your Regional event (more

information in the awards section). So, decide before your Regional - if your team qualifies for Championships, are you going? It's an amazing experience, for meeting teams, looking at designs, networking, the level of competition, and much, much more. Know, based on budget, travel, and schedule if it's possible.

Drive Team Advice

Your drive team refers to the student(s) driving the robot, the human player and the student or adult who will act as the coach during the matches. Each team approaches the selection of drive team in a different way. We ask all students who are interested in driving to write their name on a list by a certain date. Then we evaluate the list. Here are some factors we take into consideration.

Anyone you are considering for driver has to exhibit gracious professionalism at all times. Your drive team deals with everything, good and bad, that happens on the floor. Will their responses as they win or lose matches reflect on your team? What would happen if a referee missed something or made a bad call? This almost never happens, but what if did to your drive team? What if one of your alliance members or opponents was particularly hard to get along with? Again, most teams are amazing - but what if? Think through worst case scenarios and decide if anyone should be crossed off the list of potential drivers…

The coach is the only drive team role that may be filled by an adult. This can be a chance for a student to gain field experience or can be a chance to add an adult to the Drive Team to help calm nerves and smooth stressful situations.

- They have to show time commitment to the team. That doesn't mean that the person who's always there automatically gets driving privileges. It does mean that we don't consider the people that are never there or always have to leave early. You want someone who will be there and follow through.
- Solid grasp of the rules, all the rules, not just the game rules. We make a rules test that ALL students take and are required to pass at least 85%. If necessary, re-takes happen. Your drivers need to really, really know the rules! Anyone interested in driving takes the rules test, and an additional (much harder) version that asks about all the technical fouls, cards, warnings, etc. The scores are taken into consideration with everything else.
- Drivers must be able to work with others in a gracious and professional manner – both their team members and strangers. Keep in mind that you will play matches with or against nearly every team in the competition. The Drive Team is the most public face of your team.
- Having a head for strategy doesn't hurt. Things happen during the game; drivers have to know what to do and how to help their alliance win.
- At some point you need to observe how they actually drive. Rotate combinations; give students actual tasks to complete. Picking up game pieces, scoring, etc. and compare how each student does as driver, as manipulator, or as human player.

Atmosphere of *FIRST* Events

Team Image

Building a **team image** will help you to stand out at Competition - which isn't a bad thing when it gets to the Alliance Selection! Think of things you can do ahead of time to embrace a team color, mascot, slogan, etc. You will see lots of colored and crazy hair, weird outfits, painted faces, etc. It's all part of the competition and it keeps things fun!

You will want to have **team shirts** with your team number printed on them—most useful on the front of the shirt, choosing a team color, logo etc. are always fun.

You may want to consider having a **team mascot** of some sort. This is certainly not required, but the majority of teams have someone dressed up as a mascot. With small teams that may be difficult, but be creative! Consider rotating, recruiting a younger sibling, etc. It might be possible to rent a costume or borrow a school's mascot for the competition. LiveWire's mascot is a super hero. The costume involves a green spandex morph suit and a cape, complete with a green Mohawk haircut. So much fun and it contributes to the atmosphere of the competition.

Most teams have **team pins** that they trade with other teams. They can have anything on them. They're a fun way to promote your team!

Team Spirit

If you make a **team flag with pole** the announcer will wave it during alliance introductions in each of your matches. We made a simple flag (use kite fabric) with a sleeve for the pole and put our name and number on it.

Have your spectators be cheering loudly in the stands. Team cheers are always fun, especially when they catch on and other teams or the announcer join in! LiveWire has a main cheer, "*1… 2… 3562! WHO? LiveWire!*" Other popular cheers are "*What time is it? 488!*" for team XBots and the Coconuts' (Team 2086) ever popular cheer of "Coco! Coco! Nuts! Nuts! Shake your bushy tail - whew!!" Clearly, catchy is more important than logical and can be based on team name or number. Cheer on the other teams and get to know them; you'll continue to see them at other competitions in the future!

