Section 0

INTRODUCTION

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0 INTRODUCTION

0.1 WHAT IS THE *FIRST* ROBOTICS COMPETITION?

Take dedicated, enthusiastic students, teachers, engineers, and other professionals, add six weeks for design and fabrication and you get a wide range of amazing machines that are competition ready.

The *FIRST* Robotics Competition (FRC) is an exciting program that assimilates teams, sponsors, colleges, and technical professionals with high school students to develop their solution to a prescribed engineering challenge in a competitive game environment. The competitions, also know as co-opetitions, combine the practical application of science and technology with the fun, intense energy, and excitement of a championship-sporting event. The program results in life changing, career molding experiences for its participants and is *a lot* of fun.

In 2008, FRC will reach over 33,000 students representing approximately 1,500 teams. FRC teams come from every state in the United States, as well as from Brazil, Canada, the United Kingdom, Mexico, Israel, and The Netherlands. FRC has become an international program and is continuously growing. FRC teams will participate in 41 Regional Competitions and approximately 300 deserving teams will qualify to go to the *FIRST* Championship at The Georgia Dome in Atlanta, Georgia.

This year's challenge will be presented at the 2008 FRC Kickoff on Saturday, January 5, 2008. At the Kickoff event, all teams:

- see the 2008 game field for the first time
- learn about the 2008 game rules and regulations
- receive a Kit of Parts (KoP). The KoP includes, but is certainly not limited to, motors, sensors, chassis metal and hardware, transmissions, software packages, radio control systems, and batteries. The intent of the kit is to provide a level starting point for all teams, but the rules dictate additional materials teams may use on their competition robots.

0.2 GRACIOUS PROFESSIONALISM, A *FIRST* CREDO

Dr. Woodie Flowers, *FIRST* National Advisor and co-founder of FRC, asks

"Why do *FIRST* folks talk so much about that phrase?"

Dr. Flowers elaborates on the significance of gracious professionalism in *FIRST*, at work, and in life below.

> Obviously it would not make sense to endorse 'asinine professionalism' or 'gracious incompetence'. It is, however, completely consistent with the *FIRST* spirit to encourage doing high quality, well-informed work in a manner that leaves everyone feeling valued. Gracious professionalism seems to be a good descriptor for part of the ethos of *FIRST*. It is part of what makes *FIRST* different and wonderful.
>
> Gracious professionalism has purposefully been left somewhat undefined because it can and should mean different things to each of us. We can, however, outline some of its possible meanings. Gracious attitudes and behaviors are win-win. Gracious folks respect others and let that respect show in their actions. Professionals possess special knowledge

and are trusted by society to use that knowledge responsibly. Thus, gracious professionals make a valued contribution in a manner pleasing to others and to themselves.

In *FIRST*, one of the most straightforward interpretations of gracious professionalism is that we learn and compete like crazy, but treat one another with respect and kindness in the process. We try to avoid leaving anyone feeling like they are losers. No chest thumping barbarian tough talk, but no sticky sweet platitudes either. Knowledge, pride, and empathy comfortably blended.

Understanding that gracious professionalism works is not rocket science. It is, however, missing in too many activities. At *FIRST*, it is alive and well. Please help us take care of it.

In the long run, gracious professionalism is part of pursuing a meaningful life. If one becomes a professional, and uses knowledge in a gracious manner, everyone wins. One can add to society and enjoy the satisfaction of knowing that you have acted with integrity and sensitivity. That's good stuff!

0.3 PROMINENT FRC AWARDS

FIRST recognizes both on-field and off-field team performance that promotes *FIRST*'s mission to change culture. Teams are celebrated with several awards that celebrate competencies including, but not limited to technical expertise, community involvement, and safety practices. The two most prominent FRC awards are discussed here; however, for a complete list and description of awards available to teams, please reference Section 5.

0.3.1 The Chairman's Award

Every year, veteran FRC Teams have the opportunity to compete for *FIRST*'s most prestigious award, The Chairman's Award. The Chairman's Award was created to maintain focus on changing culture in ways that will inspire greater levels of respect and honor for science and technology, as well as encourage more of today's youth to become scientists, engineers, and technologists. It represents the spirit of *FIRST*. The Chairman's Award honors the team that best embodies the goals and purpose of *FIRST* and is a model for other teams to emulate.

One team is chosen at each regional to receive this award, those teams go on to the Championship to be considered for the Chairman's Award at the Championship. Teams who have won the Chairman's Award at the Championship are entered into the *FIRST* Hall of Fame. Past Chairman's Award winners who have been inducted into the *FIRST* Hall of Fame are listed below.

Year	Team	Official Team Name
2007	365	DuPont Engineering/DuPont CCRE/First State Robotics & MOE Robotics Group
2006	111	Motorola & Rolling Meadows High School & Wheeling High School
2005	67	General Motors Milford Proving Ground and Huron Valley Schools
2004	254	NASA Ames Research Center/Laron Incorporated/Unity Care Group/Line-X of San Jose/PK Selective Metal Plating, Inc. & Bellermine College Preparatory
2003	103	NASA/Amplifier Research/Custom Finishers/Lutron Electronics/BAE Systems & Palisades High School
2002	175	Hamilton Sundstrand Space Systems International/The New England Air Museum/Techni-Products/Veritech Media & Enrico Fermi High School
2001	22	NASAJPL/Boeing/Rocketdyne/FADL Engineering/Decker Machine & Chatsworth High School

2000	16	Baxter Healthcare Corporation & Mountain Home High School
1999	120	NASA Lewis Research Center/TRW, Inc./Battelle Memorial Institute & East Technical High School
1998	23	Boston Edison & Plymouth North High School
1997	47	Delphi Corporation & Pontiac Central High School
1996	144	Procter & Gamble & Walnut Hills High School
1995	151	Lockheed Sanders & Nashua High School
1994	191	Xerox Corporation & JC Wilson Magnet High School
1993	7	AT&T Bell Labs & Science High School
1992	191	Xerox Corporation & JC Wilson Magnet High School

0.3.2 The Woodie Flowers Award

The Woodie Flowers Award celebrates mentors who lead, inspire, and empower their team. Woodie Flowers Award winners demonstrate effective communication in the art and science of engineering and design. Founded in 1996 by Dr. William Murphy, The Woodie Flowers Award is presented to an outstanding engineer or teacher participating in the robotics competition who best demonstrates excellence in teaching science, math, and creative design. Students submit an essay that nominates one mentor from their team for consideration. Past winners of this award are listed below.

Year	Name	Title
2007	Mr. Dan Green	Director, New Technology Business Operations, Motorola
2006	Mr. Rob Mainieri	Teacher, The Preuss School at UCSD
2005	Mr. Paul Copioli	Staff Engineer, FANUC Robotics America
2004	Mr. David Kelso	Teacher, Central High School
2003	Mr. Andy Baker	President, AndyMark, Inc.
2002	Mr. David Verbrugge	Engineer, GM Proving Ground
2001	Mr. William Beatty	Beatty Machine & Manufacturing Company
2000	Ms. Kyle Hughes	Teacher, OSMTech Academy
1999	Mr. Ken Patton	Engineer, GM Powertrain
1998	Mr. Michael Bastoni	Teacher, Plymouth North High School
1997	Ms. Elizabeth Calef	Teacher, Bridgewater-Raynham Regional High School

0.4 SAFETY: A *FIRST* CULTURE

Safety is critical within *FIRST* and must be observed continually by all participants. Safe practices at competitions are the most visible and obvious, however teams are encouraged to adopt safe habits at competitions, traveling, and working in their shops at home. As a part of Safety Awareness and Recognition Program, teams will be observed and evaluated at many different levels and by many individuals at the event.

- Safety Advisors evaluate team safety behavior and practices at Regional Competitions from the time the robot is uncrated, until the time the robot is re-crated for shipment.
- Referees observe safety on the playing field as well as adherence to the game rules.

Judges evaluate how teams have integrated safety into their robot designs when considering the team for technical awards.

Section 1

COMMUNICATION

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1 COMMUNICATION

1.1 OVERVIEW

This section provides teams with necessary information for contacting *FIRST* staff, Innovation First, Inc. (IFI), and Autodesk. This section also contains help regarding the use of the *FIRST* logo, finding materials on the web site, updating the Team Information Management System (TIMS), tips on reserving hotels, and other informational topics such as the Judges' Information Page.

1.2 *FIRST* HEADQUARTERS- CONTACT INFORMATION

You can reach *FIRST* via mail, phone, and fax, or get information from our web site at www.usfirst.org. The office is open Monday through Friday from 8:30 a.m. to 5:00 p.m., EST. Refer to the sections below for the appropriate help resource. *Be sure to provide your team number on all communications.*

Mailing Address	Phone Numbers	Fax Numbers	
FIRST 200 Bedford Street Manchester, NH 03101	(603) 666-3906 or (800) 871-8326	Main:	(603) 666-3907
		Finance:	(603) 647-5772

1.3 TEAM SUPPORT

The Operations, Team Support Group is ready answer program-related questions regarding registration and team record maintenance, the Kickoff, and the shipping and drayage process. All are ready to help your team. If you leave a voice mail, make it short but detailed and include your team number, name, email address, and phone number. A representative will research the question and return your call or answer via email.

Email Address: frcteams@usfirst.org

Phone: (603) 666-3906 or (800) 871-8326 – **Press 0 for Operations, Team Support / Operator**.

1.3.1 Emails and Subject Lines

Our program requires that many requests must be in writing, so email may be your best communication tool and the best way to get a quick answer or solution to your problem. Emails save money, time, prevent phone tag, and provide information for a researched, more accurate answer. To facilitate a quick reply, include your team number and reference in the subject line.

1.3.2 Please Do Not Duplicate Efforts

We ask that you do not contact or copy multiple persons about the same problem. Being a small group, we must work efficiently and avoid having more than one person working on the same item. We can usually answer questions or requests within one working day.

1.4 CONTROL SYSTEM SUPPORT

(Innovation First, Inc.)

Contact Innovation First, Inc. for help with items such as: Operator Interface, Robot Controller, Radios, Speed Controllers, and Relay Modules. Remember to provide your *FIRST team* number in the subject line.

Tech Support Phone:	(903) 453-0802
Tech Support Email Address:	info@IFIRobotics.com
Web site:	www.ifirobotics.com

1.5 THE *FIRST* STORE (PARTS)

After Kickoff, IFI will host an on-line store on behalf of *FIRST* so teams can purchase listed Kit of Parts items. IFI will have the *FIRST* Store located on its web site (www.ifirobotics.com). Only *FIRST* teams will be authorized to purchase these parts. *FIRST* will establish pricing for all parts, which will include handling charges but not shipping charges. For information about contacting IFI, please refer to the above section.

1.6 *FIRST* ROBOTICS COMPETITION WEB SITE

Visit *FIRST* Robotics Competition at its FRC "community" area where you can find answers to administrative concerns and link to other areas of support.

- Check deadlines and dates for the Team Information Management System (TIMS), entries, grants, registration and payments, robot shipment, and awards submissions. www.usfirst.org/frc_calendar
- Find the "Documents and Updates" area, with link areas on the new "Consent and Release Form," the Email Blast Archive, FRC Q&A Forum, the "2008 Robot Shipping" page, FRC Team Manual sections, events, and a list of the Regional Contact persons, etc. www.usfirst.org/frc_documents
- Find fundraising support materials such as the photo gallery, video clips, and program information. www.usfirst.org/frc_communication_resources

1.6.1 Getting Answers To Your Competition Questions

Manual and Updates: The *FIRST* Robotics Competition (FRC) Manual is available on the *FIRST* Web site at www.usfirst.org/frc_documents. Those sections relating to the game will be posted after the Kickoff. *FIRST* will add to the Update page twice a week to provide teams with new information and clarifications about *FIRST* Robotics Competition events.

Updates and additions to the manual, should they be necessary, will be posted in this area of the web site. Please be sure to check this area often during the build season to ensure that you have the latest information.

FRC Q&A Forum: Shortly after Kickoff, *FIRST* also provides an on-line forum for questions and answers (Q & A). It is accessible at the above web site for each section of the Competition Manual, such as "The Game," "The Robot," etc. Anyone can view questions and replies on this system. Only those team contacts with a special team username and password can post questions to this system. This username and password have been sent to the team's Main Contact. Teams may post directly to the moderators of the forum. Until a moderator accepts the questions, others cannot see them.

1.6.2 Team Web site Links

The web site also provides links to FRC teams' home pages. If you have an FRC team-related web page, you can post it via our Team Information Management System (TIMS) as part of the registration / management process. Keep your web site up-to-date with team history, projects, accomplishments, event participation, and awards for the web site award review and deadline.

1.6.3 Email Blasts

Email blasts are important communications *FIRST* sends to the Main and Alternate contacts for all FRC teams. All team email blasts are sent to the main and alternate team contacts identified in TIMS and are also archived on the web site beginning in September. This system will provide team members and mentors easy access to information *FIRST* provides to, and requests from, teams. This feature is especially helpful for teams that register later in the season. We suggest that you have several team members in charge of updating and informing relevant persons on the team.

1.6.4 Team Updates

After the Kickoff, Team Updates provide rules updates, important information about parts, administrative reminders/deadlines. These documents are posted on the *FIRST* Web site. Our Team Updates schedule is Tuesday by 5PM and Friday by 10AM.

- We work hard to meet these commitments. Unexpected circumstances may, on occasions, delay their publication.
- Additional updates may be released if necessary.
- Occasionally, *FIRST* will publish revisions to manual sections.

Teams often ask one person to read all *Team Updates* and make sure the right team members are informed about their contents. After the Kickoff, you will find the updates on the "Documents and Updates" page at www.usfirst.org/frc_documents

1.6.5 Recruitment & Public Relations Materials

You can find information on the *FIRST* Web site to enhance your team's recruitment efforts. Find PowerPoint presentations, video clips, and statements about the Impact of *FIRST*, our Vision, testimonials, and *FIRST* financial information at: www.usfirst.org/frc_communication_resources

1.7 THE TIMS - SUPPLYING INFORMATION TO *FIRST*

(Team Information Management System)

The Team Information Management System (TIMS) is the on-line system to register your team and provide information to *FIRST* as the season progresses. For details about using the TIMS, please reference Section 2.3. Refer to the "Calendar of Important Deadlines" to check program deadlines www.usfirst.org/frc_calendar. When teams use the system properly, the TIMS provides *FIRST* with necessary, up-to-date information including:

1) Team Names: Official, Nickname, and the 21 letter Short Name used on the scoreboards
2) Team Contact information for important, team messages, shipments, and *FIRST* email blasts
3) Team Partner (Sponsor) information
4) Event attendance information for each team
5) Team's FedEx, UPS, or Purolator shipping account number
6) Team Judges' Information Page

Additionally, the TIMS "Team Information" provides options for:

- Teams willing to mentor other teams
- Teams wanting mentoring
- Entering team web site address/link

1.8 JUDGES' INFORMATION (FORMERLY KNOWN AS "THE YEARBOOK PAGE")

The Judges' Information page is crucial and a great opportunity to communicate your team's strengths to the competition judges. Please take advantage of this opportunity and provide this important information.

The Judges' Information is a team overview page. It is your team's opportunity to share valuable information and statistics with *FIRST* and the judges at the Regional and Championship events. These data are very valuable for planning events and very helpful in our efforts to procure funding. *FIRST* may use the robot photos you submit in the Awards Ceremonies. Enter the information via the TIMS under the "Pre-Event" information area.

1.8.1 Purpose

- Provides a common starting point for judging each team and makes judging more efficient
- Helps provide judges with insight into team's workings, history, goals, strengths, and robot
- Provides team data for *FIRST* and its archives

1.8.2 Information Submission and Deadline

The submission deadline is February 19, 2008 11:59 p.m. EST.

Enter this data via the TIMS in the "Pre-Event Information" area.

Don't wait until the last minute: You may have problems you can't resolve by closing time. We face a strict printing deadline when preparing for events, and we urge you to start and complete these pages as early as you can. If you ask for help early, Team Support will have time to help, but our small staff cannot help if too many teams wait until the last days.

No Extensions: *FIRST* cannot grant time extensions to complete this information.

1.8.3 Required "Pre-Event" Information

To prepare for this project, you may want to gather information about your team. Put in your data in your TIMS record as you gather it. The following is an idea of the type of information you will need for this area:

- Number of years team has been involved
- Name of the Student Leader
- Team Budget for the year
- Robot or robot and team photo
- Number of female and male students, engineers and technicians, teachers, and parents on the team
- How many freshmen, sophomores, juniors, seniors
- Teacher/Mentor information
- Percent of your school's student population receiving free or reduced-price lunch

Essay Portion – Please answer briefly. This section requires short, written descriptions of::

- Team history
- Team goals
- *FIRST* impact on the team/community
- Community description
- Team strengths
- Most significant challenge the team overcame
- Robot game and strategy
- For which awards is the Team is most competitive this year?
- Funding sources
- Why is the public aware of your team?

Photo: In the designated spot on the web page, insert a single digital photo of the robot, or the team and robot. Judges rely on the photos, and they also help *FIRST* with media coverage and awards ceremonies.

Format: The Main Contact for each team will receive the necessary instructions for filling out the form via the TIMS. To ensure proper archiving, carefully follow the directions.

1.9 AUTODESK CONTACT INFORMATION

Web site: Autodesk has created a web site area devoted to *FIRST* teams, called FIRSTbase. Please go to www.autodesk.com/firstbase for information on the software downloads, training, the Autodesk design competition, Autodesk kit of parts, technical support, their sponsorship, *FIRST* alumni, resources, frequently asked questions, the pressroom and feedback. You can find the initial email on the archive page www.usfirst.org/community/frc/content.aspx?id=6616

Email: If you can't find answers to your questions from the above web site, please contact Autodesk via first@mail.autodesk.com or use the "Feedback form."

1.10 EVENT-SPECIFIC INFORMATION

The *FIRST* Robotics web site includes important information about specific events. We advise that you add copies of the "Site Info" and "Shipping / Drayage" and any information you receive regarding the FedEx donated shipping process to your FRC Manual information regarding the events you will attend.

You will be able to download the below information for the events, and you can find this information on the *FIRST* Robotics page by clicking on Regional Events or Championship. Choose your event and click on "Site Info" or other links for pertinent information, such as pre-order lunch forms. Provide the information to appropriate team members and mentors.

- *The 2007-08 Consent and Release Form is the only acceptable version of the form for the 2008 Kickoff and events*. Bring completed copies in case the originals are lost or the person carrying them is delayed. These are due at registration of your initial competition event.
- Site Maps
- Shipping and drayage information and labels
- Copies of pre-ordered lunch forms
- Team social events
- Be sure to include your FedEx information and instructions
- If you have specific questions not addressed above, please contact the Regional Director in your area.

1.11 REGIONAL EVENTS HOTEL SEARCH INFORMATION

FIRST will not be offering hotel reservation services for the *FIRST* Robotics Regional event season. Here are some recommendations for *FIRST* team mentors regarding placing team hotel reservations. Some great resources are:

- Google (www.google.com), Kayak (www.kayak.com)
- The Convention and Visitors Bureau (CVB) in the city in which you are competing. Hotels that are members of their local CVBs tend to be more reputable properties.

Examples: www.atlanta.net, www.visitdetroit.com, www.orlandoinfo.com

NOTE: If you can't get a large enough block from a third party web site such as www.Travelocity.com or www.Priceline.com, contact the hotel directly during normal business hours to speak with a reservations representative who is better suited to make larger blocks.

We suggest that you use the following tips to help with your hotel search.

1) Pick out three or four hotels in the same proximity of your Regional city to confirm approximate pricing for the marketplace within 3-5 miles to the venue. You can find a complete list of venue addresses for the Regionals on the *FIRST* Web site.
2) Use Google, Mapquest, Yahoo, or other online driving direction services to confirm the distance to the venue.
3) Once you make your choices, contact the hotels reservation personnel and ask your questions directly. The following are examples of what features you will want your hotel to have:

   - 24 hour security
   - Free parking, or at least secure parking if it is in a city environment
   - Interior entrance rooms - rooms that have exterior entrances are the ones that have inherent security risks. Also, any team member can wander off at any time.
   - Hotels that have been renovated within the past 4 years
   - Hotels that will disclose if they have groups in house that are not consistent with or are in indirect opposition to *FIRST* values or any other groups that tend to stay up late and can affect your sleep.

   Other items to consider are:

   - Will your room block be together on the same floor/area
   - Is there a complimentary breakfast
   - Is there free Internet access (about 50% of all hotels have it)
   - Cheapest should not be the only qualifier. If the quality or location is poor, it can lead to an overall bad Regional experience. Without the proper sleep, you will wish that you had paid a little more for a better quality hotel.

4) Call and make your reservations as soon as possible. What rates you may find available now are not usually the same close to the event date when the hotel is close to its capacity.

1.12 CHAMPIONSHIP HOTEL INFORMATION

FIRST is pleased to announce that Steele Meetings, Inc will be handling the hotel reservation system in Atlanta for the 2008 *FIRST* Championship. The information for 2008 will be in place by December 3rd, 2007. *FIRST* will send out an email blast so teams are able to make hotel reservations for the 2008 Championship. To contact Steele Meetings at any time, please email: customerservice@steelemeetings.com

1.13 *FIRST* LOGOS

You have numerous creative opportunities for designing your own team identity. Every year we see great examples of how teams "brand" their efforts with web sites, incredible team logos on robots, T-shirts, hats, banners, fliers, and giveaways. These branding activities are a wonderful way to include students from art, communications, computer, and language arts classes.

As you manage your own promotion, you may want to incorporate the *FIRST* logo in what you do. Because our mark - the combination of the composite graphic element plus the *FIRST* wordmark - is registered, we have a few guidelines for you to follow when using the *FIRST* logo or the FRC logo. You can find the logos on FRC Communications Resource Center www.usfirst.org/frc_communication_resources

1.13.1 Logo Use

We encourage teams to develop and promote team identity. It is a great way to help *FIRST* judges, announcers, and audiences recognize your team at the competitions, and it is also a way to help you create a community "buzz" about your team. Here are some guidelines:

Positive Promotion: Use our logos in a manner that is positive and promotes *FIRST*.

Unmodified: Use the logos without modification. This means that you will use our name and the triangle, circle, and square as you see it on our web site or letterhead. You can use it in red, blue, and white, or in black and white. Refer to the *FIRST* logo standards for additional details including placement, size, and color specifications and incorrect logo usage.

Logo and Standards: You can download the logos from our web site in JPEG (for electronic applications) or eps (for printed applications) format. Go to www.usfirst.org/frc_communication_resources

Advertising Use Approval: All teams and sponsors must obtain approval from *FIRST* prior to incorporating our logos in any advertising. Email approval requests to marketing@usfirst.org.

1.13.2 Finding This Year's Competition Logo

Once the game is announced at the Kickoff, you will soon be able to download this year's game logo from the *FIRST* Robotics Competition Communications Resource Center (www.usfirst.org/frc_communication_resources) portion of the web site under "Graphics."

1.14 PROVIDING CORPORATE SPONSORSHIP

For those interested in providing Corporate Sponsorship to *FIRST,* please contact Julia Howell, Senior Director of Development, for information regarding the opportunity to provide sponsorship at (603) 666-3906 or (800) 871-8326, Extension 461. You can also contact her via email at jhowell@usfirst.org.

1.15 HOW TO VOLUNTEER FOR *FIRST*

Each Competition event depends on an abundance of volunteers with a broad spectrum of talents to support operating needs and competition demands. If you have time, we appreciate and can surely use your help. Please visit the *FIRST* Web site page, and click on "Get Involved" on the gray menu bar. Choose "Volunteers," to find out more about volunteer opportunities. You can register your preferences for events and volunteer positions by clicking on Go Directly to the Volunteer Information & Matching System (VIMS) (https://my.usfirst.org/vims/logon.lasso?page=logon).

Section 2

TEAM ORGANIZATION

FRC FIRST Robotics Competition

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2 TEAM ORGANIZATION

2.1 OVERVIEW

The most critical aspects of running a team can be preparing for the season and keeping abreast with current information and deadlines. Make sure your team has good systems in place. This section provides some helps for the mentoring process and required and optional team contacts and their roles.

By listing these organizational jobs and their tasks, you will get an overview of what some of the project entails and how your team members can share the project workloads, keep team members and mentors up-to-date, and watch and meet deadlines.

2.2 GETTING STARTED

Take advantage of the information on the *FIRST* Web site dealing with starting, organizing, and maintaining an FRC team. Print out and read the various handbooks and guides listed below, and have them readily available for your team members.

2.2.1 Guides, Handbooks, and other helpful Resources

Safety is an integral part of the *FIRST* programs. Be sure to read the Safety page at www.usfirst.org/community/frc/content.aspx?id=470. You will find the link for the "*FIRST* Robotics Competition Team Safety Manual." Start your team off with a safety captain, safe work places, and a safe work ethic.

The following are ready to print at this web page www.usfirst.org/frc_start_a_team

- "Starting an FRC Team"
- "FRC Handbook"
- "*FIRST* Mentoring Guide"
- A variety of community sponsored resources

2.2.2 Sharing Fundraising Ideas

There is some very unique fundraising going on within *FIRST* teams. If your team has any ideas to share and help other teams:

1. Make sure you document them in your Chairman's Award submission.
2. Please e-mail your ideas to frcteams@usfirst.org so fellow teams can share your innovations in profitability. This is a way of building on and expanding Gracious Professionalism.
3. Please realize that fundraising is not allowed at competition events.

2.2.3 Team Resources

For help with various practical aspects of the competition, refer to the Team Resources page, www.usfirst.org/frc_team_resources. You will find Autodesk and other tutorials, technical links for programming and pneumatics, ideas for team sustainability, mentoring resources and a variety of other available assets.

2.2.4 Scholarship Opportunities

Students, parents, and teachers should be aware of the wonderful scholarship opportunities for participating students at www.usfirst.org/scholarships. Students should work on their applications before the season gets too busy. Remind them of associated deadlines.

2.3 THE TEAM INFORMATION MANAGEMENT SYSTEM

Your team is encouraged to align its structure with the contact requirements in the TIMS (introduced in Section 1, "Communication"). The following contacts are required in the TIMS.

1) Main Contact
2) Alternate Contact

3) Shipping Contact

The Main and Alternate Contacts must be adults. They will receive the majority of the communications from *FIRST*, and they are usually in charge of disseminating the information. They are also responsible for keeping the team's Team Information Management System (TIMS) record up-to-date. The Shipping Contact has to know all about shipping the team's robot and receiving any program-related shipments.

2.3.1 TIMS Maintenance

Communications between *FIRST* and teams is essential, and each team-designated contact person should inform the team's Main or Alternate Contact of any change in phone numbers, mail address, or e-mail address so he/she can update the Team Information Management System (TIMS). Multiple phone numbers and e-mail addresses are necessary so we can contact team contacts during vacations, school shutdowns, and while the team is traveling.

Pre-college aged team members are not allowed in the TIMS. It is essential that the team record is kept up-to-date. We also suggest that you keep a hard copy of your team's contact information. Use pencil so you can make changes and distribute updated copies to the team.

2.3.2 Information Distribution

Main and Alternate Contacts will receive the majority of communications *FIRST* Headquarters sends. They should disseminate information to relevant team and sub-team members and mentors.

We recommend highlighting specific topics of the communication. Reminding team members of specific responsibilities and impending deadlines is essential. Use a team bulletin board for *FIRST* e-mail blasts, team happenings, and meeting times and topics.

2.3.3 Email Blast Archive

An e-mail blast is a message sent to all FRC teams via e-mail. The blast will have a relevant subject line for easy reference and will contain items such as new or updated information, a deadline reminder, or an opportunity for teams. *FIRST* archives them from the beginning of the season in September so all teams can refer back to their contents. This is especially helpful for teams who register after the mailings and enables all team members and mentors to keep abreast.

2.3.4 TIMS Access for Both Main and Alternate Contacts

At the teams' requests, we have made it possible for each team to have two ***adult*** TIMS access persons. Both the adult Main and Alternate contacts can enter the system with their logon information and make additions and changes. They are responsible for accessing the TIMS, keeping the information current, and providing necessary information by the set deadlines. Keeping the information provided in the TIMS current and accurate is critical.

2.3.5 International Teams

Please be sure to supply your country code and city code as part of all of your phone numbers in TIMS. This is especially critical during Kit of Parts and robot shipment times because it is sometimes necessary to speak with Shipping, Main, and/or Alternate Contacts.

2.3.6 "Off Season" and Current Contact Information

Each team contact listed in the TIMS is responsible for informing the Main or Alternate Contact of any changes or additions to the team's TIMS record, including phone numbers and addresses. This is especially crucial during team travel times and during school vacations.

Provide the Main Contact's information area with a secondary address, home and cell/mobile phone numbers, and email addresses so we can reach him/her. If any of the team contacts leaves the team, add the new information and delete the former contact from the TIMS.

2.3.7 Mentoring Information

If you wish to sign up to mentor or receive mentoring through the TIMS, make sure your Main or Alternate Contact edits his/her TIMS record and clicks "yes" to the question "Share this address?" (or the email, or the phone). Find this in the primary address area.

Under "Team Information," make sure you answer the questions regarding mentoring by clicking the appropriate box regarding the following:

- We are willing to mentor other FRC teams.

- We would like to be mentored by another FRC team.

2.3.8 Team Names –Official, Short, and Nickname Deadlines

Please read below for team name definitions, uses, and the TIMS deadline. Enter the information in the TIMS "Team Information" area.

2.3.8.1 Your Official Team Name

The official team name includes sponsors and schools. We refer to them as Partners. Your team's official name is generated automatically when you enter the Partner information in the TIMS. It is what appears in written materials such as the *FIRST* Program Books. *Update the Partners area of the TIMS whenever there is a change or addition to your partners/sponsors.*

2.3.8.2 Other Team Names for Scoreboard and Play-by-Play

We must prepare our practice and match lists for the competition season, so teams must enter their short name and nickname in the TIMS by mid January.

1) **Short Team Name:** Once you have established your team partners, remember to adjust your twenty-one (21)-letter maximum "short team name" to include them. Whatever you put in this field will appear on the scoreboard at each event. Sponsors appreciate the extra recognition.
2) **Nickname:** The announcer uses team nicknames during the game when announcing the play-by-play descriptions.

2.4 SUGGESTED LEADERSHIP ROLES

This section recommends various team contact duties and responsibilities that are essential to maintain the competitive team effort of the season. ***Main, Alternate, and Shipping Contacts must be adults. Pre-college students are not permitted in the TIMS.***

Your team will ultimately decide which individual duties it will adopt and ensure that the individuals are capable of performing the assigned tasks. It is the responsibility of these team leaders and other team mentors to establish, instill, and enforce team rules with regard to safety, sportsmanship, and conduct.

It is essential that team members and mentors share the workload and equally commit to the team's success. Ensure everyone understands the various roles enough to be able to cover if necessary.

Examine the roles, and compare recommended qualities and abilities with your mentors from a *FIRST* perspective. *Team structure is the team's prerogative and the following are suggestions.*

2.4.1 Main Contact Responsibilities

The Main Contact is the main source through which most information flows from *FIRST* to the team. This person may choose to delegate some of the responsibilities listed below, but should still be up-to-date with their progress and ensure their completion.

Communications:	Receive *FIRST* communications and reply when necessary. Review *FIRST* Safety Policies/Procedures and ensure all team members have this information.
Contact Information:	Verify up-to-date alternate mailing addresses and phone numbers are posted to the TIMS for use during vacations or team travel.
Event Information:	Supply event information to *FIRST*, via the TIMS.
FIRST Information distribution:	Receive and disseminate all information from *FIRST*, including E-mail Blasts and Updates from the web site, and to handle replying/complying with *FIRST* requests.
FedEx Donation:	Confirm the Shipping Contact understands the FedEx donation process and use of the on-line FedEx Shipping Administration System. (Formerly Passkey) See Section 4 of FRC Manual.
On-Line Submissions	Ensure submissions of Woodie Flowers, Web site, Chairman's, and other Awards by the respective deadlines. Find details in the "Awards" section of the FRC Manual.
Participation Medallions:	Ensure they are obtained at team's initial event. Refer to the "At the Events" of the FRC Manual for details.
Registration:	Register the team for events.
Release Forms: www.usfirst.org/frc_documents	Designate someone to distribute 2007-08 **NEW** Release Forms and collect the completed signed forms. They must be presented at the team's initial competition registration of 2008. **NOTE:** The forms for students under 18 require a parent/legal guardian's signature. They are required for: • Kickoff events • Any of the I Regional or Championship events. If a person does not attend the team's initial event, he/she must still provide one for that subsequent event, and you must turn it in at that event.
Safety:	Work together with your team's Safety Captain and entire team to ensure safety while working and traveling.
Scholarship Opportunities:	Keep students/teachers informed about scholarship opportunities well in advance of the deadlines. www.usfirst.org/scholarships
Team logon and password:	Receive, and keep secret, your TIMS logon and password.
TIMS (Team Info System):	Maintain and update team's TIMS record.
Updates and archived e-mails:	Disseminate e-mails and web "Updates" information to relevant sub-teams. Refer to web for archived e-mails.
UPS, FedEx, Purolator Account Number for TIMS:	Enter the team's account number in the TIMS. A sponsor or your school may let you use their account, or you can get a number from a shipping company's web site.
Web site Calendar:	Monitor the *FIRST Web site* calendar for changes, additions. www.usfirst.org/frc_documents
Judges' Page:	Enter this submission into the TIMS by the deadline.

2.4.2 Alternate Contact Responsibilities

This person is the Main Contact's "right hand" and is important in the team's structure. He or she should share the team administrative duties, be ready to help in ways the team decides, delegate responsibilities when necessary, and cover the Main Contact's role if that becomes necessary.

Communications:	Receive relevant *FIRST* communications and reply when necessary. Chairman's Award project - Ensure unusual stories about overcoming obstacles are included in the Chairman's Award submission.
Contact Information:	Provide current contact information for the TIMS, including an alternate phone number and address in case *FIRST* has to make contact during vacation or while the team is traveling..
Public Relations:	Confer with Main Contact. Notify Public Relations Contact of any upcoming team fundraising or events.
Safety:	Work with team's Safety Captain to ensure safety while working and traveling.
Shipping:	Be familiar with the shipping and drayage responsibilities and deadlines in case the Shipping Contact needs help.
Scholarship Opportunities:	Inform students of scholarship opportunities and their deadlines. www.usfirst.org/scholarships
Support:	Provide any support the Main Contact or team may need.
Team Logon and Password:	Receive, and keep secret, your TIMS logon and password.
Vacation Coverage:	The Main Contact and the Alternative contact will receive and be asked to disseminate *FIRST* communications.
Web site Calendar:	Monitor the *FIRST Web site* calendar for changes, additions.

2.4.3 Shipping Contact Responsibilities

This person is responsible for handling both robot shipping and drayage arrangements for the team and receiving mailed items for the team.

Kit of Parts:	If your team opted to pay for your Kit of Parts shipment, "My Site" TIMS choice, confer with Main/Alternate Contact to ensure that the shipping address in the TIMS is correct. If the team wants to pick up the kit, make sure the Main Contact meets the deadline for this TIMS entry. Designate an adult mentor to pick up the kit at a Kickoff.
Communications:	Receive relevant *FIRST* communications, replying and forwarding when necessary.
Contact Information:	Provide the Main Contact with current contact information for the TIMS, including an alternate phone number to enable *FIRST* contact during vacation or while the team is traveling.
FedEx Donated Shipments - Obtain and maintain airbills:	Read the "Robot Transportation" Manual Section and become familiar with the FedEx shipping donation, its specifications, and the related airbill distribution system for your team's location. Relay the information to another mentor in case you are not able to take care of it. The airbills are not replaceable.
Robot Shipment:	Read the "Robot Transportation" Manual Section and download your event(s) from the Events portion of the web site, "Site Info", www.usfirst.org/frc_regional_events **Be familiar with and conform to the following:** * Deadlines/specifications for shipping your robot crate….and its arrival. * Customs requirements if you ship over a border. * The drayage system and its deadlines and specifications * On-time robot shipment within the *FIRST* specifications. Domestic Teams: Be completely familiar with the FedEx on-line shipping system and how to print airbills. Teams from AK, PR, HI: Become familiar with the FedEx donation system. Keep airbills safe. International Teams: Become familiar with the FedEx donation system and keep the airbills safe. Be familiar with all Customs shipping and receiving requirements.
Team's UPS, Purolator, or FedEx Account Number:	Provide the Main or Alternate Contact with a shipping account number for the TIMS. This could directly impact the missing, defective, or broken parts replacement system for your team. Sponsor/school may let team use its shipping account, or obtain a number from the companies' web sites.

2.5 RECOMMENDED ADDITIONAL CONTACTS

2.5.1 Travel Contact Responsibilities

This person will be making event(s) travel and hotel arrangements for the team members and mentors. Tackle this task early to ensure there is room on preferred flights and in preferred hotels.

Communications:	Receive relevant *FIRST* communications and reply when necessary.
Travel Pricing:	Obtain, consider, and compare travel costs prior to registering for an event(s). The web has many opportunities to compare airfares. Ask for group rates to see if that is a good option. Is bussing an option?
Contact Information:	Provide up-to-date contact information for the TIMS. Provide an alternate phone number and address in case *FIRST* needs to make contact during vacation or while the team is traveling.
Hotel Reservations:	Regionals: Refer to "Communications" section of the Manual for hints and good advice on choosing team hotels. Championship: Use the *FIRST* vendor, located on the web site, to obtain reasonable hotel packages. Conform to the *FIRST* guidelines and deadlines regarding travel.
Manual and Web site:	Refer to the "Site Info" on the web site for special travel/parking instructions. Bring the directions for the venue.
Stores/Supplies:	Refer to the "At the Events" portion of the Manual to find links to various types of stores, such as printing, supplies, hardware. Find stores near your chosen event and print out the directions to them.

2.5.2 Public Relations Contact Responsibilities

This person's role in advertising the team's goals and accomplishments is critical. Work with the team contacts to ensure the partners are apprised of the team's progress and accomplishments.

PR Updates:	Responsible for receiving and disseminating any PR updates and using them to the team's advantage in local newspapers, as well as TV/ radio stations.
Fundraising:	The team would be wise to advise this person of any fundraising activity or team appearances well before the date.
Sponsors:	Send any PR information to potential sponsors all during the year.
Contact Info.:	Provide up-to-date contact information to the Main Contact for the TIMS.
Communications:	Receive relevant *FIRST* communications and reply when necessary. Supply up-to-date contact information to Main Contact for the TIMS.

2.5.3 School Contact Responsibilities

This adult representative is responsible for knowing and enforcing all school rules regarding team participation. A teacher or principal may be best qualified for this role to facilitate the team's progress and meeting deadlines.

Communications:	Receive school related team e-mails. Provide information/reply if necessary. If no one is specified to work on the following projects, work with Main Contact to make sure students get them done. Refer to the web *Calendar of Important Deadlines*. Check with other team mentors for information. Chairman's Award project - Continuously help record/document any unusual stories about the team overcoming obstacles during the year. Woodie Flowers Award (Look in on-line Manual, "Awards Section.") Judges' Information Page. Web site Award Autodesk Awards
Contact Info.:	Provide up-to-date contact information for the Main Contact/the TIMS
Public Relations:	Notify Public Relations Contact of any upcoming team fundraising or events. Conferring with Main Contact.
Safety:	Stress safety whenever possible.
Scholarships:	Inform students early about scholarship opportunities and deadlines, and encourage and assist those interested in applying for them.

2.5.4 Corporate / University Contact Responsibilities

This contact provides information about the team to the University or Corporation sponsoring the team. Keeping the sponsor/partner informed of team progress and achievements throughout the season is a great way to ensure their support.

Communications:	Receive related team e-mails. Provide information if necessary.
Contact Information:	Provide up-to-date contact information for the Main Contact for the TIMS. Provide an alternate phone number and address in case *FIRST* needs to make contact during vacation or while the team is traveling.
Public Relations:	Notify university/sponsor contacts of any upcoming team fundraising or events. Confer with Main Contact. Let supporters know about trials and successes regarding the robot design and build. Get them excited right through the process and continue providing information throughout the year. Invite them to an event.
Scholarships:	Know the web site area concerning scholarships and inform students about the opportunities and deadlines. Encourage and assist students interested in applying for them.

2.5.5 Technical Contact Responsibilities

This person will assist the team with technical issues and problems related to engineering.

Communications:	Receive relative team e-mails. Provide information/reply if necessary. Keep the rest of the team apprised on your technical successes/failures. Ask for help/ideas. Chairman's Award project - Help students document any unusual stories about the team overcoming obstacles during the year.
Contact Information:	Provide up-to-date contact information for the Main Contact and the TIMS. Provide an alternate phone number and address in case *FIRST* needs to make contact during vacation or while the team is traveling.
Pre-Ship Inspection:	Work with the team members to perform a robot inspection before your robot ships. Use the Inspection Sheet that will be posted on the web. This inspection will show where problems are so you can correct them before shipment. It will also provide the students with information they will need to know during the on-site, pre-competition inspection since the inspectors will be asking the students questions.
Public Relations:	Notify Public Relations Contact when your robot nears completion or when you have an opportunity to show off your robot. If the P R contact is not available, notify local media of any upcoming team fundraising or events. Plan these opportunities with your Main Contact.
Safety:	Stress safety and ensure safe working conditions, safety glasses use, etc.
Scholarships:	Encourage students to try for engineering and technical scholarships. Inform them of the deadlines.

2.6 OTHER IMPORTANT TEAM POSITIONS

Your team may want to consider appointing one or several Rules Monitors and Safety Captains. Students are welcome to fill these positions if the team members and mentors agree and find responsible candidates. *FIRST* does not need their contact information in the TIMS.

Please read below for some job-related roles these students or adults may want to fill. There will be one Safety Captain badge at the team's initial Regional event for each team's Safety Captain. If a team has more than one captain, they can take turns wearing the badge at the events.

2.6.1 Game Rules Monitor Responsibilities

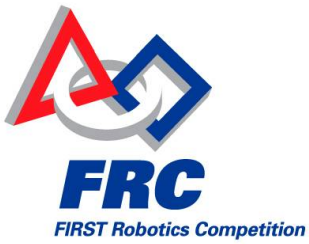
Learn Game Rules:	Read and understand the rules of the game and communicate them to the team members so they know the ins and outs of the game.
Know Point System:	Be sure the team understands the system; implement the best strategy.
Know Penalties:	Be sure all mentors and operators know and understand all penalties.
Learn Web System:	Check the on-line Manual for rules, changes, and web-based question and answer system.
Monitor Team Updates:	Communicate any changes, written in the updates, to the team.

2.6.2 Safety Captain Responsibilities

Read FRC Team Safety Manual:	Print and read the "*FIRST* Robotics Competition Team Safety Manual." Meet with the team and go over the manual with everyone.
Read Manual:	Read "Courtesies and Rules" in the "At the Events" section of the Manual. Meet with team members and decide what the team deems important in the safety area. Diplomatically enforce their findings.
Home Work Site:	Obtain enough safety glasses for the team. Ensure all persons wear them over their eyes when working on the robot or in the "work" vicinity. People who wear glasses must have regulation safety glasses with side shields or wear safety goggles over their glasses. Make sure the work area is safe and the floor is clear at the team's workplace and at the events.
Safety Policies:	Review Safety Policies and Procedures in the "*FIRST* Robotics Competition Team Safety Manual." and inform the team of the mandates and suggestions. Encourage all team members and mentors to read the document, follow the suggestions, and become familiar with the safety awards. Suggest that the team build a robot cart if it doesn't have one.
Use Courtesy:	At all times, think with a "gracious professionalism" attitude. Be courteous and helpful, not bossy or rude. This position is one that should make teams aware of safety issues and make team members want to improve conditions, not balk at the methods *FIRST* uses to ensure a safe environment. Use common sense and good judgment when bringing an infraction to someone's attention. Please be kind and positive because the Safety Captain is an ambassador for your team.
At Competitions:	Bring enough safety glasses for the team and its guests. Make sure persons who will unpack your robot crate will have glasses to wear as they arrive at the Pit, and make sure all persons wear safety glasses/goggles properly. Be sure your team transports and lifts the robot safely. Know where the EMT area is, and report any injuries to the Pit Supervisor at the time of injury or treatment. Discourage running in the Pit or Competition Arena, and work with the green-shirted Safety Advisors to keep things safe and the Pit aisles clear. Bring any serious safety infractions, such as metal grinding or open flames to the attention of the Pit Supervisor, as well as any blatant discourtesies.
Safety Tokens	Be familiar with the safety awareness program outlined in the safety manual. Familiarize your team members with the program and associated safety contest at the Regionals and Championship. Bring something to store them in at the events.

Section 3

AT THE EVENTS



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3 AT THE EVENTS

3.1 OVERVIEW

This section provides a general summary regarding safety, mascots/uniforms, recommended items and equipment for teams to bring, Pit rules, generic event schedules, robot inspections, replacement parts, and competition manners. The following section provides a "feel" for competition schedules, registration procedures, practice times, and matches. Please familiarize your team with this overview so all team members know what to expect and will understand the routine and the rules.

3.2 *FIRST* SPECIFIC EVENT INFORMATION

To ensure that your team has the proper information for the competitions it will attend, review the information presented at www.usfirst.org/frc_regional_events. This information is only available on the *FIRST* web site and contains critical event-specific information regarding pre-order lunches, agendas, event addresses/directions, drayage locations, team socials, and more.

3.3 *FIRST* SAFETY

Participants and team mentors should review the *FIRST* safety policies and the *FIRST* Safety Manual located at www.usfirst.org/community/frc/content.aspx?id=470. It provides sound safety practices for your workplace and *FIRST* events. Additional specific site restrictions can be found within the information referenced in Section 3.2. Every team should know, understand, and follow the safety rules.

- Do not run in the venue.
- Wear proper closed-toed shoes to protect feet and toes.
- Charge batteries in an open, well-ventilated area. Do not charge near an open flame or near equipment that may produce sparks. Do not use smoking materials in the battery charging area. Charge in an upright position. It is not safe to charge the SLA battery in an inverted position. Should your battery leak, ask the Pit Administration Supervisor for baking soda to absorb the acid.
- Open flames are not allowed in any of the buildings
- Only the drayage company may handle loading robots in and out.
- Only operate tethered robots in the Pit area.
- Two-way radios are not allowed in the pit or near the playing field as they may interfere

3.3.1 Safe Travel

Travel in pairs or larger groups at all times going to, coming from, and during each event. Be sure to include enough informed chaperones, specified meeting places in case someone gets separated from the group, contact information for those traveling, and a room list for hotel stays.

Be sure to specify a meeting place for your group in case of fire or evacuation at the hotel or at an event. Keep an accurate team count and have your team use the buddy system.

3.3.2 Safety Captain Badges

Each team should appoint a safety captain, adult or student, who will observe and make suggestions for a safe workplace and work methods prior to and during the competition events. He or she will receive a badge at the team's initial competition event and should continue to maintain a safe environment, especially the team's pit station, at each competition event.

3.3.3 Mandatory Safety Glasses

For each competition, *FIRST* requires all teams to bring and supply ANSI-approved safety glasses for its team members, mentors, and guests. All individuals must wear them in the team Pit stations, the general Pit area, and the competition field. Safety glasses must be non-shaded, except for rose, blue, and amber tints. Additionally, individuals must wear safety glasses while:

- Crating and uncrating the robot
- Working on the robot
- Observing any robot building/repair work

Regular glasses do not qualify as safety glasses, and y*ou must use approved safety goggles over them.* Goggles are not required over glasses **only if** the glasses are ANSI-approved with side shields.

3.3.4 Safety Manual

The "*FIRST* Robotics Competition Team Safety Manual," found online at www.usfirst.org/community/frc/content.aspx?id=470, is a must read for safety captains, mentors, and students. It contains helpful suggestions and a checklist. The whole team should be familiar with its contents.

3.3.5 Other Safety Recommendations

At events, the pure anticipation and excitement of being there sometimes overshadows common sense and safety fundamentals. One safety area that teams sometimes overlook is the particular need to wear appropriate and proper clothing when working or just hanging around the robots. In addition to the ANSI-approved safety glasses required for eye protection, *FIRST* also highly recommends that team members and mentors:

- Refrain from wearing dangling jewelry or loose, baggy clothing near the robots
- Tie back long hair so that it will not get caught in the robot or other machinery
- Wear gloves to protect hands and fingers when handling the robot or the robot crate.
- Remember that Fire Extinguishers are available at the Pit Administration Station and near the Playing Field
- Please stay within your Pit Station or move to the competition viewing area. If the pit area becomes too crowded for teams and their machines to move back and forth to the field safely and quickly, *FIRST* will request that some team members leave the area.
- Each team appoints a Safety Captain who will help maintain event safety, especially in the Pit. He/she should monitor your team's general safety practices and Pit and Pit Station safety.

3.3.6 Robot Carts

To protect team members from muscle strains and other injuries as they transport the robot between the Pits and the competition area, we strongly recommend that team members use a cart, but please keep the following in mind:

- Carts must remain in the team pit area when not in use for robot transportation;
- All carts should fit through a standard 30-inch door;
- Wheels on the cart must not damage site flooring;
- Do not add music to the cart.

Refer to the "*FIRST* Safety Manual" for robot lifting techniques. By practicing these safe techniques, your team members will also develop a quick, fluid routine.

3.3.7 Safety Recognition Program

Throughout the competition, the easily recognizable, green-shirted Safety Advisors will continuously tour in pairs to observe activities in the Pit, practice field, queue line, and playing fields to critique the safety habits of the teams. This includes observing the uncrating of robots and transporting them between the Pit and playing fields. The Safety Advisors will rate safe performance in three key areas:

1.) Safe Behaviors

2.) Physical Conditions

3.) Safety Glasses as well as other Personal Protective Equipment (PPE) as appropriate

Safety Advisors will use plastic safety tokens, or credits, to recognize and encourage safe behaviors at the competition. Teams will earn tokens for positive safety habits in the above areas.

Teams will receive ten (10) safety tokens in the registration packet and should keep 5 of them. They should distribute the other five (5), in whatever denomination they wish, to teams worthy of best safety practices. Teams will return the tokens to the Administration Station for a final count on the last competition day. The three teams accruing the most safety tokens will be announced during the Awards Ceremony. They should collect their "safety" pins at the Pit Administration Station after the ceremony.

3.4 COURTESIES AND RULES

The behind-the-scenes action is in the Pit. This is where you can get to know other team members and perhaps pick a few brains and learn a few things. The *FIRST* Staff and volunteers want you to enjoy the competition and ask that everyone follow courtesy rules while in the Pit, on the playing field, and in the audience.

We are trying to encourage support from our audience at the Regional events and the Championship because we need continued and growing support from outside sources. Please help to make guests feel comfortable and welcome. Provide your team with the site restrictions and rules so everyone can work and compete in a safe, sportsmanlike, friendly, and orderly environment.

3.5 STAFF/VOLUNTEER BADGES

At events, staff and volunteers will wear distinguishing badges. Should your team members or mentors have questions or a problem, most staff and volunteers will help you find the answer, especially the pit administration staff.

3.6 COMPETITION OVERVIEW

This section provides general competition information and necessary details regarding scheduling, robot inspection, practice times, safety, rules, regulations, and suggestions for teams.

3.6.1 Practice Matches

Your registration envelope will contain a list of practice times for the first day. Practice matches take place on the competition field. The list will indicate on which competition field you will practice and with what teams. Teams may not switch practice times.

3.6.1.1 Time Slots

All teams will receive a comprehensive list of practice times. Your team must be ready to practice at the designated times and on the specified fields. If your team/robot cannot be ready for your practice time slot, you team may still send your human player to practice alone. Your team members may want to scout other teams and their strategies during practice and the actual competition matches.