Pit Area

Every team has a designated area (their pit) in which to set up, work on the robot, and organize their tools. Depending on the venue layout and size, pits sizes change but generally they are 10' X 10'. Plan on taking some basic **organizational** things: shelving, tool boxes, surge protector, etc. It's easier to find things if they have a designated place. Take the tools that you think you will need to work on your robot: drill, screwdrivers, allen wrenches, etc. Everything that you used repeatedly during the Build Season, you'll want. Consider **safety** things: fire extinguisher, small First Aid Kit, etc.

Pay attention to your pit ***décor***. Do a little bit to fix it up and make it presentable. LiveWire has a banner, tablecloth (double duty here—looks nice on top and we can shove junk underneath!) We display our scrapbook and have our pins in a container. A little bit can go a long way!

Scouting

There are a few aspects to scouting - watching teams on the field, talking with teams about their robots, and promoting your own team. As you look at other teams pay attention to how their robot does on the field and how consistent they are at various aspects of the game, not just if they win or lose.

TheFirstAlliance.com keeps a running track of each teams' "Offensive Power Ranking," a score based on each teams' ability to score points during a match, and a "Defensive Power Ranking" that track's their defensive abilities. These OPRs and DPRs can prove useful as you scout teams and evaluate potential alliance members.

We put together a **marketing brochure** that has the picture of our robot and the specs. It is useful when you are talking to other teams to let them know how great your robot is. You want to make yourselves and your robot strengths known so that teams will want to pick you for their alliance in the finals. Teams usually have a scouter or crew of scouters that will go from pit to pit to ask about the specs of each team's robot. It is helpful to have a brochure or page with the details already summarized. On the same note, sending a student around to collect each team's robot brochure will give you lots of information.

Awards and Judging

Many awards will be given out at the Regional. Teams are recognized for Innovation, Creativity, Safety, Team Spirit and more. Some awards are unique to the Regional and based on local sponsorship and some awards are given out at every Regional. There are three awards given out at each competition that act as merit-based qualifiers for the Championship Event; Rookie All Star, Engineering Inspiration and Chairman's Award. All of these are prestigious awards that recognize exemplary teams that are committed to the ideals of *FIRST*. Chairman's and Engineering Inspiration are given to veteran teams. Rookie All Star recognizes one team that demonstrates commitment, outreach, promotion of science and technology, and in a sense, is the rookie equivalent of the Chairman's Award.

The judges will visit teams in the pits (randomly - you may not even know they're a judge). Coaches and mentors need not talk to the judges; judges want to interact with students, observe and ask questions about your robot, team, and outreach. Students should be prepared to talk to judges. An afternoon session of judge practice sessions is really helpful - especially for students who aren't comfortable with "public speaking." Remember that you're talking about *your* robot, it's not scary - by this point you've been obsessed with it for the last 3 months! No one knows more about it than you!

For our rookie year we had a picture scrapbook on display as well as a **judge's handbook** (one copy to give to them, one for display on our table) that gave a team overview. The contents primarily focused on our outreach. We included 4 student essays, one from each grade level (freshman to senior) and a first year coach's that described the impact of *FIRST* on their lives. We also included a **business plan**, nothing complicated, but it described our plans for future team sustainability.

If anyone is asking about the robot—bring them into the pit and show them on the robot. Hands on - by the time competition comes around, it's all you can do to stop talking about your robot!

Special thanks to the following teams for using and reviewing our Rookie Manual and giving us suggestions on how to improve it.

4078 Team TESLA – Twin Falls, ID

4143 MarsWars – Metamora, IL

4175 Top of the Mountain – Driggs, ID

4178 BOTT Wire – Declo, ID

4206 RoboVikes – Fort Worth, TX

4218 NaviBots – Kapolei, HI

4928 The Arabian Knights – Al Ain, United Arab Emirates

5489 CSI Golden Eagles – Twin Falls, ID

www.LiveWireRobotics.com

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