3.6.1.2 The Filler Line

Although teams may not switch practice times, there will be a designated Filler Line at each Regional Competition. Teams whose robots are ready for practice may join the filler line. Teams from the Filler Line will be used on a first come, first serve basis to fill empty spots in practice matches left by other teams that do not show up for their own practice match. Filler Lines will be limited to at most, six robots, but is dependent upon space at venues. Criteria for joining the filler line are as follows:

- Teams must join the Filler Line with their robot
- Teams may not work on their robot while in the Filler Line
- Teams may not occupy more than one spot in the Filler Line
- If a team is queued up for their practice match, they may not join the Filler Line
- Robots in the Filler Line, after the lunch break, must have passed full inspection.

3.6.1.3 Courtesy

In order to make the most of practice time, there will be specified teams on a field during an assigned practice slot. Each team must be respectful of the other teams sharing the field. Friendly interaction between machines is acceptable if all teams are willing. Un-sportsman-like conduct on the part of a team during practice could result in loss of practice time.

3.6.2 Competition Matches

Once your team robot passes inspection and receives its official sticker, it is eligible to compete.

3.6.2.1 Match Lists:

Match lists for the second and third day of competition will be available on the afternoon of practice day. The FTA will determine what time these lists will be generated and distributed. The Pit Administration Supervisor will manage the distribution process. This list includes both days of matches and provides information as to when teams will participate, with whom, and against whom. The list is final and the schedule will not be altered.

3.6.2.2 Scouting:

Teams often use the match list to scout other teams to watch their strategies and robot capabilities. This is especially helpful when choosing alliances, should your team advance to the final matches.

3.6.2.3 Early Matches:

Make sure your team is on time and in place if you have an early match on competition days.

If your team is scheduled for any of the first four matches on those days, you must queue up before the Opening Ceremony. Matches begin immediately after its conclusion.

3.6.2.4 The Schedule at Events

You will need to know when you will compete. The Pit Announcer and Queue Team will work together throughout the days to line up teams for competition matches and maintain the schedule. Pay attention to the practice and match schedules and listen for announcements throughout the day, especially about any changes to the number of the ending match before lunch or which match designates the end of the competition day. Please note that there will not be audible queuing at the Championship; teams must queue a half hour prior to each designated match.

3.6.3 Sample Competition Agendas

Print the event-specific agenda from the web site for each event you will attend. This information can be found at www.usfirst.org/frc_regional_events. Bring it with you so your team will have the schedule.

The following agendas are approximations.

3.6.3.1 Regional Competitions

First Day Robot uncrating and battery charging

3 persons per team admitted *(one person must be post high school)* prior to pit opening, typically 7:45 a.m. Each must have safety glasses. **This early opening time is not for team station setup, work on the robot, or registration**.

	Team arrival. Pit typically opens at 8:30 a.m. Registration - Release form collection, before noon Practice matches Official weigh-in and inspection Pit closes not later than 8 p.m.
Second Day	Pit opens, typically at 8 a.m. Team lineup typically begins at 8:30 a.m. Opening ceremony, typically 9 a.m. Qualification matches Awards ceremony Pit closes not later than 6 p.m. Team Social, if applicable
Final Day	Pit opens, typically 8 a.m. Opening ceremony, typically at 9 a.m. Continued Qualification matches Elimination matches, typically at 1 p.m. Awards ceremony Bronze medallion pickup at the Pit Administration station Chairman's Award submissions returned Pit closes not later than 5 p.m. - Robots crated for shipping

3.6.3.2 Championship Agenda

Wednesday Evening	Robot uncrating, battery charging, and registration - typically from 6 to 9 p.m. 3 persons per team admitted *(one person must be post high school)* prior to pit opening. Each must have safety glasses. **This time is not for team station setup or work on the robot**.
Thursday	Team arrival. Pit typically opens at 7:30 or 8:00 a.m. Registration upon arrival and before noon Practice matches Official weigh-in and inspection Pit closes not later than 8 p.m.
Friday	Pit opens; typically at 7:30 or 8 a.m. Team lineup begins at 8:30. Opening ceremony about 9 a.m. Seeding (qualifying) matches Pit closes not later than 6 p.m.
Saturday	Pit opens, typically at 7:30 or 8 a.m. Opening ceremony Continued seeding (qualifying) matches Elimination matches, typically 1 p.m. Awards ceremony Teams receive returned Chairman's Award submissions before Pit closes Pit closes not later than 5 p.m.- Robots packed for shipping, pit stations clean *FIRST* Finale typically from 6:30 to 9:30 p.m.

3.7 EARLY UNCRATING PROCEDURE AT EVENTS

For teams' convenience and to help ensure safety in the Pit, three (3) persons from each team will be allowed to uncrate early**. At least one of the three must be an adult of post high school status**. If any of the three-team members leave the Pit area during that time, he/she will not be re-admitted until general Pit opening. **Teams cannot work on the robot or set up the team's station during that time.**

Regional Competitions: Refer to your event agenda for possible early opening time, for uncrating only, on Thursday morning.

The Championship: Uncrating will be allowed on Wednesday evening from 6 p.m. to 9 p.m. The adult team member can also use this time to register at the Championship early to avoid the rush on Thursday morning. **There is to be no pit station setup at this time. If your crate becomes your pit setup, please remember you may *only* uncrate your robot**.

The Shepard Service Desk personnel will be on hand to help during this limited opening.

- If your crate has incurred damage, do not open it until you notify the Shepard Service Desk personnel right away about the problem.
- Look for any label on your crate having to do with weight or crate damage questions regarding your shipment. Contact the Shepard Service Desk *before opening the crate. Once the team opens a crate, it cannot protest a weight issue.*
- **SES - Resolution time for weight overage / damage problems:**
  Notify the Shepard Service Desk personnel *immediately.*
- When you have uncrated, notify the Shepard Service Desk personnel so haulers can remove the empty crate(s) and keep aisles clear and safe.

3.8 TEAM REGISTRATION

Registration takes place at the Pit at the Administration Station the first morning of the event at the Regional Competitions and Wednesday evening and Thursday morning for the Championship. At each event, *an adult member* of each team should register *by noon on the first day of the event.*

Prior to attending your event(s), please download the Essential Information Sheet and the Agenda. You can find agendas on the 2008 *FIRST* Robotics Competition Regional Events page.

Please read the following information carefully.

3.8.1 Consent / Release and Team Roster Forms

You can find the forms here:
www.usfirst.org/community/frc/content.aspx?id=8128

Teams cannot register without a completed Consent/Release form for each team member and mentor attending the event(s) and a completed Team Roster. This includes adults traveling with the team. The forms for persons under 18 years of age must also have a parent or legal guardian's name and signature.

3.8.1.1 Prepare and Collect the Consent / Release Forms

Assign someone to take care of this project in advance. *Do not leave it for the last minute*! If a person does not attend the first event and did not turn in a form, he/she must complete one and turn it in at the event he/she attends. This includes the Championship.

We do not want, and will not accept school permission forms in lieu of our official form.

3.8.1.2 Bring Required Consent Forms and Team Roster to Registration

By choosing to attend or participate in the 2008 *FIRST* Robotics Competition events, each person grants *FIRST* permission to use all photographs and/or video footage, releases *FIRST* from liability, and provides the opportunity to gather alumni information. Each must use our official consent forms for this purpose. Read below for instructions/requirements:

Team's INITIAL 2008 Regional Event		Subsequent Regional Competitions & Championship
1.	Download the 2007-08 revised *FIRST* Consent/ Release and Team Roster forms from: www.usfirst.org/community/frc/content.aspx?id=8128	Supply a completed *original* Consent form only for anyone who has not provided a form at an FRC Regional competition event during this season.
2.	To make it easy for yourself, fill in your team number on the designated line on the Consent form **BEFORE** you make copies.	
3.	Make enough copies of the Consent form for all team members, mentors, and accompanying adults.	
4.	Have each person fill one out and sign it.	
5.	Team members under 18 must have a parent or legal guardian sign theirs.	
6.	Collect the *original* Consent forms with the Team Roster on top, clip them together, and bring them to the event.	
7.	Give all forms to the registration staff at the Pit Administration Station at your initial Regional competition of the season.	

3.8.2 Registration Envelope

Upon receipt of the team's consent/release forms, each team will receive an event-specific registration envelope containing:

Pit Map: Pit layout. It shows team location, parts replacement, inspection/ weigh/size areas, the traffic flow, and Pit Administration area.

Practice Match List: Schedule designating practice times/alliance partners for all teams on the first day of the event.

Safety Captain Badge: This safety badge is in the team's initial event registration envelope *only*. Bring it to subsequent Regional events.

10 Safety Tokens: These tokens are part of our safety recognition program.

Team List: List of competing teams by number, official team name, and state.

Operator Badges: These are for participants as defined in Sections 7, The Game.

3.9 THE PIT

Teams, volunteers, *FIRST* Staff, and guests spend a lot of time in the Pit area. Get to know other teams, help each other when you can, and keep the aisles clear. Time is short, and help is very often right "next door" in the adjacent Pit stations.

3.9.1 Be Safe, Be Kind, Be Gracious

- Use common sense regarding safety and courtesy.

- Wear required ANSI-approved safety glasses when working on or watching work done on a robot. Wear them on the playing field.
- Choose a student or adult Safety Captain during the build season to monitor team safety at your work areas and also at the events.
- Respect advice from Safety Captains and Safety Advisors.
- While your robot is in your team's pit space any hybrid receiver must be disconnected from your robot.
- Teams will not be allowed to activate their shooting mechanisms within the team's pit space. If possible, we will try to provide a designated space within the venue for testing purposes.
- Trackballs must be stored within the confines of the team's pit space.

3.9.2 Administration Station

The Pit Administration Station is centrally located in the Pit area. *FIRST* staff members and/or volunteers run this area to register teams and help teams and visitors. Come to the Pit Administration station to:

- Turn in your team's Consent/Release Forms.
- Register and receive your registration envelope, safety tokens, and badges. Check your event agenda for the Pit opening/closing time for each event.
- Notify a staff member that your team is ready for its initial robot inspection.
- Pick up participation medallions at your initial event of the season.
- Look at an FRC Competition Manual.
- Turn in safety tokens for the award count.
- Get answers to most questions, including machine shop access.
- Ask about lost and found articles.
- Report an illness or injury.

3.9.3 Pit Map

You will receive a Pit map when you register. It shows team locations, robot traffic flow, First Aid/EMT Station, Replacement Parts Area, Drayage Service Desk, Inspection Area, and the Pit Administration Station.

3.9.4 Team Stations

These are the areas where teams work on their robots. These numbered spaces help organize team placement and help team members, judges, and visitors find teams easily. These areas are set up to be as equal as possible. Each team's pit station will have a table and power outlet.

3.9.4.1 Rules

For safety and because of insurance regulations:

- Teams cannot build any structure that supports people, or items for storage, above the work area in their team pit station.
- No Team Station structures, signs, flags, or displays can be higher than 10 feet above the floor.
- Team Station signs, flags, and displays must be securely mounted to the structure.
- *FIRST* personnel, event management, and/or local committee members will require teams to remove any pit structure that is deemed unsafe or outside specifications.

3.9.4.2 Station Numbering

At every event, each team station will have a pole-mounted team number sign. They are aligned for easy team identification.

3.9.4.3 Space Regulations

Each team is allotted approximately the same amount of workspace at an event, usually about 10' by 10' by 10'; however, the size will vary from event to event, and in many cases the space is smaller. Be sure your equipment will fit in a space smaller than those dimensions. In all cases, the height cannot exceed 10'. This includes the height of signs, flags, banners, etc.

It is not gracious to expand your area. Keep your equipment and team members within your assigned area and do not "grow" into the aisle or undesignated space. If your team is too large to fit into the allotted space, encourage your team to leave the area to scout other teams and/or to watch the matches.

Don't add to your space by setting up in another area or by adding illegal height.

3.9.5 Replacement Parts Station

Spare parts will be available at the events; however, the available parts at the events will not be published until after Kickoff. Watch for a Team Update with this information. *FIRST* asks that teams bring any unused parts from their kits to events to assist and support each other. This kindness can expand your *FIRST* network of friends as you exchange parts.

Batteries & chargers will NOT be available at any event unless you have made prior arrangements with FIRST (email FRCParts@usfirst.org for more information).

Teams are responsible for all Innovation First, Inc. products required at events. If a team has a problem with its controller, LOANERS will be available under the following restrictions:

- Teams must get approval from the on-site Innovation First, Inc. staff member.
- An adult member of the team must provide a Credit Card number to ensure proper return of the items after the completion of the event.
- **If the part is not returned at the end of the event, or the part is damaged when returned, FIRST will bill the credit card for the replacement cost of the borrowed item or the repair charge.**
- All "loaner" items are available on a first-come, first-served basis. (*) Requires approval from Innovation First, Inc. before a team can borrow equipment.
    - Operator Interface **(*)**
    - Robot Controller **(*)**
    - Radio Modems **(*)**
    - AC Adapter for Operator Interface
    - Speed Controllers (Victor 884)
    - Relay Modules (Spike)

3.9.6 Inspection

To ensure all robots are safely constructed and fall within the *FIRST* parameters, there is an official robot inspection at each event. *FIRST* staff and volunteers will be on site all day on the first day of the event, until Pit closing time, to inspect machines. Inspectors can sometimes help find problems and/or provide suggestions during an early inspection. Go to the Inspection Station, shown on the Pit map. Read below for criteria and caveats:

1. To ensure safety and readiness, pre-inspect your robot before you ship it. This will make your official inspection go more smoothly and quickly.

2. Inspectors will use an Official Inspection sheet for checking robots; a draft copy of the inspection checklist will be available to teams during the build season. Inspectors check off items on an Inspection Sheet as the team passes those portions of the process.
3. Don't wait until the last moment to begin the process. Bring your robot to the Inspection Station early. Partial inspections, such as for height and weight compliance, help prevent an inspection clog at the end of the day.
4. Student team members must accompany the robot and be prepared to answer Inspectors' questions.
5. Correct items and return for inspection until your robot passes.
6. Teams may practice on the first day of the event without completing the inspection process; however, if field personnel deem a robot unsafe, it will not be allowed to practice until the unsafe condition is fixed.
7. Robots must pass inspection before actually competing in qualification matches.
8. Each time you modify your robot, you must request and pass a robot re-inspection.
9. Inspectors may re-inspect randomly before or after matches to ensure continued safety and compliance.
10. Remember: Each team is only allowed to have one robot at an event.

3.9.7 Practice Field

Many events will have practice fields on which teams can share practice time. Adhere to the system in place, work with the schedule, and make every effort to keep the area safe, both in and around the perimeter.

3.9.8 Drayage Service Desk

Shepard Exposition Services will have a representative at its service desk to help you with shipping questions or problems. Refer to the Pit Map for its location.

3.9.9 Machine Shop

Each event has a machine shop to help teams with repair and fabrication. While the machine shops vary from event to event, *FIRST* strives to have welding and a variety of high-powered tools available at the shop.

The staff and volunteers in the Pit Administration Station will be able to tell you how to make use of the machine shop. Sometimes the machine shop is on site and readily accessible to all teams, but when it is off site, we require teams to use the mandatory transportation provided at the venue. *Teams cannot travel to the machine shop "on their own."*

Pit/Machine Shop Hours: Specific hours are necessary to provide teams with equal work time. Please be aware of the opening and closing hours of the Pit and Machine Shop posted on the agenda posted on the web.

3.9.10 First Aid Station

There will be an EMT or Nurse in the Pit to assist with injury and illness. Mentors and the Safety Captain should refer to the Pit Map for the location and alert team members. *Notify the Pit Administration Supervisor of any injuries or illness.* Bring a box of bandages for minor injuries.

3.9.11 Traffic Flow

At each event, there is a pre-determined traffic flow pattern to maximize efficiency of the team/robot ingress and egress and maintain safety to the competition area. Refer to the Pit Map for the flow. The queuing team maintains this pattern at each event. Please obey the traffic rules to ensure an efficient lineup for practice and competition.

It is extremely important to keep aisles clear for safety, judging accessibility, robot mobility, courtesy, and maintaining competition schedules. Keep chairs and equipment out of the aisles.

Please sit in the audience, not on the floor or in the aisles. Judges/Safety Advisors notice noncompliance.

3.9.12 Suggested Equipment

We suggest you bring the following:

- Extension cord, heavy duty and at least 25 feet long.
- Power strip to make best use of your power drop.
- Other items as suggested on the *Team Checklist* in this section of this Manual.
- A relatively small cart to transport your heavy robot from the Pit to the playing field. Do not add music to your cart.

3.9.13 Machine Tools at Events

When using tools in the Pit, be sure to use them properly, in a safe and controlled manner. Unsafe operation, especially those that endanger those around you and your team, will be subject to scrutiny by the event staff and safety reviewers. Their findings may result in team caution or event expulsion.

Please adhere to the following safety rules regarding Pit safety and tool use:

- **Tools that throw sparks are prohibited.**

  Examples: Electric welders, bench grinders, and angle grinders.

- **Tools that produce open flames are prohibited.**

  Examples: Gas welders and propane/MAPP gas torches.

- **Floor-standing power tools are prohibited.**

  Examples: Full-size drill presses, full-size band saws, and full-size table saws.

- **Grinding or painting in the Pit is prohibited.** Designated grinding and painting areas are available to teams.
- **Brazing/welding is prohibited at the pit stations.** Use the machine shop.
- Soldering is permitted **using electric iron/gun only**.
- **Small, bench-top machinery, with appropriate guards, is permitted in team Pit stations.**

  Examples: Band saws, drill presses, and sanders.

- **Small, desktop machining centers are permitted as long as they are reasonably sized and easily lifted by one person.** They must be appropriately covered to prevent throwing of chips during operation.

  Example: Desktop CNC mill.

3.9.14 Team-Provided Mobile Machine Shops

FIRST welcomes team-provided mobile machine shop facilities/trailers at events, but the proposed facility has to comply with *FIRST* and venue requirements. The mobile machine shop/trailer sponsor must adhere to the following two sections.

3.9.14.1 Approval and Liability and Security Coverage

- Have *FIRST* approval and clearance prior to each event. E-mail frcteams@usfirst.org to request approval by Kickoff.
- Provide liability coverage. Note that liability coverage at event venues vary, and specific venue policies my further restrict the use of these team-provided mobile machine shops. Without the proper additional insurance certificate, the mobile machine shop cannot be used at the event. The requirements are:

  a) Name *FIRST* as an additional insured.

b) Fax the certificate to 603 666 3907, Attention Team Support.
c) Present a copy of the certificate to the Event Manager on site prior to setting up the machine shop.

- Include an appropriate team-provided staff to perform the requested work. Each must be covered under the provided liability coverage.
- Provide for any security requirements. Neither *FIRST* nor the venue will provide these services.

3.9.14.2 Local Restrictions

Although *FIRST* may approve a local machine shop use at any Regional, there are local restrictions such as fire codes, and venue approval that you must consider as part of the process. *FIRST* will do its best to convey any relevant needs, and work on your behalf to gain venue approval through a professional and legal process.

3.9.14.3 Other Requirements

In addition to the above, the sponsoring team(s) must:

a) Include an electrical source for the mobile machine shop facility.
b) Ensure that all teams have the ability to use tools/machines and its use. Access cannot be restricted to certain teams.
c) Handle job requests through the same counter/process as the *FIRST*–provided shop services. This includes the sponsoring team's requests.
d) Operate ONLY during event hours when the Pit is open.

3.9.15 Announcements

We make every effort to keep noise down and announce only important items and scheduling, so do not ask the pit announcer to make frivolous announcements.

3.9.16 Queuing Your Team

The Pit announcer and queue volunteers must maintain the practice and match schedules. Your team should designate team members to be your queue captains and carefully watch the schedule and alert the team when its turn is near. The queue captain should:

- Look at the Pit Map to find the pre-set traffic pattern for each event.
- Highlight team practice times on the Practice Schedule on the first day of the event and your competition match times on your Match List for the second and third days.
- Listen carefully for the queuing announcements at Regional events and line up your four (4) competing team members/mentor and robot when your team number is announced.
- Queue your team a half hour prior to your matches at the Championship since there are no match announcements. Ensure that you monitor play within your respective division and adjust your queuing time accordingly. Please check with the Lead Field Queuing personnel on your field if you have questions.

NOTE: *Check the second and third day schedule. If your team is in the first 4 matches of either day*, the competition team must queue up prior to the Opening Ceremony, on or near the field.

3.9.17 Property Security

There have been occasions when items such as cameras and laptops have "disappeared" from the Pit or competition area. Use common sense and do not leave valuable items unattended. Neither the site nor *FIRST* is responsible for any theft. Take valuable items with you, or designate a team representative to remain with them in the Pit Station or competition areas.

3.9.18 Lost and Found

If you find an article or lose one, come to the Pit Administration Table to fill out a "Lost Item Report," or to turn in an article you find. We try hard to return articles to owners.

3.10 CEREMONIES

There are both Opening and Awards Ceremonies on the second and third day at Regional events. These ceremonies allow everyone to show honor and respect for our country, sponsors, teams, mentors, volunteers, and award winners and to provide everyone with the opportunity to applaud the successes of team members and mentors. They also give teams a chance to "meet" the judges, referees, MCs and other important persons and sponsors involved with the event.

At the Awards Ceremony, ***FIRST*** presents trophies and medallions to outstanding teams.

3.10.1 All Teams Should Attend

We encourage all team members to attend the ceremonies, on time, to show appreciation for the event and those people involved who are volunteering their time and efforts.

3.10.2 Pit Manners/Rules During the Ceremonies

1.) Team members will *not* be allowed to use power tools, hammers, or other noisy tools during the ceremonies.

2.) All persons in the Pit should observe the code of behavior for the presentation of the *Star Spangled Banner* and any and all other national anthems:

- Maintain a respectful silence.
- Stand, facing the flag. If there is no flag, look toward the video screen showing a flag.
- Hats off, please.

3.11 PIT CLOSING ETIQUETTE

On Time: For many reasons, it is necessary that teams adhere to the Pit closing time each day. Many people working in the Pit are volunteers and deserve to have a set closing time met. Assign team members and mentors to the clean up/organization of your pit station.

Robot Shipment: The mentor in charge of your robot shipment must take care of the shipping process early with a plan in place to have everything packed and out the door by closing time. This means having a crew ready to get your robot crated and labeled for shipment on the last day. When your play in the competition ends, pack your crate; notify the shipping/drayage company that it is available for removal and clean up your area. To avoid congestion and long lines, please do not wait until the end of the competition to prepare your robot for shipment.

Advance preparation is especially important because any team may end up participating in elimination matches and will have even less time to prepare their robots for shipping.

3.12 TEAM SOCIALS

Many events host team socials, which is a great part of the competition celebration. Refer to www.usfirst.org/frc_regional_events prior to your event to learn event specifics. Team socials are usually after the Awards Ceremony on the evening of the second day, and usually include food, fun, and an opportunity to unwind and get to know each other in an informal, relaxed, and entertaining setting.

In order to help ensure that your team social will be organized and fun, each attending team must have 1 adult chaperone for each 10 students. There usually is no charge, and "come as you are from the competition" is the dress code. Remember that your behavior reflects the ethics of your team and sets the tone for the activities.

3.13 CHAMPIONSHIP *FIRST* FINALE

This event takes place after the Awards Ceremony on Saturday evening. Please refer to the *Championship* event Information.

3.14 PARTICIPATION MEDALLIONS

FIRST provides ONE box of twenty-five (25) bronze medallions to each team that has *not* won the following medal(s):

- A Regional Chairman's Award winner

- An Engineering Inspiration Award winner
- A 2008 Regional Champion or Regional Finalist

3.14.1 Pick up at Your Initial Event

A box of 25 medallions is given out at the Pit Admin Station at each team's initial event only. Pick up/sign for them on the last day of the event, once it's clear that you won't receive any of the awards listed above. If your team has been to another event, you will not receive medallions at a subsequent event. See below.

3.14.2 If You Forget to Pick Up Your Medallions

- Teams have to request shipment.
- Teams will pay for the shipment cost via their shipping account number in the TIMS.
- The medallions will not ship until after our trucks return from the Championship and materials are unloaded and categorized. Estimated ship time would be mid/end May.
- We will accept check, credit card, or money order. We will not accept purchase orders, and there will be a request deadline.

3.15 TEAM SPIRIT AND TEAM "LOOK"

When deciding on a team name or acronym, consider how you can work a theme around it to make your team more fun and recognizable. Part of the pleasure of being a team member or mentor is the way the team stylizes itself. Team numbers provide unique identification for FRC teams. We strongly recommend that you include the team number on all team T-shirts, trading buttons, hats, cheers, and costumes.

3.15.1 Team Giveaways

Often teams bring items to give away to others at the event. This is completely optional, but a great way to promote your team identity. The most popular item to give away is a button with your team logo and number.

3.15.2 Mascots and Team Costumes

Keep safety in mind. Awards acceptance often means descending and ascending bleachers. Please make sure that mascot and team costumes are safe for the wearer as to vision and movement and that they are comfortable and cool enough to prevent fainting and dehydration.

3.15.3 Competition Spirit

We ask that you choose to bring attention to your team in ways that are in good taste and in the spirit of the competition. Please refrain from the following:

- Using obnoxious noisemakers.
- Using objects that can damage bleachers or floors.
- Wearing inappropriate clothing.
- Taping or affixing items or papers to walls, bleachers, floors, or other site areas.

Please make sure your Pit Station and surrounding area is clean when you leave the site.

3.15.4 Banners and Flags

Sponsors provide *FIRST* with banners so we can display them in specified areas as a way of thanking them for their generosity. We encourage teams to bring team flags and/or sponsor banners, but we ask that you adhere to the following:

- Do *not* hang them in the competition area, since this area is designated for official *FIRST* sponsors' banners.
- You may bring banners to the competition area while your team competes, but do not leave them or use them to section off seating. *Saving group seats is not permitted*.
- Hang banners *in your Pit station only*, not on the Pit walls.

3.16 BLEACHER RULES

Sitting together in a group during competition matches makes the game more exciting and fun. It's where you can show support for your team. Since very often there is not enough seating to accommodate everyone, there has to be a policy regarding seating. Teams are not allowed to save seating space.

With this in mind, it is not permitted to hang banners or ribbons to designate such an area. *We will remove and discard banners or roping, etc*. Please take turns sitting in the bleachers. Share the fun. When you see there is a crowding problem, leave after your team's match and return later for another few matches.

3.17 SITE RESTRICTIONS

Please read the following common site restrictions and adhere to them in order to promote an orderly, safe, pleasant, and exciting competition. Please refer to Section 3.2 for additional site restrictions at your event.

- **Do not take robots from any Regional or the Championship.** You must go through the drayage company and ship your robot, even if it's your last competition.
- **Do not bring food** on the site. If you bring food, do not bring it onto the property.
- **Do not use noisy devices,** such as floor stompers, whistles, or air horns.
- **Do not deliver or ship robots directly to the competition site**. All shipments go through the drayage company.
- **Do not arrange for Internet access or phone lines** on the site or attempt to connect to the Internet.
- **Do not sell any products.** This includes food, hats, shirts, or any promotional products.
- **Do not give out any free food products**, such as candy, water, soft drinks, or fruit. You may trade team pins, however.
- **Do not sell raffle tickets.**
- **Do not bring bottled gas tanks (e.g. helium).** This is a safety concern.
- **Do not use walkie-talkies.** They can interfere with the robots.
- **Do not invite or bring live bands** to play in the audience. This dilutes the presentation on the playing field and is too loud and confusing for the audience.
- **Do not play loud music in the Pit** because it interferes with important announcements. If a team receives more than a warning or two, the power to the team's Pit Station will be shut off and/or the music confiscated.
- **Do not form "tunnels"** during the Awards Ceremony. This can cause discomfort to those traveling through them and creates safety issues.

3.18 CONSIDERATIONS

You will often hear the expression *Gracious Professionalism* throughout your involvement in *FIRST*. You can read Woodie Flowers' definition in Section 0 of the Manual. One of our main goals is to encourage all team members and mentors to conduct themselves with kindness, sharing, and consideration..

We hear heartwarming stories of teams sharing parts, helping to build and/or repair competing robots, and helping rookie teams avoid preventable pitfalls. These are examples of some side benefits of being involved with this organization. Please read the following sections to help further the success of *FIRST* and its teams.

3.19 LOCAL STORES – WEB SITES

Use these URLs to locate stores in the vicinity of your hotel and/or competition site. Before you travel, print out directions from both the competition site and your hotel. Competition site addresses for each event are on our web site in the Events Sections, “Site Info.”

Note for Canada: Please note that the web site addresses for stores in Canada end in “.ca”.

If the address is for a home page, click on the “find a store,” “store locator,” or “location.”

HARDWARE STORES	
Ace Hardware	www.acehardware.com/
Lowe's	www.lowes.com/
Menard's	www.menards.com/nindex.jsp
The Home Depot	www.homedepot.com
The Home Depot - Canada	www.homedepot.ca
True Value Hardware	www.truevalue.com/
OFFICE SUPPLIES	
Kinko's	www.kinkos.com
Office Depot	www.officedepot.com/
Office Max	www.officemax.com/
Staples	www.staples.com
Staples Business Depot	www.staples.ca
VARIETY STORES	
Kmart	www.kmart.com/shc/s/StoreLocatorView?storeId=10151&catalogId=10104&langId=-1&adCell=A2
Target	http://sites.target.com/site/en/spot/page.jsp?title=stores_services_main
Wal*Mart	www.walmart.com/cservice/ca_storefinder.gsp?NavMode=7
ELECTRONICS	
Best Buy:	www.bestbuy.com/
Circuit City:	www.circuitcity.com/
Future Shop	www.futureshop.ca
Radio Shack®:	www.radioshack.com/
DRUG STORES	
CVS Pharmacy	www.cvs.com/CVSApp/cvs/gateway/cvsmain
Eckerd, Rite Aid, Brooks	www.riteaid.com/brooks_eckerd/locator/
Sav-On, Osco	www.savon.com/default2.asp
Shoppers Drug Mart	www.shoppersdrugmart.ca
Walgreens	www.walgreens.com/

3.20 TEAM CHECKLIST

This list provides suggested items your team may want to / must bring. Replenish between events.

SAFETY GLASSES are REQUIRED! **Bring enough for your team and visitors.**	**Bring required completed CONSENT/ RELEASE FORMS for all team members and mentors!**

TOOL BOX ITEMS

-- Ball driver set / nut driver set
-- Batteries and Charger
-- Box cutter
-- Broom (small, for pit station cleanup)
-- C-Clamp, large, medium, small
-- Cutters
-- De-burring tool
-- Dremel tool/accessories
-- Drill - cordless w/charger, Drill bit set
-- Flashlight
-- Glue, super, glue stick, Loctite
-- Hacksaw and blades
-- Hammer (ball peen & brass)
-- Heat gun
-- "Leatherman" tool
-- Level, small
-- Lithium grease, spray can
-- Magnet on a stick
-- Paint brush
-- Pliers - large, small, needle nose assort.
-- Power outlet strip / extension cord (2)
-- Power screwdriver
-- Saber saw/wood & metal blades
-- Sandpaper - various grits
-- Screws - nuts - washers
-- Screw driver assortment, flat and Phillips
-- Shrink tubing
-- Socket set – 1/4", 3/8" drive
-- Soldering iron (electric), solder, wick, flux
-- Spare parts
-- Square - small, medium
-- Tap & die set/assorted taps
-- Tape: clear/electrical/masking
-- Tape measure / ruler
-- Tie wraps / connectors / rubber bands
-- Tin snips
-- Tweezers / scissors
-- Vice grip - large, small
-- Volt meter
-- WD-40 / lithium grease, spray can
-- Wire terminal crimpers / Wire strippers
-- Work gloves- several pairs
-- Wrenches, Allen, crescent, open and box
-- X-Acto knife and blades

ADDITIONAL ITEMS

-- Banners - Corporate signs & flags for pit station
-- Camera and film, disposable
-- Cart for moving robot
-- Drop light
-- Epoxy
-- File folder box for paperwork
-- Hand truck
-- Laptop / software / cables / discs
-- Manual and Updates
-- Medical Release Forms
-- Message board - dry erase marker set
-- Notepads / spiral notebook / clipboard
-- Paper / Post It Notes
-- Paper towels and paper cups
-- Pens / pencils / sharpies / markers
-- Portable printer
-- Release form for each person, completed
-- Seat(s) for pit station (small, foldable)
-- Schedule to set up and break down pit station
-- Spray cleaner
-- Stapler / staples
-- Storage box / bins- trinkets & trash (buttons)
-- Team roster and contact information
-- Trash can (small) / trash bags
-- Ziploc bags

PERSONAL ITEMS

-- 1st Aid Kit - Band-Aids / blister kit / ice bag
-- Advil / Aspirin / Tylenol
-- Alcohol prep pads / 3M First Aid tape
-- Cough drops / sore throat medicine
-- Eye wash and drops
-- Hand sanitizer / Liquid Soap
-- Feminine products
-- Insect sting medicine / OFF spray
-- Kleenex / Cotton Balls / Wet ones / Q-Tips
-- Neosporin
-- Pepto-Bismol / Imodium AD
-- Safety glasses
-- Sewing kit (small)
-- Sunscreen / sunburn Spray / aloe vera

Section 4

ROBOT TRANSPORTATION

TABLE OF CONTENTS

4. ROBOT TRANSPORTATION

4.1. OVERVIEW

This section provides information regarding crate specifications, shipping and associated requirements, the drayage system, and an introduction to the FedEx® Freight complimentary shipping. Please make sure those persons responsible for building and shipping your team's crate(s) understand and follow the guidelines for these processes. Adherence is key to a successful season.

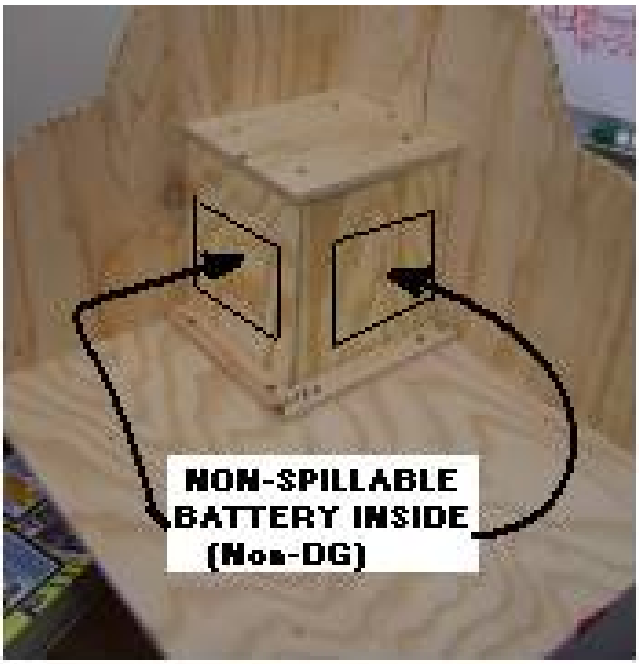
4.2. BATTERY UPDATE

Non-North American teams **cannot** ship batteries with their crate(s).

NOTE: It is not mandatory that you ship your batteries with the robot, however if you choose to ship the 12VDC batteries in the crate with the robot, federal regulations require teams to follow the instructions below. If you do not adhere to these rules, your crate may not make it to the event(s).

If you include batteries, you must:

- Ship them inside their original box or carton packaging.
- Use the Styrofoam covering with protective caps to cover the battery terminals.
- Secure the boxed batteries inside the "inner battery box" section of the robot crate in an upright position. The photograph below shows a sample of an inner battery box built to comply with regulations. Remember to label this box…see below.



a) **NO** batteries are to remain mounted on the robot! (Connected or not)

b) If you ship your batteries with your robot, you must use the battery labels, **"NON-SPILLABLE BATTERY"** on all four facing sides of the crate. Find the label provided in the web site Events area, "Shipping / Drayage" section.

c) Mark the inner battery box with the battery labels also. It too **MUST** be marked **"NON-SPILLABLE BATTERY"** in 1" or larger letters on 2 sides of the battery box.

4.3. INSTRUCTIONS FOR ASSEMBLING AN "INNER BATTERY BOX"

Bill of Materials

Item #	Part Description	Material	Dimensions	Qty
1	Box walls	½" plywood	8" x 8½"	4
2	Box bottom	½" plywood	9" x 10"	1
3	Box top	½" plywood	8" x 9"	1
4	Fasteners	Staples *or* drywall screws	1¼"	16
5	Base fasteners	Staples *or* drywall screws	1¼"	4
6	Lid fasteners	Drywall screws	1¼"	4

Attach the box walls to the box bottom and to each other using the fasteners, spaced approximately as shown in Figure 1.

Install the box into your crate. Use the exposed 1" lip of the box bottom to secure the box to the crate using four more fasteners. Place fasteners approximately as shown in Figure 2.

Put your batteries in the box (Don't forget to use the original packaging and styrofoam).

Secure the box top. Use 4 fasteners, positioned approximately as shown in Figure 3.

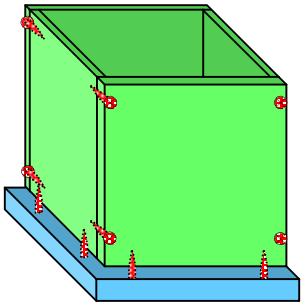
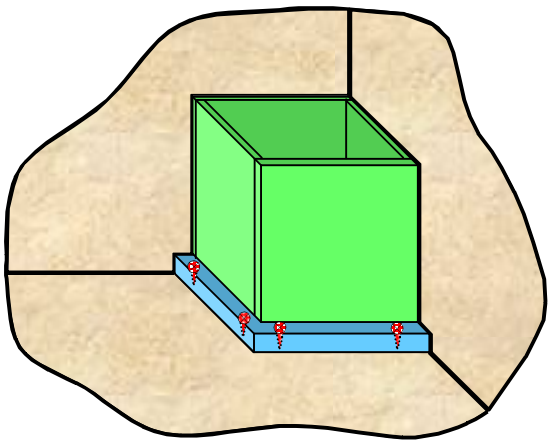


Figure 1: Assemble box walls to box bottom and to each other

Figure 2: Install the battery box in crate.



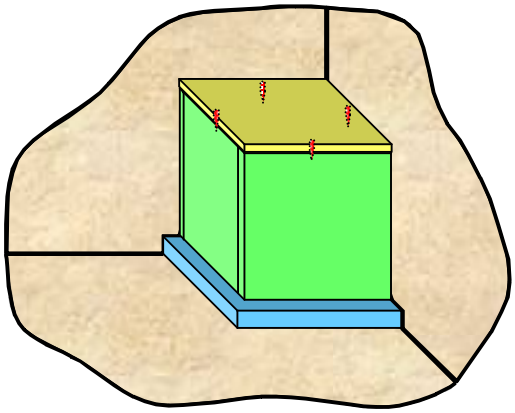


Figure 3: Attach box top to box.

4.4. CRATE INFORMATION

Build your crate so it is sturdy and falls within height and weight parameters when packed for shipment. Adhere to crate specifications and cautions. The Drayage Company determines whether a crate meets the size and weight criteria and will pass non-conforming crate information to *FIRST*.

If a crate exceeds size specifications, or is poorly constructed, *FIRST* will not guarantee its security or delivery to the site. The Drayage Company will round up to the next hundredweight if a crate exceeds 400 pounds, and will charge accordingly. For specific information, refer to the *FIRST* Web site and choose your event, then "Shipping / Drayage" www.usfirst.org/frc_regional_events

4.4.1. Crate Construction Specifications and Construction Suggestions

Build your crate(s) with more than one shipment and season in mind. Remember to consider the weight of your materials. For instance, if 3/8" or 1/2" plywood is sturdy enough, why use the much heavier, costlier 3/4" product?

4.4.1.1. All Crates MUST:

1. Comply with the "Wood Materials Regulations Across U.S. Borders" section below if the crate ships into the U.S.
2. "Sit" on 2 pieces of 4" by 4" lumber, spaced at least 28" apart so it can be moved by a forklift.
3. Have a footprint no greater than 4' by 4' and be no taller than 5'10" (70") high. This maximum includes the 4" by 4" lumber mentioned above.
4. Be constructed so it can withstand stacking during transport.
5. Weigh 400 pounds or less when loaded to avoid drayage overage charges.

SAFETY NOTE: Don't pack all safety glasses because you will need them when uncrating!

4.4.1.2. All crates should:

a. Be sturdily built to prevent damage to your equipment

b. ***Use** 3/8" or 1/2" plywood or 3/8" or 1/2" Oriented Strand Board (OSB), a solid panel product of consistent quality with no laps, gaps, or voids.

4.4.1.3. Crate building cautions:

a) *Medium density fiberboard (MDF) is **not recommended** for crate building because the material makes crate construction too heavy, and MDF can be dangerous to use if the correct safety precautions are not taken. MDF contains a substance called urea formaldehyde, which may be released from the material through cutting and sanding and cause irritation to the eyes and lungs.

b) ***Don't use** particleboard because it collects moisture that adds weight and may cause the crate to fall apart. Remember, your crate may be exposed to the elements when loading and unloading trucks.

4.4.2. Crate Limit

FIRST asks that each team ship only one crate, **but mandates a maximum of two crates for any team at any competition site.** This helps keep Pit entrances, aisles, and egresses clear, safe, and less crowded**.** This restriction also keeps team costs down.

If you ship an extra crate, it should also meet the above specifications. *Teams pay all shipping and drayage costs for the additional crate.*

4.4.3. Crate Labeling

Go to the web site www.usfirst.org/frc_regional_events

1. Obtain the printable, mandatory consignee address label from the "Shipping / Drayage" area for your event's drayage warehouse terminal.
   - Fill in your team number and team information on the address label; make an additional 3 copies and attach one to each side of the 4 facing sides of the crate. This labeling helps the shipper and also helps the drayage company locate your crate at the warehouse and at the competition.
   - Copy and bring your completed outbound address labels to your event(s).
   - **If** you ship batteries with your robot, print 5 additional copies of the battery label, and tape one to each facing side of the crate and also label 2 sides of the battery box.
   - Bring extra plastic sleeves in case yours gets damaged during shipment
2. Place a plastic "sleeve" on your crate, for insertion of an Air Waybill, if appropriate. A Bill of Lading does not require a one.
3. Repeat the above items for each event in which your team participates.

4.5. INTERNATIONAL SHIPMENTS AND CUSTOMS

1. Teams shipping to international events and international teams shipping into the U.S. and back should research Customs requirements weeks in advance.
2. *FIRST* strongly recommends using a Customs Broker so your team knows exactly what paperwork it needs to complete/supply to import and export your crate.
3. Comply with the Building Restrictions/Laws Regarding Wood Materials listed above.

4.6. ROBOTS SHIPPING ACROSS A U.S. BORDER

The above sections apply to all crates. Crates crossing a U.S. border have additional limits. Recent Federal Rules apply to the crating and pallets you will use to ship crates across U.S. Borders to FRC events. Please read and comply with the sections below.

4.6.1. Wood packaging laws/restrictions

The following regulation applies to any team planning to ship its robot into the U.S. from another country. Teams that do not comply risk having their robots detained at the U.S. border by U.S. Customs and not arriving at the event on time.

The U.S. Dept. of Agriculture has adopted international guidelines to decrease the potential for the introduction of certain plant pests that may accompany wood materials arriving from other countries. The guidelines call for wood packing materials used in crate construction and that pallets be either heat treated or fumigated with methyl bromide in accordance with applicable rules. These wood materials must have the approved international mark certifying treatment.

4.6.2. Exemptions

The following exemptions apply to the above wood packing material rules:

- Processed wood packing materials that have received more than primary processing, such as plywood, corrugated board, fiberboard, veneer, whiskey and wine barrels, strand board, etc.
- Pieces of wood less than 6 mm/0.24 inches in any dimension
- Loose wood packing material such as shavings, excelsior, etc.
- Wood packing material originating in Canada and made in Canada. (An importer's statement may be required to document the origin of the wood packing material).

4.6.3. Related Web sites

a. Refer to www.cbp.gov/xp/cgov/import/commercial_enforcement/wpm/ for specific information on the recent stages of implementation. This site has:

* Examples of the regulatory stamps.
* A Questions and Answers section for clarification.

b. Contact your local FedEx office for additional information and assistance. You can also find information at: http://fedex.com/us/promo/woodpackaging.html

4.6.4. Rules

All international teams, or U.S. teams shipping out of the U.S. and then back into the Country, must do the following to comply:

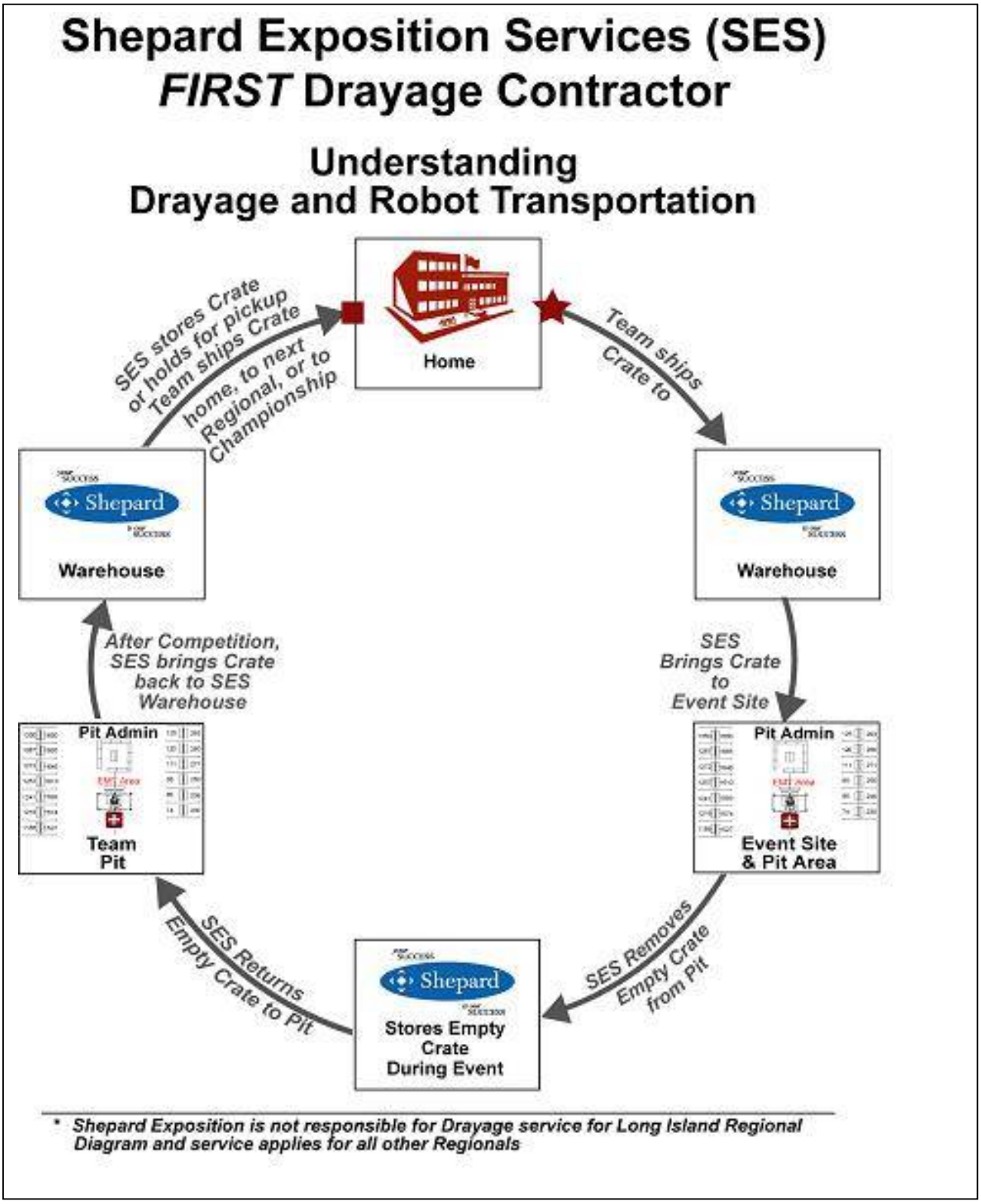
- Use only plywood or other exempted wood materials when constructing their shipping crates and robots.
- If using raw wood materials such as 4"x4", 2"x4"s, 1"x boards, etc., obtain the materials from a lumber dealer who sells compliant wood products.
- Be sure the wood is marked with the approved international mark.
- Make sure you use properly treated and labeled wood for the 4" x 4"s under your crate used for facilitating forklift use.
- If you must use a pallet to ship your crate, make sure it is either non-wood or a compliant wood pallet, available from commercial pallet distributors.
- Canadian teams should obtain an appropriate importer's statement as indicated.

4.7. SHIPPING AND DRAYAGE DEFINITIONS

Bill of Lading	A receipt given by the carrier to the shipper acknowledging receipt of the goods being shipped and specifying the terms of delivery
At Drayage Deadline	Latest date and time you can have your robot delivered to drayage facility. Find your initial event deadline in the "Shipping / Drayage" document. This deadline helps ensure that robots arrive at drayage in time for competition. After initial event, robots are due at the drayage facility on Monday before the event unless you make prior arrangements with the drayage company
Drayage	In our case, drayage refers to the system of accepting the delivered crate(s) into the drayage terminal, crate storage, crate delivery to the event site, and delivery back to the drayage terminal for outbound shipping.
Drayage Companies	Temporary warehousing companies. They take in, store, deliver, and document movement of event materials. In our case, the Drayage Company receives and documents team crate weight and arrival time, then stores them until delivery to the event site Pit Stations on the day prior to the event.
Material Handling Authorization & Transportation	Shepard Exposition Services requires you to fill one out in order to keep track of your crate(s), whether you ship with FedEx or the Shepard Logistics designated carrier. You will receive a copy to help you track your crate.
Pro Number	A number on the Bill of Lading used to monitor/track the shipment movement
Ship Deadline	The robot crate must leave the team's possession by delivering it or shipping it to the drayage facility. This deadline helps ensure that teams have equal robot work time.
Shipping	In this case, the term "shipping" refers to the transportation of your crate(s): • To the Drayage Company/warehouse. • From the Drayage warehouse to the next event's Drayage warehouse. • Home after your last event.
Tracking Number	A number on the FedEx Express Air Waybill to monitor shipment movement.

4.8. VISUAL DEPICTION OF SHIPPING / DRAYAGE PROCESS

Please take a look at the figure below. It provides a visual of the flow of a team's crate shipment.



4.9. SHIPPING YOUR ROBOT

Event sites do not accept or store team robots, crates, or toolboxes. All teams must ship to the designated drayage warehouse facility, which stores the robots and then transports them to the event site and back to the warehouse for outbound shipment.

If you ship two crates, both crates must adhere to specifications and deadlines. Teams are responsible for paying for ALL charges at the time of shipment.

4.9.1. Robots MUST Ship Through the Drayage System

In order to keep track of robots and maintain a fair and safe robot shipping process and honor our venue agreements, union rules, and on-site safety, teams must ship robots from event to event through Shepard Exposition Services. Please use this link for planning your shipping: www.shepardes.com/first

Teams must also use Shepard Exposition Services to ship their robot and crate(s) home and are not permitted to transport them home themselves. Exceptions to this rule will be made on a case-by-case basis.

1. Requests will be considered for a team's last event of the season only.
2. Teams requesting an exception must contact Team Support via frcteams@usfirst.org.
3. **Complete the exception application process by February 15, 2008** to allow for processing. Make the request clear and provide the:
    - Subject line: "Robot Removal, "Name of Event - Team XXXX (your team #)"
    - Reason for the rule variation
    - Event from which the robot would be taken
    - Description of the vehicle you will use to transport your robot and crate

Upon reception of this information, *FIRST* will, in good faith, consider your request. Be advised that each venue, its rules, and safety situations are unique. Some events are not laid out for safe robot removal and you will be refused for that reason. The Director of Robotics will review each case and will provide a written response. This decision will be final.

If permission is granted, you will have to present the confirmed, written allowance to the **Event Manager on the first day of the event** so a plan can be in place. *FIRST* will notify the Event Manager of the exception so he/she will already be aware of the situation. The Pit Administration Supervisor can locate him/her for you.

PLEASE NOTE:

- The drayage company will not help or provide equipment for the removal, and teams will not be permitted to use the loading dock.
- You may have to wait to load out at an earlier or later time than may be convenient.
- You will also be responsible for dismantling and removing your robot crate. Do not expect to receive assistance in those processes.
- A $150 clean-up fee will be assessed for any crates left behind.

4.9.2. Shipping to Your Initial Event

You may choose any carrier or you may drive your crate to the drayage warehouse <u>for your initial event only</u>. (For subsequent events, use only the Shepard Exposition Services carrier OR if you have not yet used it, the complimentary shipping with FedEx).

- Locate "Shipping and Drayage" information for your initial event on the *FIRST* Web site, "Event" area www.usfirst.org/frc_regional_events
- Read and follow the instructions
- Print the related shipping labels for your crate(s).
- Refer to section below regarding donated shipping information web sites.
- Make shipping arrangements well before the ship deadline.

- NOTE: You will need the total weight and dimensions of your crate and its contents for an accurate estimate. Obtain the best shipping rate to the drayage warehouse if you are not using the complimentary FedEx Freight ship option.
- Your truck must have a 48" bed height if you drive your crate(s) to the warehouse.
- If you don't have a loading dock, notify your shipper that your crate pickup area does not have a loading dock so the shipper will send a truck with a lift gate.
- Obtain a dated receipt from your carrier. Retain all shipping documents and pro numbers so you can track your shipment and provide the required information for the mandatory shipment verification to *FIRST*.
- Print, read, and save all relative sections of this manual and web area relating to the FedEx Freight shipping donation and paperwork from the "Shipping and Drayage" web site area for your outbound shipment. Bring them to your event.

4.9.3. Event to Event Shipping - Two Choices

Remember to print/bring the consignee shipping address labels to each event in which you compete. Crates will return to the drayage terminal and ship from there on Monday.

Crates must ship directly from event to event, either through:

A. Shepard Exposition Service and its Logistics carrier. Go to the web link and follow directions for your quote. www.shepardes.com/first

OR

B. The FedEx Freight complimentary shipping for ONE crate to ONE Regional, the Championship, and back home. Bring the supplied Bill of Lading with you to the event on the last day of the event.

4.9.4. Crate Shipment Deadline and Requirements

ALL team robots/crates must leave the team's hands by February 19, 2008. This date applies whether you ship your crate(s) or drive it/them to the drayage facility. The crate(s) must arrive at your team's initial event's drayage warehouse by Monday, February 25, 2008.

NOTE: Teams must work within the business hours of the shipper and drayage facilities. **Hours: Monday – Friday, 8 a.m. to 4 p.m**., including the Shepard Exposition Services warehouses.

A. If you ship your robot, obtain written proof from your shipper that shows the date that the shipper took possession of your crate. Read below for rules to "Verify Initial Crate Shipment."

B. If you drive your robot to the drayage terminal, ask for written proof that shows the date you delivered your crate(s). Read below for rules to "Verify Initial Crate Shipment."

- *Drayage personnel will not unload personal vehicles.*
- Your delivery vehicle must have a **48" bed height** or you will be turned away at the warehouse!

4.9.5. Mandatory – Verify Initial Crate(s) Shipment

FIRST requires every team to document the shipment of its crate(s) for its initial event. All crates must ship from event to event thereafter. Teams will disqualify themselves from aspects of the competition for failure to adhere to the rules and deadlines. It is your responsibility to track your robot.

Please follow the instructions below for your chosen shipment method.

4.9.5.1. If You Ship Complimentary FedEx

FIRST recorded Bill of Lading and Air Waybill numbers and will verify that your shipment left on time.

4.9.5.2. If You Drive Your Robot to the Drayage Facility

a. Ask the drayage warehouse personnel to put the time and date of drop off on an official receipt.

b. Write your team number on the receipt.

c. Make a copy and retain for your records.

d. Address the envelope as shown below, using all capital letters.

e. Send the receipt to *FIRST* so it arrives by the following Monday.

4.9.5.3. If You Use an Alternate Shipper

Obtain a receipt from the shipper and ensure it clearly shows the date and time the crate(s) left your team's hands.

a. Write your team number on the bill of lading/receipt.

b. Make a copy for tracking purposes and retain for your records.

c. Provide shipping verification to *FIRST* so verification arrives the following Monday.

4.9.6. Verification Mailing Address – Use capitals please.

YOUR TEAM # and EVENT NAME AND EVENT DATE
TEAM SUPPORT
FIRST ROBOTICS
200 BEDFORD STREET
MANCHESTER, NH 03101

4.9.7. Consecutive Weekends

You cannot use the FedEx complimentary shipment donation for back-to-back events.

The shipping cost for back-to-back events is extremely costly. Compare shipping a small package to a location at a “ground” rate, and the cost of sending it overnight. Use this same scenario to compare freight shipping rates for a 3 or 4-day freight shipment to an overnight or airfreight shipment. *The difference can be staggering!*

FIRST discourages teams from competing in events on consecutive weekends if they are more than 1,000 miles apart. To have your robot ship and arrive at the next event on time, make arrangements with Shepard Exposition Services Logistics early to help ensure timely arrival. This is your only option.

Contact your event’s Drayage Company(s) well before both competitions to see if it can/will ensure a timely shipment and extend the Monday crate arrival deadline for your team.

4.9.8. Delivery Deadlines

Each event has an "at drayage" deadline. Refer above to "Definitions." Make sure your shipper is aware of the deadline so your crate will meet it. Find the crate arrival deadline for each event by referring to the web site *Events* section. Crates must arrive at the drayage site by the Monday before the team’s next event, unless you make prior arrangements with the drayage company.

4.10. FEDEX® FREIGHT SYSTEM COMPLIMENTARY SHIPPING

FedEx has again graciously agreed to partner with *FIRST* and donate specific robot crate shipping via the FedEx Freight System. *FIRST* expects all teams to follow the instructions carefully and become familiar with any changes made to the donation in order to accommodate the increasing number of teams in the FRC program.

The most obvious change is the change in FedEx service branch for most U.S. teams. Those in the contiguous forty-eight states will benefit this season from the kindness and generosity of FedEx Freight. Specifics will be available on our web site.

4.10.1. The 2008 FedEx Donation

FedEx Freight will ship your crate to the Regional of your choice and ship it back "home" as the second benefit. If your team is registered to compete at the Championship, FedEx Freight will also ship your crate to the Championship.

Registered for/Competing in: Regional Event(s) Only
ONE crate to any *ONE* Regional
ONE crate home

Registered for/Competing in: Regional Event(s) & The Championship
ONE crate to any *ONE* Regional
ONE crate to the Championship
ONE crate home

NOTES:

a. You cannot substitute your complimentary shipment "home" for a shipment to another Regional.

b. You cannot take your robot home from any event, including the Championship. You must ship your crate(s) unless you have been granted an exception by the deadline.

c. Because of the FedEx donated shipment volume, it could take a month or so until you receive your crate after the Championship, so if you have an event scheduled for your robot, you may want pay for the Shepard Exposition Services Logistics carrier to ship your crate home.

4.10.2. Weigh the Donation Value

Which event will give your team the most value for this donation? Consider the following if:

- **You have back-to-back events:** You cannot use The FedEx donation because it is a "ground" shipment. Crates are due at the drayage facility on Monday so there will not be enough time to make it from one event to the next drayage terminal/warehouse.
- **You are registered for more than one Regional:** See if your sponsor will ship your crate to the initial event since you must use either FedEx or the Shepard Exposition Services Logistics carrier after the first event. Use the FedEx donated shipment for another Regional.
- **Your initial event is close to home:** If you have the proper vehicle/bed height (48"), you could drive your crate to the drayage facility and save the donation for a different Regional.

4.10.3. Donation Differences Within the Contiguous U.S. States

Shipments within the contiguous forty-eight states will ship 'ground,' and shipments may take up to five (5) or six (6) days for completion, and add a day or two for inclement weather. Refer to the map for a time estimate. www.fedexfreight.fedex.com/servicemaps.jsp

1. Crates will ship via FedEx Freight, NOT Express Freight.
2. Your crate will ship "ground," not air.
3. Shipments will take up to ***5 or 6 business*** days. If applicable, add a day or two extra for weather. (Do not count the day you ship).
4. Shipments require a Bill of Lading (BOL), not an Air Waybill.
5. Teams will receive two Bills of Lading in a FedEx envelope as a part of their Kit of Parts pickup.
   - Bills Of Lading are not replaceable.
   - Pro Labels are pre-attached to the BOL.
   - Use the Pro Label number to track each shipment.

4.10.4. FedEx Complimentary Shipment Information and Instruction

Refer to the following for FedEx guidelines and specific information on robot shipment documentation:

Robot Shipping page, **www.usfirst.org/frc_robot_shipping**
Also: Event specific "Shipping & Drayage" document found on the Regional Events page, **www.usfirst.org/frc_regional_events**

4.11. SHEPARD EXPOSITION SERVICES FREIGHT QUOTES

Business hours for Shepard Exposition Services warehouses.- **Monday – Friday, 8 a.m. to 4 p.m.**

If you do not ship with FedEx Freight, you *must* ship from event to event with the Shepard Exposition Services Logistics carrier. To obtain a quote, please go to www.shepardes.com/first

OR

Contact Shepard Exposition Services Customer Service at (704) 394-9140

a. Identify yourself as a *FIRST* Robotics team
b. Provide your team number, event name, city, and state

To help with this process, **Paula Mullis** will be contacting all participating teams registered for more than one Regional event.

NOTES - SHIPPING CHARGES:

- Your shipment may have additional charges, such as a re-weigh charge.
- If your delivery area does not have a loading dock, you will need a truck equipped with a lift gate, and there is a charge for this.
- All shipments will also have a fuel surcharge at a commodity price.

4.12. DRAYAGE

Every team has to ship its competition crate(s) to the designated drayage warehouse for each event it attends. *You cannot, under any circumstances, drive or ship crates to competition sites.*

Shepard Exposition Services is the designated Drayage Company for all events except the SBPLI Long Island Regional. FESTO Corporation handles materials for the SBPLI Long Island Regional event. Shepard will handle outbound shipments after the New York City Regional.

All instructions apply for the drayage companies.

a. Label your crate properly. If it doesn't meet required specifications, the drayage terminal may refuse it.
b. Well ahead of shipping time, find drayage information and overweight (overage) costs for all events in which your team will compete. Click on your event at www.usfirst.org/frc_regional_events
c. Refer to all related sections below.

4.12.1. The Drayage Companies: Functions and Services

FIRST contracts with a drayage company for each event to provide the following services to:

a. Provide *FIRST* with a system to monitor on-time crate arrival
b. Provide robot storage prior to the events
c. Ensure on-time crate delivery to team Pit stations at the competition sites
d. Provide storage for empty crates at the venue
e. Provide a staging location for outbound shipments
f. Protect staff and teams from crowded load-in and load-out situations
g. Comply with venue contracts, which prohibit the acceptance of shipments on site

4.12.2. Drayage Company Regulations

Teams cannot take their robot/crate(s) home from any event, even their last without pre-approval from FIRST Headquarters. Drayage personnel are not allowed to, and will ***not,*** load your crate onto your vehicle.

- **All shipments must be prepaid:** The Drayage Warehouse will not accept Cash on Delivery (COD) shipments. Teams must take care of this with the carrier prior to sending a shipment to a drayage site.
- **Use only designated shippers:** Teams must:
  a) Use the Shepard Exposition Services Logistics carrier or the complimentary FedEx when shipping from ALL events.
  b) Fill out required paperwork and return it to the drayage desk when shipping from an event.
  c) Make on-site arrangements for shipping through the Shepard Exposition Carrier representative when not using FedEx.

Freight Bills, Weight Receipts: Shipments received without freight bills or specified unit counts on receipts will be delivered to team Pit Stations without guarantee of piece count or condition. When receiving freight, the drayage terminal requires that drivers submit a *certified weight receipt* and reserves the right of refusal to unload shipments without it.

Bills of Lading: All shipments must have a Bill of Lading or delivery receipt showing:

a. Number of items, weight, and description of merchandise
b. All Items labeled per Regional/Championship event specifications
c. When shipping from an event, fill out a Bill of Lading. If shipping with FedEx, also provide a FedEx tracking or pro number on the Shepard form.

Damage: The drayage warehouses will not be responsible for damage to uncrated materials, improperly packed materials, or any concealed damages, loss, or theft of materials after crates have been picked up for loading out of the competition site.

Weigh In: The drayage warehouse handlers will weigh team crates as they arrive at each facility. These weights will be certified, and any crates exceeding four hundred pounds will be subject to drayage overage fees. *If a team wants to dispute the weight of its crate, a scale will be on site at each event for reweigh within the specified time.*

4.12.3. Freight Overage

All teams must pay for drayage overage in advance, prior to the competition. If a team refuses to pay overage charges, the drayage companies may refuse return of the team's crate until payment is reconciled at the service desk. Upon payment receipt, it will return the crate(s).

Provide a *Payment Authorization Form* f**or the Shepard Exposition Services warehouse,** for each event if you know your crate will be overweight.

- Download the form, which is part of your "Shipping / Drayage" information for your event(s). www.usfirst.org/frc_regional_events.
- Fill it out completely and fax it to (704) 398-0914.

4.12.3.1. Accepted Payment Forms for Shepard Exposition Services:

All overage payments are due at Shepard Exposition Services 15 days post event.

- MasterCard, Visa, or American Express are accepted credit cards for overage fees:
- School check - the check must arrive at Shepard Exposition Services *before* the team participates in the event.

4.12.3.2. Immediate On-site Weight Complaint Resolution

Because of safety requirements, crates are removed from the Pit as early as possible. Adhere to the following schedules for resolving weight complaints.

Regional Events: 7:45a.m. - 8:30a.m.

Championship: Wednesday, 6p.m. - 9p.m, Thursday, 7:45a.m. - 8:30a.m.

When team members arrive at the Pit Station to uncrate the robot:

a. Read the label Shepard Exposition Services placed on your crate.

b. If your crate shows a weight over 400 pounds, and if you have any question as to the accuracy of the weight or information on the label, *immediately* find an Shepard Exposition Services representative to ask for a re-weigh. See the Pit Administration Supervisor if you cannot find a representative.

c. *Do not open the crate until you have received a re-weigh.*

NOTE: If you open the crate, you relinquish any appeal rights.

d. Do not leave your Pit station until the re-weigh.

4.12.4. Weight and Rates Structure

Rounding Up: Drayage Companies weigh by the hundredweight and round the weight up to the next hundred. Make a real effort to keep weight down to well below the hundred marks to allow for scale calibration differences.

Example*:* If your crate weighs 401 pounds, your charge will be based on five hundred pounds, and you will have to pay for a hundred pound overage for that crate. Refer to the "Events" section of the web site, click on your event and "Shipping / Drayage" for material handling rates.

www.usfirst.org/frc_regional_events

4.12.4.1. Drayage Costs - *FIRST*

FIRST will pay for the Material Handling (drayage) cost of *ONE* crate, *within criteria limits,* for each team, for each *FIRST* competition in which it competes this season.

Refer to *Crate Information, Crate Size, and Weight Specifications* section for specifics.

4.12.4.2. Drayage Costs - Teams

The following will cost teams money:

a. Crate exceeding measurement or weight specifications

b. Any additional crate. Teams pay *entire* drayage cost of additional crates

NOTE: Each team must pay for any additional material handling charges by the end of each competition.

4.12.5. Outbound Shipments from the Drayage Terminal

Shepard Exposition Services will bring crates back to its Shepard Exposition Services Advance Warehouse on Saturday after the competition. Crates will be available for outbound shipping from the warehouse on Monday, with the exception of shipping from the Championship.

NOTE: The crates from the Championship shipping via FedEx Express Freight donated shipping, will ship at FedEx convenience.

a. Teams must ship their robots and cannot take robots or crates with them from any event, including the Championship, without prior permission by the deadline.

b. Be sure to:

- Ensure your crate is still fit for travel.
- Remove the old address labels.
- Attach the consignee address label for the next event, if applicable, to all sides of the crate…at a readable level.
- Pre-pay for all applicable outbound shipping charges.

- At Shepard Exposition Services handled events, fill out the "Shepard Logistics Services Material Handling Authorization and Transportation Agreement." A representative will pass out a form to each team on the last day of the event. See example next page.
- If you are shipping "home," and the delivery site has no loading dock, note your request for a delivery truck with a lift gate in the "Special Instructions" area on the Shepard Exposition Services form. For the Long Island Regional and New York City Regional, ask where to make that note.

c) Make arrangements for the outbound shipment.

Using the FedEx donation?

- Fill out your FedEx Bill of Lading or Air Waybill.
- Attach your Pro Label or Air Waybill to your crate. Retain a copy for tracking purposes.
- Write your FedEx Pro number above the "SPECIAL INSTRUCTIONS" area on your Shepard form, and turn it in at the Shepard Exposition Services shipping desk. You will receive a copy.

4.12.6. Example of Shepard Exposition Services Outbound Bill of Lading

You will receive an outbound bill of lading from the Shepard Exposition Service desk at each event. For an example of how to fill it out for your outbound shipment, go to www.shepardes.com/first.

4.13. TRACK YOUR CRATE

FedEx Freight

You should see movement on your shipment by Wednesday after the event.
Go to www.fedexfreight.fedex.com/track.jsp

- Choose "Track by Pro Number"
- Insert your Pro number

Contact FedEx if you don't see movement by Wednesday. (800) 463-3339

FedEx Express Freight

Go to www.fedex.com/us/expressfreight/ and choose the "Track" tab and "Track by tracking number" option.

Insert your tracking number.

Contact (800) 332 0807 if you don't see movement.

Shepard Logistics Carrier

You should see movement on your shipment by Wednesday after the event. *For back-to-back shipments, begin tracking on Monday.*

To track your shipment:

Go to www.shepardes.com/first and choose the "Track My Crate" button OR:

Contact Paula Mullis at:

Phone: (704) 394-9140
Cell: (704) 201-2058
E-mail: pmullis@shepardes.com

For problems, contact Shepard Exposition Services Customer Service at (704) 394-9140. Provide your team number and event(s) involved

4.14. WE JUST QUALIFIED FOR THE CHAMPIONSHIP

4.14.1. What do we do? Is there a Decision Deadline?

If you are unsure whether your team can go to the Championship, you have *until the Tuesday following your qualifying event* to inform *FIRST* and Shepard Exposition Services whether you will attend and register for that event. If this is your last event, you have until Tuesday to let the drayage company know whether you will be shipping home or to the Championship. Follow instructions below.

4.14.2. Undecided? Temporary Crate Shipment "Hold, Then Ship"

If you are not sure your team can attend the Championship (CMP), read below for the "hold" process.

1. Make sure you talk with the Shepard Exposition Services freight representative at the event (or the FESTO Corporation representative if at the Long Island event – NY???). Explain your situation and make temporary arrangements per the directions below.
   - Put an 8 ½" by 11" sign on your crate, near your BOL sticker/Air Waybill. It should say:

     Team will call.
     Hold until Tuesday.

   - Consider shipping your tools if you have room and can safely pack them in your crate.
   - Teams that qualify for the Championship at an event can obtain a FedEx Freight Bill of Lading from the Event Manager. *FIRST* supplies these pre-printed, pre-recorded, official documents prior to the events.
2. Label your crate:
   - Fill in your donated FedEx Freight Bill of Lading with the team's "home" shipping address OR the address for the Championship drayage warehouse. You can look in the FRC Manual at the Pit Administration Station for the Championship consignee address.
   - Place the Pro Number label on your crate if shipping FedEx. Keep your copy of the Bill of Lading.
   - Create and place one consignee address label on each facing side of the crate if you are shipping to the CMP.
   - Make sure you still have the battery labels, if applicable, on the four sides of your crate and the inner battery box.
   - Fill in a Shepard Bill of Lading and write your pro number on it if shipping FedEx. Save this copy also
3. **Inform the drayage terminal of your shipping intentions by Tuesday.**
   - Follow up on your shipping arrangements.
   - Always Track your shipment.

Because of possible liability, the drayage company won't fill out FedEx paperwork for your team.

4.14.3. We Changed our Minds

- If you find that you are not shipping to the address on your Bill Of Lading or Air Waybill, you must ship through the Shepard Exposition Services carrier and pay for that shipment. Call to make the arrangements, provide the new shipping address, and prepay the shipment.
- Always track your shipments to ensure a timely delivery.

Section 5

THE AWARDS

TABLE OF CONTENTS

5 THE AWARDS

5.1 *FIRST* ROBOTICS COMPETITION AWARDS

This chapter contains descriptions of the *FIRST* Robotics Competition Awards as well as any required submission criteria. Note an asterisk designates a new or "changed" award in the listing. The "Rockwell Automation Innovation in Control" Award was previously known as the RadioShack Innovation in Control Award. Unless otherwise noted all awards are given at both the Regional events and the *FIRST* Championship.

FIRST will hold an Awards Celebration at each Regional and at the Championship presenting these awards.

5.2 AWARDS AT A GLANCE

Award	Description	Selected By	REG	DIV	CMP
Autodesk Visualization	This award honors excellence in student animation.	Reg: Students CMP: Autodesk	X		X
Autodesk Inventor	This award honors excellence in student mechanical design, coordination, and presentation.	Autodesk			X
Chairman's	The Chairman's Award represents the spirit of *FIRST*. It honors the team that, in the judges' estimation, best represents a model for other teams to emulate, and which embodies the goals and purpose of *FIRST*. It remains *FIRST*'s most prestigious award.	Chairman's Judge Panel (application and interview process)	X		X
Champion	This award celebrates the alliance that wins the final match of the Championship Playoffs	Performance Based			X
Championship Finalist	This award celebrates the alliance that makes it to the final match of the Championship Playoffs	Performance Based			X
Chrysler Team Spirit	This award celebrates extraordinary enthusiasm and spirit through exceptional partnership and teamwork.	Judges	X		X
Delphi "Driving Tomorrow's Technology"	This award celebrates an elegant and advantageous machine feature. This award recognizes any aspect of engineering elegance including, but not limited to: design, wiring methods, material selection, programming techniques, and unique machine attributes. The criteria for this award are based on the team's ability to concisely describe verbally, as well as demonstrate, this chosen machine feature.	Judges	X		X
Division Champion	This award celebrates the alliance that wins the final match in their division at the Championship.	Performance Based		X	
Division Finalist	This award celebrates the alliance that makes it to the final match in its division at the Championship.	Performance Based		X	

Engineering Inspiration	This award celebrates a team's outstanding success in advancing respect and appreciation for engineering and engineers, both within their school as well as their community. Criteria include: the extent and inventiveness of the team's efforts to recruit students to engineering, the extent and effectiveness of the team's community outreach efforts, and the measurable success of those efforts.	Judges	X		X
Founders Award	Each year *FIRST* presents this award to honor an organization or individual that has contributed significantly to the growth of *FIRST.*	Not a Team Award			X
General Motors Industrial Design	This award celebrates form and function in an efficiently designed machine that effectively achieves the game challenge.	Judges	X		X
Highest Rookie Seed	This award celebrates the highest-seeded rookie team at the conclusion of the qualifying rounds.	Performance Based	X	X	
Imagery	This award celebrates attractiveness in engineering and outstanding visual aesthetic integration from the machine to team appearance.	Judges	X		X
Johnson & Johnson Gracious Professionalism	This award celebrates outstanding sportsmanship and continuous gracious professionalism in the heat of competition, both on and off the playing field.	Judges	X		X
Judges Award	During the course of the competition, the judging panel may encounter a team whose unique efforts, performance, or dynamics merit recognition.	Judges	X		X
Kleiner Perkins Caufield & Byers Entreprenuership	This award celebrates the entrepreneurial spirit. This award recognizes a team, which since its inception has developed the framework for a comprehensive business plan in order to scope, manage, and obtain team objectives. This team displays entrepreneurial enthusiasm and the vital business skills for a self-sustaining program.	Judges	X		X
Motorola Quality	This award celebrates machine robustness in concept and fabrication.	Judges	X		X
Regional Finalist	This award celebrates the alliance that makes it to the final match of the competition.	Performance Based	X		
Regional Winner	This award celebrates the alliance that wins the final match of the competition.	Performance Based	X		
Rockwell Automation Innovation in Control	This award celebrates an innovative control system or application of control components to provide unique machine functions.	Judges	X		X

Rookie All Star	This award celebrates the rookie team exemplifying a young but strong partnership effort, as well as implementing the mission of *FIRST* to inspire students to learn more about science and technology.	Judges	X		X
Rookie Inspiration	This award celebrates a rookie team's outstanding success in advancing respect and appreciation for engineering and engineers both within their school, as well as in their community.	Judges	X		X
Underwriters Laboratories Industrial Safety	This award celebrates the team that progresses beyond safety fundamentals by using innovative ways to eliminate or protect against hazards. The winning team consistently demonstrates excellence in industrial safety performance that shines throughout the competition from uncrating to re-pack.	Safety Advisors	X		X
Website	The Website Award recognizes excellence in student-designed, built, and managed *FIRST* team websites.	Website Evaluators (prior to the event)	X		X
Woodie Flowers	The Woodie Flowers Award celebrates effective communication in the art and science of engineering and design. Dr. William Murphy founded this prestigious award in 1996 to recognize mentors who lead, inspire, and empower using excellent communication skills.	Panel of prior WFA Winners	X		X
Xerox Creativity	This award celebrates creative design, use of a component, or a creative or unique strategy of play.	Judges	X		X

5.3 THE AUTODESK DESIGN COMPETITION

5.3.1 AUTODESK INVENTOR AWARD (Championship Only)

5.3.1.1 Purpose of Award:

This award honors excellence in student mechanical design, coordination, and presentation.

5.3.1.2 Award Overview

Autodesk wants to honor those young inventors and engineers that make the *FIRST* Robotics Competition possible! Once again we are excited to offer the Autodesk Inventor Award. With Autodesk Inventor we have provided the tool that allows you to design without limits. Now we want to see what you do with this tool. We know that before your team can start building your robot you need to design it. We want to see the exciting journey of how your designs evolved into a real-life robot! Autodesk Inventor allows you to quickly and easily design and modify your robot using the same iterative techniques employed by professional engineers.
From concept through completion, the Autodesk Inventor Award was created to help experience your ideas before they're real.

Additional information about this award, along with the specific award criteria, judging process and deadlines will be posted on the Autodesk website: www.autodesk.com/firstbase

5.3.2 THE AUTODESK VISUALIZATION AWARD

5.3.2.1 Purpose of Award

This award honors excellence in student animation.

5.3.2.2 Award Overview

All *FIRST* Robotics Competition teams are invited to create a submission for the Autodesk Visualization Award (AVA) using Autodesk 3ds Max® software**.** Additional information about this award, along with the specific award criteria, judging process and deadlines will be posted on the Autodesk website: www.autodesk.com/firstbase

At the regional level the Autodesk Visualization Award will be peer judged at each event by one student animator from each team competing for the AVA at that event. At the Championship level the AVA submissions will be professionally judged and then five finalists will be advanced for final peer voting.

Note: *FIRST* will continue to showcase Autodesk Visualization animations at each regional event. We are committed to honoring the student teams who undertake this challenge by showing the animations created by each team participating at the Regional event. Autodesk will continue to support this effort by providing a compilation DVD for each Regional event.

5.4 CHAIRMAN'S AWARD

The *FIRST* Robotics Competition is about much more than the mechanics of building a robot or winning a competitive event. It is about the partnership among people who are part of the *FIRST* community and the impact on those who participate in *FIRST* programs with a united goal of achieving *FIRST*'s mission. *FIRST*'s mission is to change the way young people regard science and technology and to inspiring an appreciation for the real-life rewards and career opportunities in these fields.

The concept of the Chairman's Award includes Regional Chairman's Awards, which enable *FIRST* to recognize more teams for their exemplary efforts in spreading the *FIRST* message, as well as their talents in organizing materials for their presentations.

The winning entries of the Regional Chairman's Awards will travel to the Championship for the continuing process of consideration for the most prestigious 2008 Chairman's Award.

5.4.1 Overview

The Chairman's Award was created to keep the central focus of the *FIRST* Robotics Competition as our ultimate goal for transforming the culture in ways that will inspire greater levels of respect and honor for science and technology, as well as encourage more of today's youth to become scientists, engineers, and technologists

The Chairman's Award represents the spirit of *FIRST*. It honors the team that, in the judges' estimation, best represents a model for other teams to emulate, and which embodies the goals and purpose of *FIRST*. It remains *FIRST*'s most prestigious award.

FIRST will present a Regional Chairman's Award at each regional competition. There are forty-one (41) regional competitions scheduled for the 2008 season, therefore, there will be forty-one Regional Chairman's Award winners. Only the winners of the Regional Chairman's Award will be eligible to compete for the Chairman's Award presented at the *FIRST* Championship.

Hall of Fame members, a/k/a teams that have already won the Chairman's Award are ineligible to compete for the Regional Chairman's Award. However, as *FIRST* believes that the process of submitting for the Chairman's Award is a very valuable exercise in itself, *FIRST* encourages Hall of Fame members to complete a submission which will be used by Hall of Fame judges to verify that each Hall of Fame team is maintaining its Hall of Fame status. Accordingly, all submissions by Hall of Fame teams will be electronically routed to a folder judging as part of the Hall of Fame.

5.4.2 First-Year (Rookie) and NASA Grant Teams:

Because the Chairman's Award recognizes sustained excellence and impact, not just a one-year team effort, it is not possible for a first-year (rookie) team to receive this honor**.** However*, FIRST* invites and encourage rookies to develop a Chairman's Award submission which may be evaluated by the judges determining the winner of the **Rookie All-Star Award**. This submission will document where your team started its *FIRST* journey and will also provide background for documenting the results of your team's efforts – it will be a great way to start your team's efforts to win the Chairman's Award.

Rookie Teams: If you prepare a Regional Chairman's Award, print a copy to give the Judges when they visit you at your Pit Station, judges will not be viewing them online.

Teams receiving **NASA Grants** must provide a copy of this submission as part of the grant.

All teams are encouraged to print a copy of their final submission for their records and to confirm for themselves that the submission was accepted.

5.4.3 Submission Information

The criteria for the 2008 Chairman's Award are essentially identical to those in the past, with special emphasis on recent accomplishments in both the 2007/2008-year and the preceding two years. The judges focus on teams' activities over a sustained period, as distinguished from just the six-week design-and-build time frame.

The *FIRST* Robotics Competition is not about machines; it is about the experience of people working together toward a shared goal. Documenting and preserving your team's *FIRST* experience becomes an important component of the over-all *FIRST* experience.

As in the past, teams may only submit at one Regional competition for judging. Teams submitting for both the Chairman's Award and the Woodie Flowers Award should note that both awards are judged at the same event. Students working on the Woodie Flowers Award submission and those team members working on the Chairman's Award submission should coordinate to select the best event for the team.

5.4.3.1 Submission Content

The Chairman's Award is presented to the team judged to have created the best partnership effort among team participants and which best exemplified the true meaning of *FIRST* through measurable impact on its participants, school, and community at large. There is no single "best way" for a team to win the Chairman's Award. Many factors come into play. The primary factors the judges will evaluate are:

1) How strongly does the submission document the impact *FIRST* has on the learning experience of the students, school curriculum, engineers, and/or community during the 2007/2008 team year as well as in prior years?
2) Has the team explained/demonstrated why/how it should be a role model for other *FIRST* teams to emulate?
3) How well has the team communicated its excitement and impact within the entire school, community, and beyond (state/nation) through participation in *FIRST* during the 2007/2008 team year as well as in prior years?

4) Has the team documented an innovative way to spread the *FIRST* message?
5) How strong of a year-round team partnership effort is reflected during the 2007/2008-team year as well as in prior years? (You can define partnership in many ways, including: the partnership among the team's students/corporate sponsor/engineers; school/university sponsor/engineers; students/adults; community/team)
6) As a whole, does the content of the documentation exemplify the true meaning of *FIRST*?

Your Chairman's Award submission should include documentation for all the above factors.

5.4.3.2 Submission Format

Regional Chairman's Award submissions will be submitted on line. The submission, excluding the Executive Summary, will be limited to 10,000 characters, including spaces and punctuation, and may include up to four (4) photographs totaling no more than 1.0Mb of memory.

Submission Process

The URL for the Chairman's Award Submission is www.firstawards.org/Follow the directions shown on the site to submit your team's entry. Teams may only submit at one regional event at which the team will compete. This site will be available beginning January 16, 2008 at noon EST.

Submitters can easily enter information, save it, and return to the site to edit the Chairman's Award submission until they are ready to submit it for final judging. All entries will be final on Thursday, February 21, 2008 at 11:59 p.m. EST. No entries will be accepted or altered after this date.

Chairman's Award submitters will go to the website and enter the required information.

Team Number:

Regional Selection:

Executive Summary – Teams ***must complete the following fields*** in order to be considered for this award. The information included in the Executive Summary is not included in the total character/word count for the Chairman's Award Submission.

- Team Name
  Corporate/University Sponsors
- Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2007/2008 year and the preceding two years (500 characters allowed, including spaces and punctuation)
- Examples of role model characteristics for other teams to emulate (500 characters allowed, including spaces and punctuation)
- Describe the impact of the *FIRST* program on your team and community with special emphasis on the 2007/2008 year and the preceding two years (500 characters allowed, including spaces and punctuation)
- Team's innovative methods to spread the *FIRST* message (500 characters allowed, including spaces and punctuation)
- Describe the strength of your partnership with special emphasis on the 2007/2008 year and the preceding two years (500 characters allowed, including spaces and punctuation)
- Team's communication methods and results (500 characters allowed, including spaces and punctuation)

- Other matters of interest to the *FIRST* judges, if any (500 characters allowed, including spaces and punctuation)
- Upload pictures (maximum of 4 allowed, not to exceed 1.0Mb in total)
- Essay (10,000 characters allowed, including spaces and punctuation, or approximately 1500 words)
- Electronic signature of Team Captain/Student Representative certifying that the document is complete and accurate
- Electronic signature of adult team mentor certifying that the document is complete ad accurate
-

Once the Chairman's Award submissions are completed, they are sorted and posted on a private, password-protected site where only the judges can read the entries. Each regional will have all the candidates who successfully completed the submission listed and the judges will review the submissions. Teams should always print and bring a hard copy of their submission to the event.

In preparing this document, bear in mind that students, engineers, teachers, community, school, sponsors, families, and other supporters, as well as the machine itself are all integral parts of your team experience. Your submission does need to clearly convey the factors outlined above.

- ***Important Note:*** Chairman's Award Judges look for and review the information entered in the *Yearbook Page* as part of the Chairman's Award submission. This information is entered as part of the Team Information Management System (TIMS) at www.my.usfirst.org/ *Refer to Section 1 Communications for more details about the Yearbook Page.*

5.4.3.3 Submission Deadline

Chairman's Award submissions are due no later than **Thursday, February 21, 2008**. **11:59 p.m. EST.**

5.4.4 Judging Process

5.4.4.1 The Regional Award Process:

By 10 a.m. on Friday mornings of each Regional Competition a list of interview times (which will either be pre-assigned by the judges or available for self selection by the teams, at the option of the judges) for the submitting teams will be available at the Pit Administration station. Interviews will take place during the day on Friday. A panel of judges will review the Chairman's Award entries at each Regional and will conduct on-site Chairman's Award interviews with those teams who have entered a submission for that regional event. Judges will select one winner for the Regional Chairman's Award at each regional competition.

Interviews are limited to ten (10) minutes with not more than three (3) team members (student or adult mentors). The team selects these representatives. During the first five (5) minutes of the interview, the team members give a presentation to the judges, and the judges will use the second five (5) minutes for their questions and answers.

NOTE 1: If the presentation requires special equipment, the team is responsible for bringing it to the interview, and the time required to set up the equipment will count as part of the team's allotted 5 minutes.

NOTE 2: Teams are encouraged to bring copies of documentation, supporting their submission, to leave with the judges. This documentation may include, but is not limited to:

- Letters of reference

- Newspaper and magazine articles
- Program Books

As part of the Chairman's Award judging process, *FIRST* judges will also review the Executive Summary page *AND* the yearbook page for each of the submitting teams. Your team's submission will be a key factor in the selection process, along with the judges' own observations of the team at the competitions.

5.4.4.2 The Chairman's Award Championship Award Process

At The Championship, a panel of judges will review the winning forty-one (41) Regional Chairman's Award submissions and will select one ultimate Chairman's Award winner. This winning team has the additional honor of choosing one of its junior or senior student members to be the recipient of the Allaire Medal.

5.4.5 The Allaire Medal - Leadership Exemplified

The Chairman's Award is presented at the Championship to the *FIRST* team judged to have the best partnership effort. The Allaire Medal recognizes leadership exemplified and is awarded to an individual student on the winning Chairman's Award team.

Named in honor of Paul A. Allaire, a long-serving *FIRST* Chairman of the Board, the Allaire Medal is given to the student who has demonstrated outstanding leadership on his/her *FIRST* team, within his/her school and community, and whose personal character best embodies the spirit of *FIRST*.

The team receiving The Chairman's Award at the Championship will select the Allaire Medal recipient. The adult and student team members determine the winner. The recipient must be a high school junior or senior who has been accepted into a four-year degree program at a college or university. The Allaire Medalist receives the Allaire medallion and up to $10,000 in total scholarship support for undergraduate tuition, room and board, fees, and books at his or her intended university or college.

5.5 CHAMPION (CHAMPIONSHIP ONLY)

This award celebrates the alliance that wins the final match of the Championship Playoffs.

5.6 CHAMPIONSHIP FINALIST (CHAMPIONSHIP ONLY)

This award celebrates the alliance that makes it to the final match of the Championship Playoffs.

5.7 CHRYSLER TEAM SPIRIT AWARD

This award celebrates extraordinary enthusiasm and spirit through exceptional partnership and teamwork.

5.8 DELPHI "DRIVING TOMORROW'S TECHNOLOGY™" AWARD

This award celebrates an elegant and advantageous machine feature. This award recognizes any aspect of engineering elegance including, but not limited to: design, wiring methods, material selection, programming techniques, and unique machine attributes. The criteria for this award are based on the team's ability to concisely describe verbally, as well as demonstrate, this chosen machine feature.

5.9 DIVISION FINALIST (CHAMPIONSHIP ONLY)

This award celebrates the alliance that makes it to the final match in its division at the Championship.

5.10 DIVISION CHAMPION (CHAMPIONSHIP ONLY)

This award celebrates the alliance that wins the final match in their division at the Championship.

5.11 ENGINEERING INSPIRATION AWARD

This award celebrates a team's outstanding success in advancing respect and appreciation for engineering and engineers, both within their school as well as their community. Criteria include: the extent and inventiveness of the team's efforts to recruit students to engineering, the extent and effectiveness of the team's community outreach efforts, and the measurable success of those efforts.

5.12 THE FOUNDER'S AWARD (CHAMPIONSHIP ONLY)

Each year *FIRST* presents this award to honor an organization or individual that has contributed significantly to the growth of *FIRST.*

Past winners of the Founder's Award include:

1993 Motorola, Inc.

1994 Honeywell

1995 Walt Disney World's Epcot

1996 The City of Manchester, NH

1997 Francois Castaing of Chrysler Corporation

1998 Johnson & Johnson

1999 NASA

2000 William Murphy, Founder of Cordis Corporation & Small Parts, Inc.

2001 Autodesk, Inc.

2002 John Doerr, partner, Kleiner Perkins Caufield & Byers

2003 Innovation First

2004 FedEx Corporation

2005 The LEGO Group

2006 United Technologies Corporation

5.13 GENERAL MOTORS INDUSTRIAL DESIGN AWARD

This award celebrates form and function in an efficiently designed machine that effectively achieves the game challenge.

5.14 HALL OF FAME (CHAMPIONSHIP ONLY)

FIRST Robotics created The Hall of Fame to recognize the teams that have had the most impact on *FIRST* growth. A team earns permanent Hall of Fame status by winning the Championship Chairman's Award, *the* most prestigious *FIRST* award. Unlike other Halls of Fame, the model teams in the *FIRST* Hall of Fame are not retired, but begin a new phase of participation,

requiring additional activities to achieve Hall of Fame Star Status. To achieve Hall of Fame Star Status, a team must submit a Chairman's Award entry, using the same criteria as all other Chairman's Award applicants as described above in "Submission Process." These submissions need to include all activities that the team has participated in during 2008 that enhance the community's awareness of *FIRST*. Hall of Fame Chairman's Award submissions will not be included in the Regional Chairman's Award judging process.

5.14.1 DVD Submission

FIRST encourages teams to enhance each submission by creating a DVD, which should be mailed to *FIRST* headquarters, attention Wendy Trommer, postmarked no later March 28, 2008. Teams are encouraged to bring a copy of the DVD and have equipment to show it in their booths at The Championship.

Congratulations to all the previous Chairman's Award winners! This year's forty-one (41) Regional Chairman's Award winners will vie for the one spot reserved for the 2008 winner.

5.14.2 Display Specifications

To be determined and communicated at a later date.

5.15 HALL OF FAME TEAMS HIGHEST ROOKIE SEED AWARD

This award celebrates the highest-seeded rookie team at the conclusion of the qualifying rounds.

5.16 IMAGERY AWARD

This award celebrates attractiveness in engineering and outstanding visual aesthetic integration from the machine to team appearance.

5.17 JOHNSON & JOHNSON - GRACIOUS PROFESSIONALISM AWARD

This award celebrates outstanding sportsmanship and continuous gracious professionalism in the heat of competition, both on and off the playing field.

5.18 JUDGES' AWARD

During the course of the competition, the judging panel may encounter a team whose unique efforts, performance, or dynamics merit recognition.

5.19 KLEINER PERKINS CAUFIELD & BYERS ENTREPRENEURSHIP AWARD

This award celebrates the entrepreneurial spirit. This award recognizes a team, which since its inception has developed the framework for a comprehensive business plan in order to scope, manage, and obtain team objectives. This team displays entrepreneurial enthusiasm and the vital business skills for a self-sustaining program.

5.20 MOTOROLA QUALITY AWARD

This award celebrates machine robustness in concept and fabrication.

5.21 REGIONAL FINALIST (REGIONAL ONLY)

This award celebrates the alliance that makes it to the final match of the competition.

5.22 REGIONAL WINNER (REGIONAL ONLY)

This award celebrates the alliance that wins the final match of the competition.

5.23 ROCKWELL AUTOMATION INNOVATION IN CONTROL AWARD

This award celebrates an innovative control system or application of control components to provide unique machine functions

5.24 ROOKIE ALL-STAR AWARD

This award celebrates the rookie team exemplifying a young but strong partnership effort, as well as implementing the mission of *FIRST* to inspire students to learn more about science and technology.

NOTE: This is essentially the "Chairman's Award for Rookie teams". We encourage, but do not require, rookie teams to enter a Chairman's Award submission relative to this award.

5.25 ROOKIE INSPIRATION AWARD

This award celebrates a rookie team's outstanding success in advancing respect and appreciation for engineering and engineers both within their school, as well as in their community. It is the 2nd highest honor *FIRST* bestows to a rookie team.

5.26 UNDERWRITERS LABORATORIES INDUSTRIAL SAFETY AWARD

This award celebrates the team that progresses beyond safety fundamentals by using innovative ways to eliminate or protect against hazards. The winning team consistently demonstrates excellence in industrial safety performance that shines throughout the competition from uncrating to re-pack.

5.27 XEROX CREATIVITY AWARD

This award celebrates creative design, use of a component, or a creative or unique strategy of play.

5.28 WEBSITE AWARD

The Website Award recognizes excellence in student-designed, built, and managed *FIRST* team websites. Eligible websites are scored *PRIOR* to the competition by a panel of evaluators. Two subcategories of awards will be given for website design:

7) "Website Excellence"
8) "Best Website"

Every submission that meets the *FIRST* website design standards of excellence will receive the Website Excellence award. Website Excellence award winners will receive an electronic certificate to include on their websites. At each Regional Competition, there will be one award for Best Website. The overall championship Best Website award winners will be chosen from among the regional winners.

5.28.1 Submission and Deadline Information

Only team websites that are entered into firstawards.org by **11:59 p.m. EST on February 14, 2008** will be evaluated. Team websites are eligible for these awards at every regional event in which the team is competing. You must enter your website separately into each event where you want it evaluated. The websites must be completed and functioning by the date of

submission. Any website found to be "down," and not able to be viewed by the evaluators, will be disqualified at that particular event.

Any website, which in the evaluator's opinion, contains distasteful or objectionable material will be disqualified from consideration in all events in which the website was entered. Any team whose website is disqualified will be notified by e-mail of the disqualification and the reason for it.

Only one electronic Website Excellence certificate will be awarded per team for the entire competition season. A team is eligible to win the Best Website award at multiple regional events.

5.28.2 Scoring Criteria

The following criteria will be used to evaluate the Website Awards:

5.28.2.1 General

The ideal website is a genuine reflection of the team, its participants, spirit, and goals. It should not be just a bulletin board with information accessible via a menu. It should tell an individual story and also detail how it is part of the larger *FIRST* community.

5.28.2.2 Content and Design

The content (text, pictures, music, etc,) and design of a website should work together to provide a pleasing user experience. Good content with a confusing interface, or vice versa, will not be scored as highly as a site with better balance.

5.28.2.3 Content (50 points)

- How well does the site explain *FIRST* and promote its vision?
- Is there a prominent link to the FIRST website on the website home page?
- Does the site use correct *FIRST* terminology and contain the updated *FIRST* logo?
- Does the website clearly tell the team story and contain the team name, *FIRST* program team number and physical location of the team?
- Does the website contain updated information dealing with the current season?
- Does the website include recognition of sponsors, mentors and volunteers?
- Does the website include helpful resources for other *FIRST* teams?
- Does the website contain helpful non-text content such as music, sound, animation , or video?
- Is this site dedicated exclusively to a FIRST team and its activities?
- Does this site follow copyright infringement rules correctly?

5.28.2.4 Visual Design (25 points)

- Does the website communicate a visual experience reflective of the identity of the team?
- Is the site engaging and does it encourage exploration?
- Does the font size and format make the site easy to read?
- Does the website contain visuals relating to the current game and the current season's work as a team?
- Is the home page inviting to all readers, or is it cluttered with team member specific information?

5.28.2.5 Functionality and Interactivity. (25 points)

- Does the website work well and the homepage load quickly?
- Do the links work throughout the site?
- Is important information easily accessible?
- Do external links open new, separate browser windows?
- Can I easily return to the website from an outside link?

5.28.3 Evaluating Process

- Each website submitted for consideration will be reviewed by a panel of evaluators prior to each competition.
- There will be no on-site interviews. If the evaluators have questions about a particular website, they may contact the team via email prior to the competition to resolve their questions.
- Websites receiving a score of 80% or more, but not winning the Regional Best Website Award, will receive the Website Excellence Award.

5.28.4 Award Presentation

- Each team that wins Best Website at a competition will receive an award at that event.
- Teams that earn the Website Excellence award will receive an e-mailed, electronic certificate to place on their websites following the Championship.

5.29 2008 WEBSITE AWARD SCORING SHEET

Event: _____

Team Numbers	#	#	#	#	#
Content (50 points)					
How well does the site explain *FIRST* and promote its vision?					
Is there a prominent link to the FIRST website on the website home page?					
Does the site use correct *FIRST* terminology and contain the updated *FIRST* logo?					
Does the website clearly tell the team story and contain the team name, *FIRST* program team number and physical location of the team?					
Does the website contain updated information dealing with the current season?					
Does the website include recognition of sponsors, mentors and volunteers?					
Does the website include helpful resources for other *FIRST* teams?					
Does the website contain helpful non-text content such as music, sound, animation , or video?					
Is this site dedicated exclusively to a FIRST team and its activities?					
Does this site follow copyright infringement rules correctly?					
Visual Design (25 points)					
Does the website communicate a visual experience reflective of the identity of the team?					
Is the site engaging and does it encourage exploration?					
Does the fort size and format make the site easy to read?					
Does the website contain visuals relating to the current game and the current season's work as a team?					
Is the home pate inviting to all readers, or is it cluttered with team member specific information?					

Functionality and Interactivity (25 points)					
Does the website work well and the homepage load quickly? Do the links work throughout the site? Is important information easily accessible? Do external links open new, separate browser windows? Can I easily return to the website from an outside link?					
Total Scores. (0-100 points)					

5.30 WOODIE FLOWERS AWARD

The Woodie Flowers Award celebrates effective communication in the art and science of engineering and design. Dr. William Murphy founded this prestigious award in 1996 to recognize mentors who lead, inspire, and empower using excellent communication skills.

FIRST will recognize one adult team member at each of the forty-one (41) Regional Competitions as a Woodie Flowers Finalist Award (WFFA) winner. These finalists will be combined with past years' WFFA winners, and one will be judged to receive the Woodie Flowers Award at the 2008 Championship in Atlanta.

5.30.1 Award is Students' Choice

High school students on a *FIRST* Robotics team will choose one adult team member as their WFFA candidate. They will describe how this mentor has given them the best understanding of the challenges, opportunities, and satisfaction involved in the discipline of engineering and design. Professor Flowers will lead the past Championship Woodie Flowers Award (WFA) winners as they judge and select the 2008 Finalists and Championship winner based on student essays.

Team mentors should direct their students to the entry site and let the student nominators decide who to nominate. Adults can help edit, but this must be a student-led effort, since any team mentor is eligible. Authors must be clearly identified as high school students in the submission paperwork.

5.30.2 Spirit of the Award

Two aspects of this award are important. The accomplishments in communication by the mentor are essential. Also important is the student's ability to communicate clearly and concisely through their written nomination. This award recognizes an individual who has done an outstanding job of motivation through communication while also challenging the student body to be clear and succinct in recognizing the value of communication.

In the spirit of recognizing additional deserving mentors, past WFFA winners are not eligible to win the Regional award again. These previously recognized mentors are only eligible to win the Championship WFA.

5.30.3 Judging Criteria

Each FRC team may nominate one candidate to be a WFFA winner. This candidate must be an adult mentor on the same team as the student nominator(s). Students may also re-nominate one

of their team's past WFFA winners by submitting a new essay for this past Finalist to be eligible for the Championship WFA. Judging criteria is based on the team's description of how the mentor inspired each member of the team in some or all of the following ways:

- Level of student participation
- Creativity of effort
- Clear explanation of mathematical, scientific, and engineering concepts
- Demonstration of enthusiasm for science and engineering
- Encouragement to work on projects as a team effort
- Inspiration to use problem-solving skills
- Inspiration to become an effective communicator

Each *FIRST* team completes a product development cycle as it designs a concept, develops a prototype, and builds and debugs a unique machine. This requires teamwork, attention to detail, scheduling, and hard work. The award-winning essay should answer this question; "How did the candidate inspire your team throughout this process?" If the essay best describes how this individual excels above all others as he or she inspires the team, then that mentor truly deserves to be recognized with the award that honors Professor Woodie Flowers and his contribution to engineering, education, and communication.

5.30.4 Entry Requirements

Students enter their candidate at the Woodie Flowers Award entry web page: www.firstawards.org/They enter team and candidate information, reference information, and a six hundred-word (600) essay, written in English. Teams may also add up to six (6) pictures, totaling no more than 1.0 Mb. of memory. This essay should be a team effort and will stand alone as the team's entry to award their candidate the deserved recognition.

For students to re-nominate a past WFFA winner (one per team) for the WFA, they must write a new six hundred word essay.

As in the past, teams may only submit at one Regional competition for judging. Teams submitting for both the Chairman's Award and the Woodie Flowers Award should note that both awards are judged at the same event. Students working on the Woodie Flowers Award submission and those team members working on the Chairman's Award submission must coordinate to select the best event for the team.

5.30.5 Submission Deadline

The Woodie Flowers Award entries are due on Thursday, February 21st at 11:59 p.m. EST.

5.30.6 Entry Process

The Woodie Flowers Award submission is submitted on-line at www.firstawards.org/ . Nomination entry directions are listed on this site. This site will be available beginning January 16th, 2008 at noon EST.

Student nominators must follow the directions listed on the screen. Each team can only submit one WFFA candidate for this award. Teams can also enter an essay for one of their team's past WFFA winners (if applicable) in order to make them eligible for the Championship WFA. As the student nominator fills out the required information, he/she will choose their selected regional.

Student nominators can easily enter information, save it, and return to the site to edit their entry information until they are ready to submit it for judging. All entries will be final on Thursday,

February 21nd at 11:59 p.m. EST (midnight). No entries will be accepted or altered after this date.

Students will go to the website to enter information in the following fields:

Team Number

Candidate Information:
First Name, Middle Initial, Last Name
Address, City, State, zip code
Employer
Occupation
Position on team

High School ***Student Nominator's information: (Student recommending candidate)***

First Name, Last Name
Phone Number
High School
E-mail Address
Position on Team
Year in School (9th, 10th, 11th, 12th)

Adult Reference (On the same team)
First Name, Last Name
Phone Number
E-mail Address
Position on Team

Adult Reference (Any FIRST affiliation)
First Name, Last Name
Phone Number
E-mail Address

Regional Selection *(Team must attend this Regional)*

Upload Pictures *(Up to 6, no more than 1.0 Mb total)*

Essay (600 words or less) - The students will see a quote from Dr. Murphy and/or Woodie about the value of concise and clear writing. Once candidates' information and essays are submitted, they are sorted and posted on a private, password-protected site where only the Judges can read the entries. Each Regional will have its candidates listed and the Judges will review the Prior Regional Woodie Flowers Award Winners

5.30.7 Prior Regional Woodie Flowers Award Winners

A team may refresh the submission of any past WFFA winner on their team for their eligibility to win the Championship WFA. Only one past year WFFA winner per team can be eligible for the Championship WFA. Student nominators will not be able to edit the original submission but can refresh it by adding a new 600-word (maximum) essay to make the submission current. Past winners without a new essay will not be eligible for the WFA in 2008.

Judges will read only the new essay.

Students nominators who entered an essay for a past year WFFA winner and for a 2008 WFFA winner will be asked to pick between one of the two mentors to be their team's Championship WFA candidate. Each *FIRST* team can have a maximum of one candidate for the Championship WFA.

5.31 FIRSTAWARDS.ORG SITE

FIRST will once again be using www.firstawards.org/ as a submission site for the Regional Chairman's Award, Hall of Fame, the Woodie Flowers Award and the Website Award. The FIRSTawards.org site will open for submissions at noon EST on January 15, 2008 and close for all submissions on Thursday, February 21, 2008 at 11:59PM EST. The submission requirements for each award are listed in the section for the specific award.

Teams should carefully read the following information about this site before proceeding.

5.31.1 Formatting

Entries cannot contain any formatting only plain text. The only formatting supported is paragraph spacing by way of the 'return' key.

5.31.2 Accounts

Teams must register for a new firstawards.org account every year. A team's TIMS account and their firstawards.org account are not the same. Teams can only have one firstawards.org account. There are not separate logins for Chairman's and WFA entries.

5.31.3 Verification of Submission

Teams should always log in to the firstawards.org site to verify the content and the submission date of their entry after it has been submitted. For Chairman's, Hall of Fame, Rookie All Star and Woodie Flowers Award entries, teams should print a copy of the submission and bring it with them to the Regional Event. NASA Grant teams should download a copy to have should NASA request it. NASA does have access to this site, but in prior years some entries have not been completed successfully or the team did not check the NASA box and were required to supply a copy to NASA.

Section 6

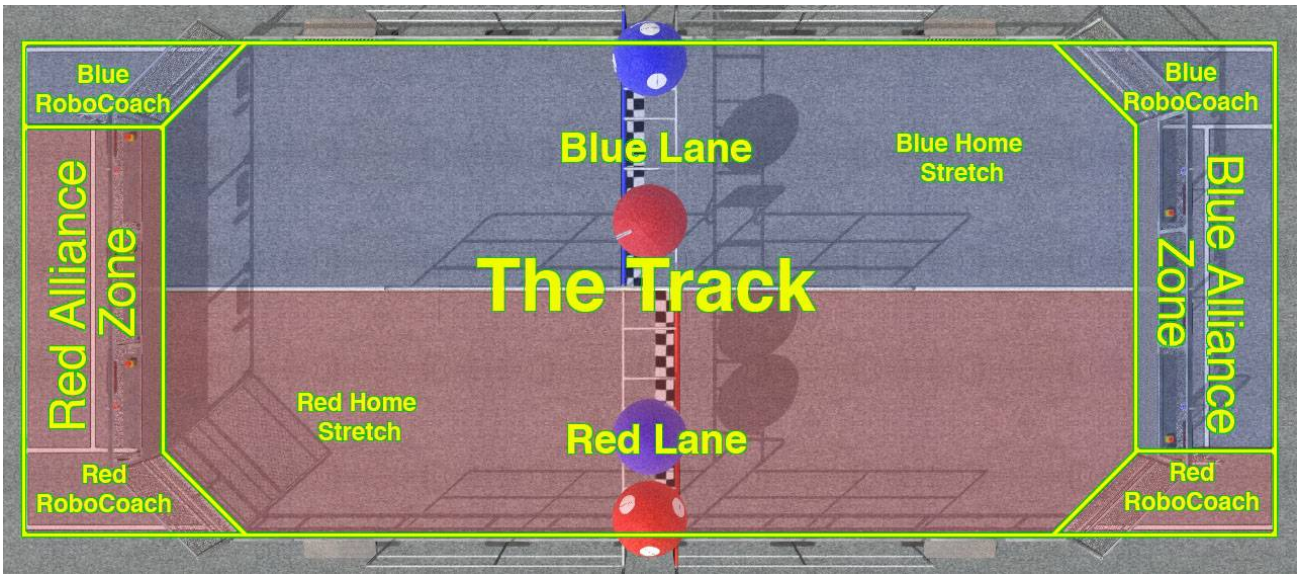
THE ARENA

Table of Contents

6 THE ARENA

6.1 OVERVIEW

The following sections of the manual describe the arena, game, robots and tournament structure used in the 2008 *FIRST* Robotics Competition. Please be sure to read and thoroughly understand Sections 6, 7, 8, and 9 to fully understand the game and ensure the best opportunity for success during the competition season.



Note: The illustrations in this section of the manual are for a general visual understanding of the FIRST Overdrive arena only. Please refer to the official drawings for exact dimensions and construction details.

The *FIRST* Overdrive game field, known as the "TRACK," is a 27 by 54-foot rectangular area in which the ROBOTS compete. The TRACK is split lengthwise into the Red Lane and the Blue Lane, to correspond with the team ALLIANCES that play the game. Positions from which signals may be passed to the ROBOT from a team ROBOCOACH are located at the outer corners of the TRACK. The ones on the Red Lane are designated as Red ROBOCOACH STATIONS, and the ones on the Blue Lane are designated as Blue ROBOCOACH STATIONS. The Alliance Zones are located outside the ends of the TRACK. These rectangular zones consist of three team stations. The three teams that make up each ALLIANCE play the game from these zones.

The specifications for the *FIRST* Overdrive arenas used in competition are listed below in Section 6.1.1. The arenas are designed to withstand rigorous play and frequent shipping. Precise specifications and construction details of the TRACK can be found on the *FIRST* web site off of the manual landing page, www.usfirst.org/frc/2008/manual. Note that the web site also contains drawings for suggested low-cost versions of the important elements of the TRACK that teams can build for their own use during the construction and testing of the ROBOT.

6.1.1 Dimensions and Tolerances

The exact dimensions and construction details of the TRACK are contained on the official arena drawings. The relevant drawings include:

2008 FRC DRAWINGS			
TITLE LINE 1	**TITLE LINE 2**	**DWG NO.**	**SHEET/S**
2008 Field	Bridge (Overpass) Assembly	G08-0003	1 Sheet
2008 Field	Bridge, Divider and Fence	G08-0004	19 Sheets
2008 Field	Rail Extension	G08-0005	2 Sheets
2008 Field	Rail Corner Connector	G08-0006	1 Sheet
2008 Field	FG Panel Posts	G08-0007	1 Sheet
2008 Field	FG Panels	G08-0008	1 Sheet
End Panel	Fabrication	F05-0001	1 Sheet
End Panel	Assembly and Weld Details	F05-0002	2 Sheets
Drivers Station Support	Fabrication	F05-0003	1 Sheet
Drivers Station Support	Assembly	F05-0004	1 Sheet
Corner Support	Fabrication	F05-0005	1 Sheet
Corner Support	Assembly	F05-0006	1 Sheet
Field, Rail	Fabrication & Assembly	F05-0007	1 Sheet
Field, Rail / Gate	Fabrication & Assembly	F05-0008	1 Sheet
Field, Top Rail	Fabrication & Assembly	F05-0011	1 Sheet
2008 Field	Border/Driver Station Plastic	F05-0012	2 Sheets
Field Outrigger	Fabrication & Assembly	F05-0013	1 Sheet
Hinge Insert	Fabrication	F05-0015	1 Sheet
Field Entry Ramp	Fabrication & Assembly	F05-0016	1 Sheet
Field Gate Hanger	Fabrication	F05-0021	1 Sheet
Field Trip Guard	Fabrication	F07-0023	1 Sheet

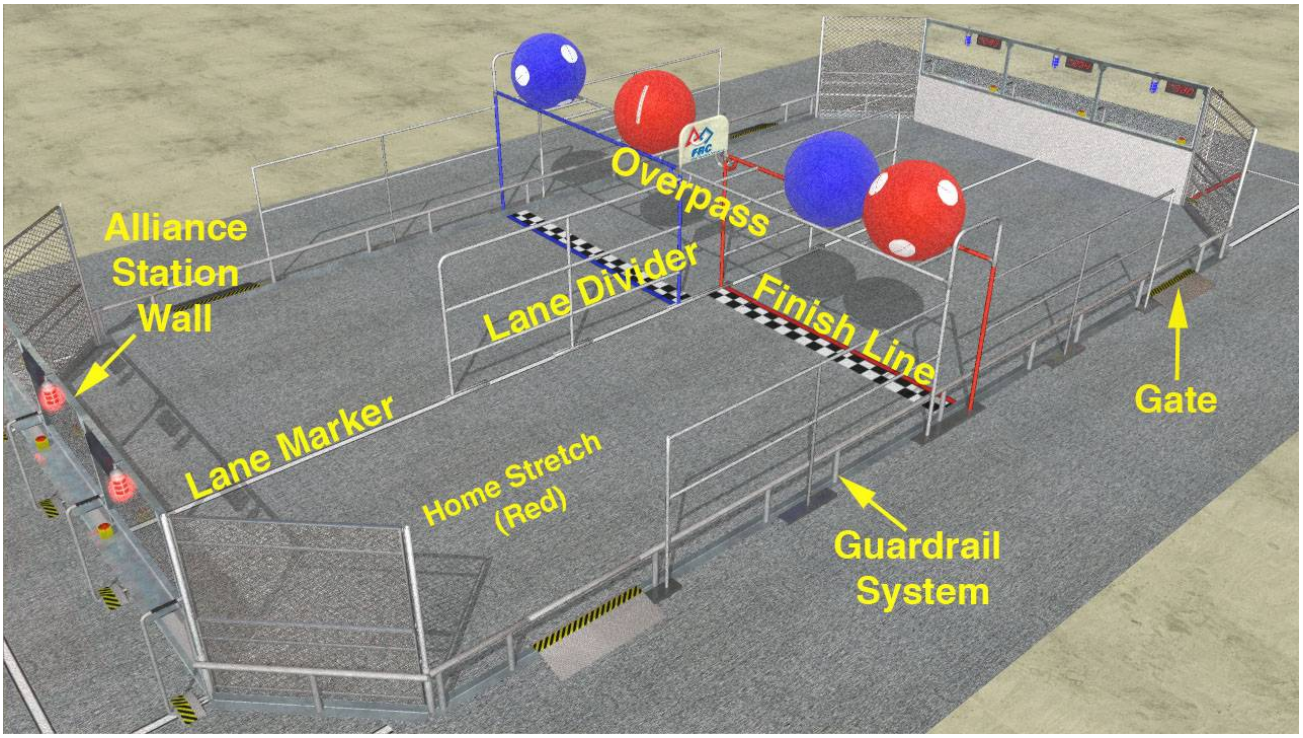
The competition arenas are modular constructions that are assembled, used, disassembled, and shipped many times during the competition season. They may undergo a significant amount of wear and tear. Every effort is made to ensure that the arenas are as identical from event to event as possible. However, as the arenas are assembled in different venues by different event staff, small some variations do occur. Fit and tolerance on large assemblies are ensured only to within 1/4 inch. Successful teams will design robots that are insensitive to these small variations.

6.2 THE TRACK

Note: The official FIRST Overdrive Track description, layout, dimensions and parts list are contained in the "2008 FRC Drawings". Diagrams and dimensions below are for illustrative purposes only.

6.2.1 Boundaries and Markings

The TRACK is an octagonal carpeted 27 feet by 54 feet area, bounded by two Alliance Station Walls and a Guardrail System.



The Alliance Station Wall is 6-1/2 feet high, 18 feet wide, and centered on the ends of the TRACK. The wall is composed of a 3-foot high base of diamond plate aluminum topped with a 3-1/2-foot high transparent acrylic panel. The corner between the Alliance Station Wall and the Guardrail System, called the ROBOCOACH STATION, is protected by a six foot tall, six foot wide section of chain link fence. The protective fence is oriented at a 45-degree angle between the Alliance Station Wall and the Guardrail System. This angled corner helps prevent TRACKBALLS from getting trapped in the corners of the TRACK.

The Guardrail System is a horizontal pipe 20 inches above the floor, supported by vertical struts mounted on a 3" aluminum angle. A shield is attached on the inside of the Guardrail system, extending from the floor to the top of the guardrail, and running the length of the guardrail. The Guardrail System defines the borders of the TRACK, except where it is bounded by the Alliance Station Wall and the ROBOCOACH STATIONS.

Four gates in the Guardrail System allow easy access to the TRACK for placement and removal of ROBOTS. The gates are four feet wide and are located in each quadrant of the TRACK. The gates are closed and shielded during game play. Along the edge of the TRACK between the gates, a set of additional rails extends upwards from the floor to approximately six feet high. These additional rails are to help prevent TRACKBALLS from exiting the TRACK during game play.

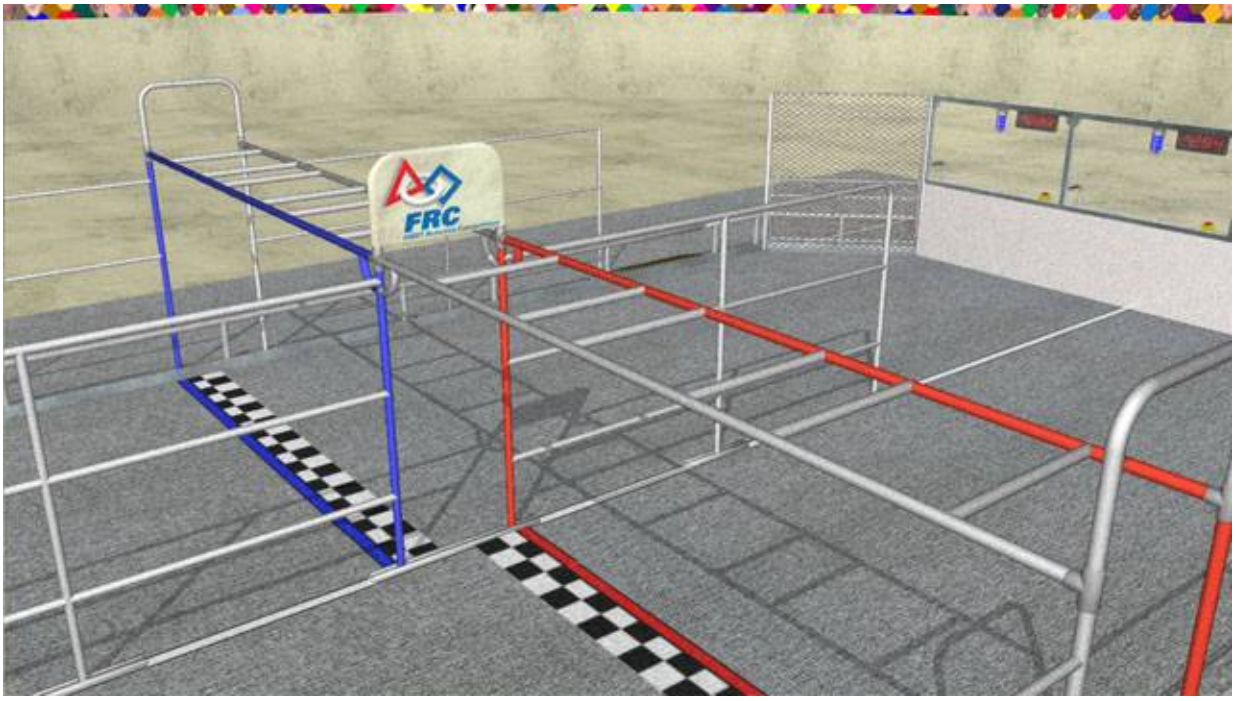
A two-inch wide stripe of white gaffers tape extends down the center-line of the TRACK and under the LANE DIVIDER. This stripe is known as the "LANE MARKER." The LANE MARKER divides the TRACK into two halves: the "Red Lane" and the "Blue Lane."

A red or blue “FINISH LINE” is marked on each side on the carpet under the OVERPASS. The FINISH LINE is indicated by a six-inch wide tripe of black-and-white checkered tape, followed by a two-inch wide stripe of colored gaffers tape. The pipes of the OVERPASS structure coplanar with the vertical projection of the gaffers tape are colored to provide further indication of the plane of the FINISH LINE. For the red FINISH LINE, the gaffers tape and pipes are red, and for the blue FINISH LINE the gaffers tape and pipes are blue.

As the ROBOTS move in a counter-clockwise direction around the TRACK, the quadrant of the TRACK immediately preceding the FINISH LINE for each ALLIANCE is known as the “HOME STRETCH.” The HOME STRETCH for the red ALLIANCE is the one immediately in front of the red ALLIANCE ZONE, and the HOME STRECTH for the blue ALLIANCE is the one immediately in front of the blue ALLIANCE ZONE. The HOME STRECTCH is bounded by the FINISH LINE for the ALLIANCE, the LANE DIVIDER/LANE MARKER, the Alliance Station Wall and the Guardrail System.

All taped lines, rails, fences, and borders used to define the different regions of the TRACK are intended to represent the boundaries of three-dimensional spaces. When determining if an object is within an area indicated by the lines, or to determine if an object has CROSSED a line, the lines/borders are projected vertically upwards.

6.2.2 The OVERPASS



The OVERPASS structure extends across the minor axis of the TRACK. The OVERPASS is constructed of 1-1/2 inch O.D. steel pipe and connecting hardware. The OVERPASS is supported by three vertical supports – one at each end, and one in the center (the center support is also part of the LANE DIVIDER). The vertical supports rise above the horizontal portion of the OVERPASS, to a total height of eight feet and four inches. This is to help prevent TRACKBALLS from rolling off the OVERPASS and exiting the arena, or rolling across the center of the LANE DIVIDER. The

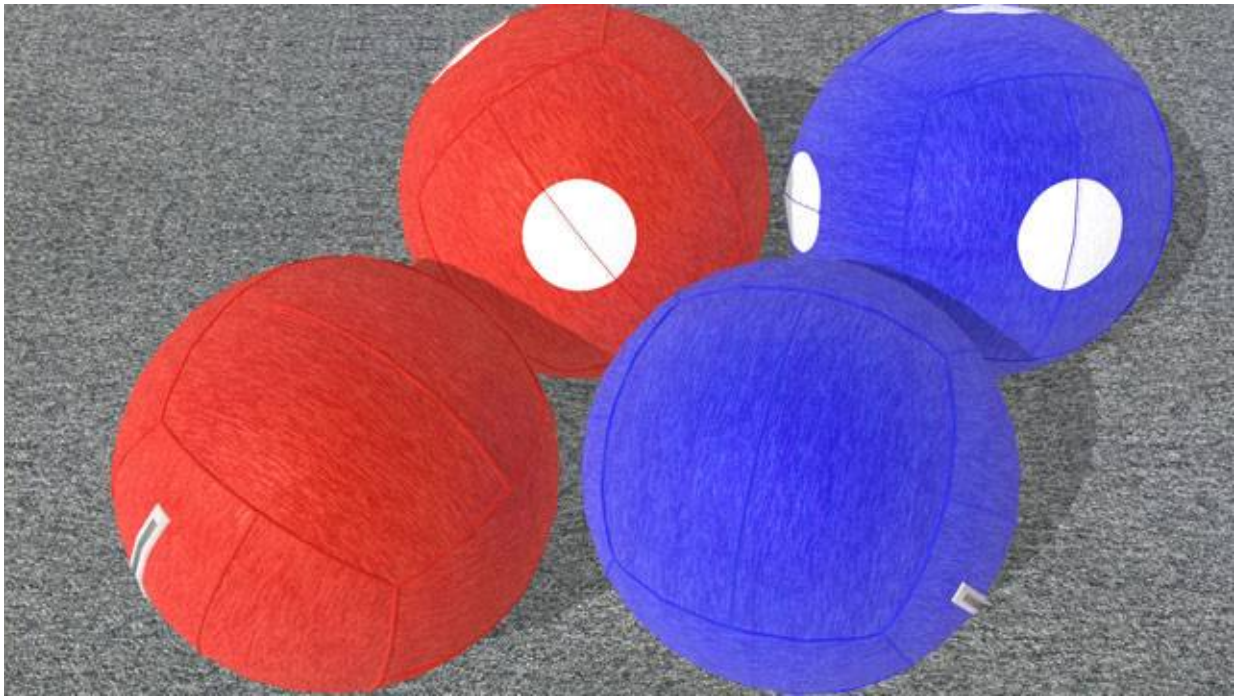
horizontal portion of the OVERPASS is 6-1/2 feet above the floor. The rails of the OVERPASS are spaced 32 inches apart (center to center). On each side of the OVERPASS, a series of spacer bars define three TARGET LOCATIONS on the OVERPASS. The TARGET LOCATIONS are sized to allow the TRACKBALLS to rest within them.

6.2.3 The LANE DIVIDER

The TRACK is divided by a LANE DIVIDER that extends along the major axis of the TRACK. The LANE DIVIDER is six feet tall and approximately 27 feet long. It is constructed of 1-1/2 inch O.D. steel pipe and connecting hardware, forming railing panels. The openings in the railing panels are filled with clear plastic to prevent portions of ROBOTS from inadvertently passing through the structure. The LANE DIVIDER is attached to vertical posts that are anchored to supporting plates covered by carpet. Note that these plates will create a bump in the carpet approximately 1/2 inch tall, and as a result the surface of the TRACK will not be perfectly flat. ROBOTS must be designed to accommodate these surface variations. The LANE DIVIDER is attached to the floor such that it should remain vertical and not move when struck by ROBOTS.

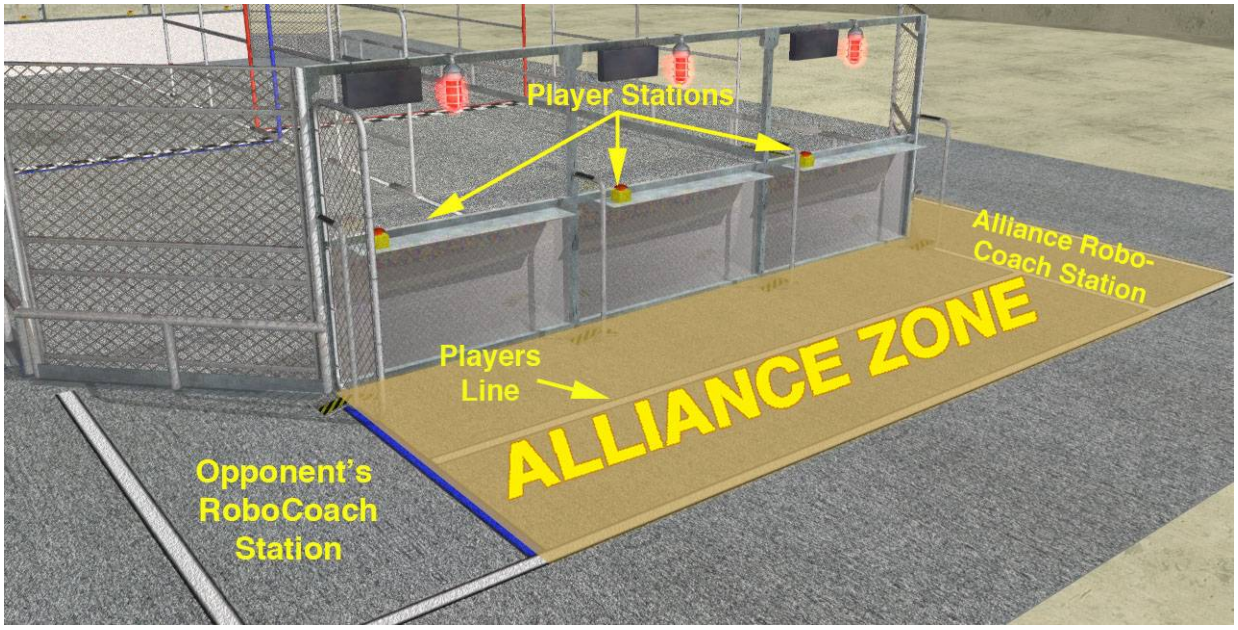
6.3 GAME PIECES

The game pieces, known as “TRACKBALLS,” are large balls made of an inflatable plastic bladder and an outer fabric covering. When inflated, each TRACKBALL is approximately 40 inches in diameter, and weighs approximately 7.3 pounds. Two TRACKBALLS of each alliance color, red and blue, are in the arena during the MATCH. One TRACKBALL of each color will be marked with a set of six-inch diameter white dots so that it may be uniquely identified for tracking purposes during the match.



6.4 ALLIANCE ZONES

The two ALLIANCE ZONES are located at either end of the TRACK, behind the Alliance Station Walls. Each ALLIANCE ZONE includes the18' x 8' area behind the three identical player stations, and the ROBOCOACH STATION for that ALLIANCE. The DRIVERS and COACH from each team stand behind the Alliance Station Wall during the match, where they can move freely within the Alliance Zone.



6.4.1 Boundaries and Markings

Each ALLIANCE ZONE shares the Alliance Station Wall with the TRACK and has its outer and back edges marked on the carpet with white gaffers tape. The ALLIANCE ZONE extends eight feet back from the Alliance Station Wall, and is the width of the Alliance Station Wall (eighteen feet). Four feet from the Alliance Station Wall, the Players Line is marked on the carpet with a two-inch wide white gaffers tape. The ALLIANCE ZONE includes the area behind the PLAYERS LINE. At the outer edges of the ALLIANCE ZONE are marked areas for the ROBOCOACH STATIONS. When standing in the ALLIANCE ZONE and facing the TRACK, the ROBOCOACH STATION for the ALLIANCE is to the right, and the opponent's ROBOCOACH STATION is to the left. The tape boundaries are considered "in" the bounded areas.

6.4.2 Player Stations

Attached to the Alliance Station Wall are three aluminum shelves to support the robot control systems of the three teams on the ALLIANCE. The support shelf measures approximately 60 inches wide by 12 inches deep. There is a 4-1/2-foot long by two-inch wide strip of Velcro tape ("loop" side) along the center of the support shelf that may be used to secure the ROBOT controls and Operator Interface. Each setup location includes a competition cable that attaches to the "Competition Port" of the Operator Interface. This cable provides power for the team's Operator Interface and controls communications with the ROBOT. Emergency Stop (E-Stop) buttons for each team are located on the left end of each Player Station shelf. Arena components (including team number displays, competition arena hardware, alliance lights, control hardware cabinets and clock displays) are also located above the Player Station and below the shelf.

Section 7

THE GAME

FRC FIRST Robotics Competition

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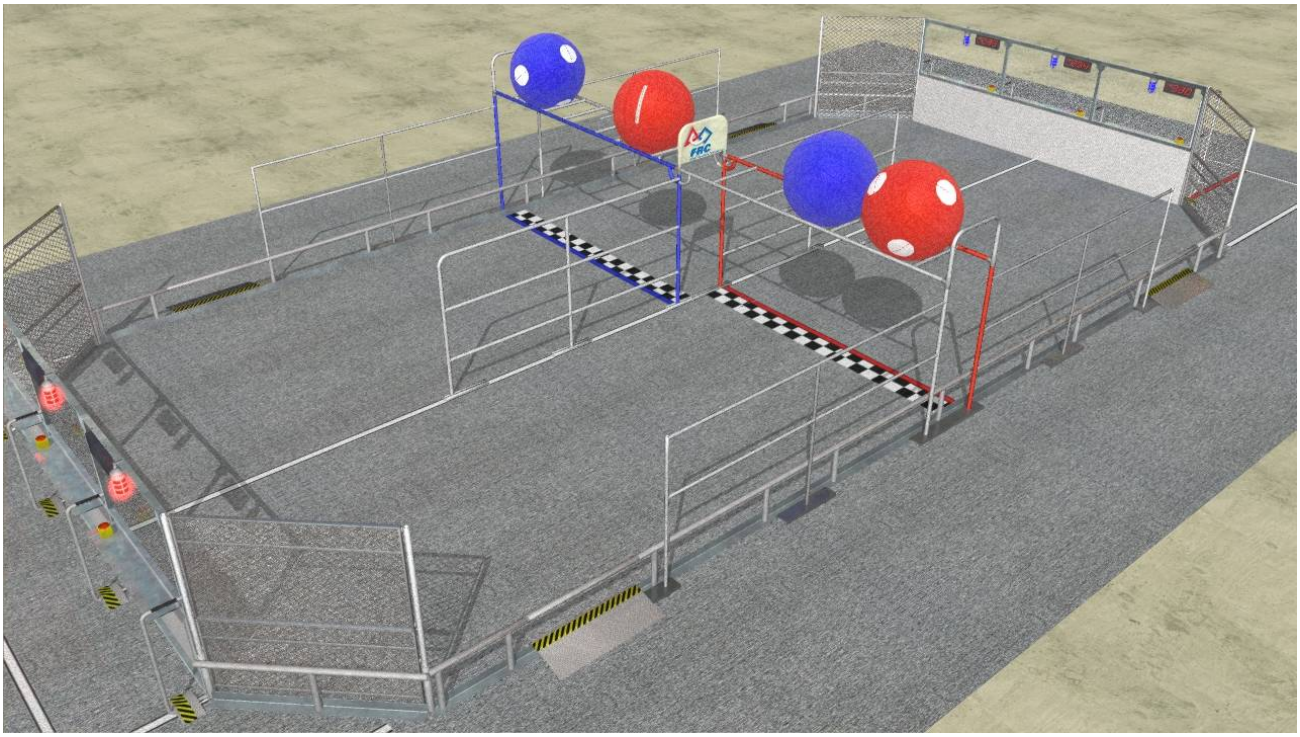
7 THE GAME

7.1 GAME OVERVIEW

FIRST Overdrive is a game played on the TRACK (illustrated in the figure below). Two ALLIANCES, one red and one blue, composed of three teams each, compete in each MATCH. The object of the game is to attain a higher score than your opponent by making counter-clockwise laps with your robot around the TRACK while moving large TRACKBALLS over and/or under the OVERPASS that bisects the TRACK. The point values for each of those actions are explained below.



Note: The illustrations in this section of the manual are for a general visual understanding of the FIRST Overdrive arena only. Please refer to the official drawings for exact dimensions and construction details.

7.1.1 Match Format

A MATCH is 2 minutes and 15 seconds long. A HYBRID PERIOD starts each MATCH in which the ROBOTS are controlled by pre-programmed instructions and/or transmitted information from the ROBOCOACH. The HYBRID PERIOD is followed by the TELEOPERATED PERIOD during which the DRIVERS assume control of the robot. There may be a short pause between HYBRID PERIOD and the start of the TELEOPERATED PERIOD as the player's controls are activated. The ROBOTS continue to play the game until the TELEOPERATED PERIOD is over.

7.2 DEFINITIONS

ALLIANCE: A set of three *FIRST* Robotics Competition TEAMS that work together during a MATCH to play *FIRST* Overdrive against an opposing ALLIANCE. ALLIANCES are identified during the MATCH by their assigned color, either red or blue.

BUMPER ZONE: The volume between two planes parallel to the floor, the lower being 2-1/2 inches above the floor, and the upper being 8-1/2 inches above the floor. The BUMPER ZONE is defined with respect to the ROBOT when in its PLAYING CONFIGURATION.

CROSSING: The act of a TRACKBALL or ROBOT passing through the plane defined by a line (i.e. LANE MARKER or FINISH LINE) when it is projected vertically upwards. A TRACKBALL or ROBOT shall have CROSSED a line when all parts of the object, while traveling in a counter-clockwise direction, have completely passed through the plane.

HERDING: Controlling the position and movement of a TRACKBALL while the TRACKBALL is not supported by any ROBOT (i.e. supported by the TRACK or other TRACKBALLS) shall be considered HERDING. Both continuous and intermittent contact between the ROBOT and TRACKBALL are permissible methods of HERDING. E.g. bumping, plowing or dribbling a TRACKBALL around the TRACK are all considered forms of HERDING.

HURDLE: When a TRACKBALL CROSSES a FINISH LINE while passing above the OVERPASS and then contacts either the floor or another ROBOT before re-contacting the originating ROBOT.

HURDLING: The act of completing a HURDLE. To be considered in the process of HURDLING, the ROBOT must:

- be in its own HOME STRETCH, and
- be in POSSESSION of a TRACKBALL, and
- be moving toward the OVERPASS and/or elevating the TRACKBALL so that the top of the TRACKBALL is higher than the LANE DIVIDER.

IMPEDING: Preventing or obstructing an opposing ROBOT'S ability to proceed around the TRACK in the direction of traffic.

MATCH: A single iteration of play in which ALLIANCES attempt to complete the goals of the *FIRST* Overdrive game during a competition.

PENALTY: A 10-point decrement in the ALLIANCE score assigned when a deserving violation of the game rules has been identified by a REFEREE.

POSSESSION: Controlling the position and movement of a TRACKBALL while the TRACKBALL is supported or captured by an ALLIANCE shall be considered POSSESSION of the TRACKBALL. A TRACKBALL shall be considered "supported" by a ROBOT if in the estimation of a reasonably astute observer the majority of the weight of the TRACKBALL is being borne by the ROBOT. A TRACKBALL shall be considered "captured" by a ROBOT if, as the ROBOT moves or changes orientation (e.g. backs up *or* spins in place), the TRACKBALL remains in approximately the same position relative to the ROBOT. Both the "supported" and "captured" conditions include the case where the TRACKBALL is also in contact with the floor.

REFEREES: The certified volunteers led by the Head Referee, responsible for assisting teams, monitoring game play, and enforcing the *FIRST* Overdrive rules.

ROBOT: Anything that has passed ROBOT inspection that a TEAM places on the TRACK prior to the start of a MATCH.

SIGNALING DEVICE: Any equipment used by a ROBOCOACH to provide external stimuli to the ROBOT.

TEAM: Four representatives from a registered *FIRST* Robotics Competition team that interact with their robot and their ALLIANCE partners to play *FIRST* Overdrive. The positions on the TEAM include:

COACH: A student or adult mentor designated as the team advisor during the MATCH and identified as the person wearing a "COACH" pin or button. There is one COACH per TEAM.

DRIVER: A pre-college student team member responsible for operating and controlling the ROBOT. There are two DRIVERS per TEAM.

ROBOCOACH: A pre-college student team member designated as the only team member permitted to provide external stimuli to the ROBOT from either of the two ALLIANCE ROBOCOACH STATIONS. There is one ROBOCOACH per TEAM.

7.3 RULES

7.3.1 Safety

<S01> If at any time a ROBOT'S operation or design is deemed unsafe, it will receive a PENALTY and be disabled for the remainder of the MATCH. If the safety violation is due to the ROBOT design, the Head Referee has the option to not allow the ROBOT back onto the TRACK until the design has been corrected. An example of unsafe operation would be uncontrolled motion that cannot be stopped by the drivers.

<S02> ROBOCOACHES, DRIVERS, and COACHES may not directly contact any ROBOT at any time during the MATCH. Illegal contact will result in the TEAM being disqualified.

<S03> E-Stop - An Emergency Stop (E-Stop) button is located in each TEAM'S Player Station. Pressing an E-Stop button will cause the TEAM'S ROBOT to be disabled for the remainder of the MATCH. The E-Stop buttons are intended for remote shut down during a MATCH in the event of safety hazards and will not otherwise affect MATCH score or duration. Any TEAM member may press the E-Stop button.

7.3.2 Game Periods

<G01> HYBRID PERIOD - The HYBRID PERIOD is the 15-second period at the start of the MATCH. Driver control of the ROBOT is not permitted at this time. During this period, the ROBOTS may react only to sensor inputs and commands programmed into the onboard control system. The only external signals that may be received by the ROBOT are those sent from ALLIANCE ROBOCOACHES. No external signals are permitted from any other source. The ROBOT may react to no more than four distinct external commands provided by the ROBOCOACH. All ROBOT safety rules are still applicable during the HYBRID PERIOD. The HYBRID PERIOD ends when the arena timer displays zero seconds left in the period.

<G02> TELEOPERATED PERIOD – The TELEOPERATED PERIOD is the 2-minute period of game play immediately following the HYBRID PERIOD. At the beginning of the TELEOPERATED PERIOD the OPERATOR CONSOLE controls are activated and DRIVERS may remotely control their ROBOTS. The DRIVERS continue to teleoperate their ROBOTS for the remainder of the MATCH. ROBOCOACHES may continue to signal the ROBOT. The TELEOPERATED PERIOD ends when the arena timer displays zero seconds. This also indicates the end of the MATCH.

7.3.3 Scoring

7.3.3.1 ROBOT scoring

<G03> All ROBOT scores are awarded to the ALLIANCE associated with the scoring ROBOT.

<G04> During the HYBRID PERIOD, a ROBOT will earn 4 points each time it CROSSES either FINISH LINE.

<G05> During the HYBRID PERIOD, a ROBOT will earn 4 points each time it CROSSES either LANE MARKER.

<G06> During the TELEOPERATED PERIOD, a ROBOT will earn 2 points each time it CROSSES its FINISH LINE.

<G07> A ROBOT that has CROSSED its own FINISH LINE must CROSS the opponent's FINISH LINE before it can score by CROSSING its own FINISH LINE again.

7.3.3.2 TRACKBALL scoring

<G08> All TRACKBALL scores are awarded to the ALLIANCE associated with the scored TRACKBALL, independent of the ROBOT that may have caused the scoring action to occur.

<G09> During the HYBRID PERIOD, each TRACKBALL that is removed from the OVERPASS (i.e. completely removed from its initial TARGET LOCATION and not in contact with any portions of the OVERPASS) at the end of the HYBRID PERIOD will earn 8 points.

<G10> Each TRACKBALL that has CROSSED its own FINISH LINE while not in contact with a ROBOT of the same ALLIANCE will earn 2 points. A TRACKBALL that has CROSSED its own FINISH LINE which contacts ROBOTS of both ALLIANCES while CROSSING will earn 2 points.

<G11> Each TRACKBALL that HURDLES its own FINISH LINE will earn 8 points (2 points for CROSSING the FINISH LINE and a 6 point bonus, yielding 8 points total).

<G12> A TRACKBALL must CROSS a LANE MARKER before it can score for the first time by HURDLING or CROSSING its FINISH LINE.

<G13> A TRACKBALL that has CROSSED its own FINISH LINE must CROSS the opponent's FINISH LINE before it can score by CROSSING its own FINISH LINE again.

<G14> When the MATCH ends, each TRACKBALL that is at least partially supported by the OVERPASS and not in contact with any ROBOT of the same ALLIANCE will earn a 12-point bonus. If a TRACKBALL is in unrestrained motion (i.e. not in contact with another ROBOT) when the clock reaches zero, its contribution to the score will be based on when it comes to rest.

Scoring opportunities and point values are summarized in the table below:

		HYBRID PERIOD	TELEOPERATED PERIOD
Each ROBOT:	CROSSES LANE MARKER	4 points	0 points
	CROSSES opponent FINISH LINE	4 points	0 points
	CROSSES ALLIANCE FINISH LINE	4 points	2 points
Each TRACKBALL:	Removed from OVERPASS	8 points	0 points
	CROSSES ALLIANCE FINISH LINE under OVERPASS	2 points	2 points
	HURDLES ALLIANCE OVERPASS	8 points	8 points
	On OVERPASS at end of MATCH	n/a	12 points

7.3.4 Game Play

7.3.4.1 Starting Conditions

<G15> ROBOT Starting Positions – Prior to the MATCH, the three alliance ROBOTS must be placed entirely inside their HOME STRETCH, touching their Alliance Station Wall or the angled fence in front of their local ROBOCOACH STATION, and not contacting any other ROBOTS.

<G16> ROBOT Alignment Devices - Alignment devices (templates, tape measures, laser pointers, etc.) that are not part of the ROBOT may not be used to assist with positioning the ROBOT. TEAMS that use external alignment devices to position their ROBOT will have their ROBOT arbitrarily repositioned before the start of the MATCH.

<G17> ROBOT Starting Size - At the beginning of a MATCH, each ROBOT must not exceed the maximum weight or volume specified in Rule <R11>. The Head Referee may call for an inspector's recertification of the ROBOT size and weight prior to the start of any MATCH. ROBOTS in violation will be prohibited from participating in the MATCH.

<G18> ROBOT Orientation - ROBOTS must start the MATCH with their long (maximum) dimension in a vertical orientation. After the start of the MATCH, ROBOTS may change their orientation such that the long dimension is either vertical or horizontal. Refer to Rule <R08> and Rule <R17> to determine how this affects the use of STANDARD BUMPERS and FLAGS.

<G19> LAP INDICATOR Use - The provided LAP INDICATOR must be placed on the ROBOT as specified in Rule <R18>, and connected to a power source. The correct operation of the LAP INDICATOR will be verified prior to the start of the MATCH.

<G20> TRACKBALL Locations - After all ROBOTS participating in the MATCH are in their starting positions and TEAM members are standing behind the PLAYERS LINE within their ALLIANCE ZONE and/or ROBOCOACH STATIONS, four TRACKBALLS will be placed on the OVERPASS. On each side of the OVERPASS there are three TARGET LOCATIONS for TRACKBALLS. The field management system will randomly choose an initial starting location for the TRACKBALLS before the start of each MATCH. One red and one blue TRACKBALL will then be positioned in the chosen TARGET LOCATIONS on each side of the OVERPASS. After this point in time no ROBOT or OPERATOR CONSOLE may be adjusted or repositioned until the MATCH starts.

<G21> Field Equipment - Other than the TRACKBALLS and competing ROBOTS, no other items shall be placed on the TRACK or OVERPASS prior to, or during, the MATCH.

7.3.4.2 Match Play

<G22> Direction Of Traffic – ROBOTS must proceed around the TRACK in a counter-clockwise direction. Once a ROBOT has CROSSED a LANE MARKER or FINISH LINE, it shall not break the plane of the line by moving in the clockwise direction. A PENALTY will be assigned for each infraction.

<G23> Causing PENALTIES - A ROBOT's action shall not cause an opposing ROBOT to break a rule and thus incur penalties. Any rule violations committed by the affected ROBOT shall be excused, and no penalties will be assigned. For example, an opposing ROBOT may not be pushed into another ROBOT in an attempt to cause a IMPEDING situation and violation of Rule <G40> by the opponent, nor may a TRACKBALL be placed intentionally on an opposing ROBOT for the purpose of causing the opponent to violate Rule <G26>.

<G24> ALLIANCE PENALTIES - Unless otherwise noted, all PENALTIES assigned by REFEREES are applied to the entire ALLIANCE.

<G25> Minimum Scores - The minimum score is 0 (zero) points. Even after adjustment for PENALTIES, there are no "negative scores."

7.3.4.3 TRACKBALL Handling

<G26> TRACKBALL POSSESSION - ROBOTS may only have 1 (one) TRACKBALL in their POSSESSION at any time during the MATCH. A PENALTY will be assigned for each infraction.

<G27> HERDING TRACKBALLS – ROBOTS may HERD one or more TRACKBALL at one time. ROBOTS shall not HERD a TRACKBALL while also being in POSSESSION of a second TRACKBALL. A PENALTY will be assigned for each infraction.

<G28> Bulldozing TRACKBALLS - Inadvertent bulldozing of TRACKBALLS while the ROBOT moves around the TRACK is allowed whether or not the ROBOT is in POSSESSION of, or HERDING, a TRACKBALL.

<G29> POSSESSING Opponent's TRACKBALLS - ROBOTS may not be in the POSSESSION of a TRACKBALL belonging to an opposing ALLIANCE. A PENALTY will be assigned for each violation. HERDING of an opponent's TRACKBALL and removing an opponent's TRACKBALL from the OVERPASS is permitted.

<G30> TRACKBALL Out of Bounds - TRACKBALLS that leave the arena will be placed back on the TRACK at the earliest safe opportunity. The TRACKBALL will be placed on the TRACK at the approximate location where it exited.

7.3.5 Robot Operations

7.3.5.1 Robot Out Of Bounds

<G31> ROBOT out of Bounds - Any ROBOT that touches any surface outside of the TRACK boundary will be disabled for the remainder of the period (either HYBRID or TELEOPERATED). No penalty points will be assigned.

<G32> Grace Period after HYBRID - If a ROBOT should touch any surface outside of the TRACK boundary during the HYBRID PERIOD, it will have a 10 second "grace period" to right itself and return to the TRACK at the beginning of the TELEOPERATED PERIOD. If the ROBOT is unable to right itself within the grace period, it will be disabled for the remainder of the MATCH. If at any time the Head Referee should determine that the attempts to recover from the situation constitute unsafe operations, Rule <S01> will take precedence.

<G33> Alliance Station Wall - ROBOTS may not extend/cross over the Alliance Station Wall for any reason. If a violation of this rule occurs a PENALTY will be assigned and the ROBOT may be disabled.

7.3.5.2 Robot Actions

<G34> Arena Interaction - ROBOTS may push or react against any elements of the arena, provided there is no damage or disruption of the arena elements. ROBOTS may not grab, grasp, grapple, or attach to any arena structure. If a ROBOT violates this rule, the TEAM will be given one warning. If the referee determines that the TEAM is disregarding the warning, their ROBOT will be disabled for the remainder of the MATCH. ROBOTS that become entangled in the arena elements will not be freed until after the MATCH has finished, unless the entanglement represents a safety hazard.

<G35> Arena Damage - Any ROBOT that has damaged any part of the arena, carpet, or TRACKBALLS, may be disabled if the Head Referee determines that further damage is likely to occur. The TEAM may be required to take corrective action (such as eliminating a sharp edges, removing the damaging MECHANISM, and/or re-inspection) before the ROBOT will be allowed to compete in subsequent MATCHES.

<G36> Disabled ROBOTS and PENALTIES – If a ROBOT becomes incapacitated (e.g. the ROBOT overturns and can not be righted, the battery falls out, etc.), it may be completely disabled by pressing the E-Stop Button in the corresponding Player Station. ROBOTS that are disabled in this manner can not incur further PENALTIES (e.g. can not receive a PENALTY for IMPEDING). Disabled ROBOTS may be pushed out of the path of travel without PENALTY.

<G37> ROBOT to ROBOT Interaction - Strategies aimed solely at the destruction, damage, tipping over, or entanglement of ROBOTS are not in the spirit of the *FIRST* Robotics Competition and are not allowed. In all cases involving ROBOT-to-ROBOT contact, the TEAM may receive a PENALTY and/or their ROBOT may be disqualified if the interaction is inappropriate or excessive. However, it is noted that *FIRST* Overdrive is a highly interactive game. Robust construction of ROBOTS will be very important in this high-speed competition. ROBOTS should be designed to withstand the high-speed contact that will occur during the MATCH. Appropriate contact is allowed under the following guidelines:

a. High speed accidental collisions are likely to occur during the MATCH, and are an expected part of the game. However, high-speed intentional ramming is not acceptable and will be penalized.

b. Contact within the BUMPER ZONE is generally acceptable.

c. Contact outside of the BUMPER ZONE is generally not acceptable, and will result in a PENALTY. The offending ROBOT may be disqualified from the MATCH if the offense is particularly egregious or if it results in substantial damage to another ROBOT. However, incidental contact outside of the BUMPER ZONE will not be penalized.

d. If a ROBOT extends outside of the perimeter of the STANDARD BUMPERS (the perimeter of the bumpers is the polygon defined by the outermost corners of each STANDARD BUMPER segment), it is responsible for the extension's contact with other ROBOTS. The ROBOT must not use the extension to contact other ROBOTS outside of the BUMPER ZONE. Likewise, other ROBOTS will not be responsible for contact with the extension outside of the BUMPER ZONE. Again, incidental contact will not be penalized.

e. Extension to extension contact between two ROBOTS with appendages outside the ROBOT perimeter of the STANDARD BUMPERS will generally not be penalized.

f. Contact with a tilted ROBOT outside the BUMPER ZONE (particularly if resulting from contact within the BUMPER ZONE) will generally be considered incidental contact.

g. A ROBOT may not attach to and/or climb onto a ROBOT on an opposing ALLIANCE (doing so will be interpreted as an attempt to damage an opposing ROBOT, and will be penalized as such).

h. Use of any sloped or angled feature of the ROBOT as a wedge to overturn an opposing ROBOT is explicitly prohibited, and will be assessed as a violation of Rule <R19>.

<G38> Signal To Pass – During the Teleoperated Period, a ROBOT may indicate a desire to pass an IMPEDING ROBOT by approaching the opponent ROBOT and "bumping" the back of the opponent ROBOT (relative to the Direction of Traffic) .

- All "bump to pass" signals must be made with or against a STANDARD BUMPER and inside the BUMPER ZONE, or
- If in POSSESSION of a TRACKBALL, the ROBOT may "bump" the IMPEDING ROBOT with the TRACKBALL outside the BUMPER ZONE, providing the contact is made exclusively with the TRACKBALL.
- If the IMPEDING ROBOT is in POSSESSION of a TRACKBALL, and positioning the TRACKBALL so that it covers the back of the ROBOT, then the approaching ROBOT may "bump" the held TRACKBALL. In this situation, "bumping" the TRACKBALL will be considered equivalent to "bumping" the STANDARD BUMPER of the IMPEDING ROBOT.

Signaling a desire to pass by "bumping" must still be executed within the constraints indicated in Rule <G37>. E.g. high-speed intentional ramming or using the TRACKBALL to intentionally damage or topple an opponent are still not acceptable actions, and will be penalized.

<G39> Robot Entanglement – Entangled ROBOTS will be disabled if attempts to disengage are causing damage or a dangerous situation. If it is determined that a ROBOT intentionally entangles an opposing ROBOT, the offending ROBOT will be disqualified. If, due to loose cables, hoses, cordage, etc., a ROBOT unintentionally but routinely entangles another ROBOT as a result of normal game interaction, the ROBOT may be disqualified. The TEAM will be required to repair the entangling elements before the ROBOT will be permitted to participate in subsequent MATCHES.

<G40> IMPEDING Traffic – ROBOTS shall not intentionally IMPEDE the flow of traffic around the TRACK. During Teleoperated Period, a ROBOT will be considered to be IMPEDING traffic if it is preventing an opposing ROBOT from proceeding around the TRACK. A ROBOT can be found to be IMPEDING traffic if:

- the ROBOT is traveling slowly relative to the approaching ROBOT, and moving to prevent the approaching ROBOT from passing, or
- the ROBOT is stopped on the TRACK and there is no clear lane of passage for the opposing ROBOT, or
- the ROBOT pins an opposing ROBOT against an arena element, border, or another ROBOT

Note that a ROBOT is <u>not</u> IMPEDING traffic if:

- there is a clear "passing lane" around the ROBOT, or
- the IMPEDING ROBOT and the approaching ROBOT are from the same ALLIANCE (i.e. a ROBOT can not impede another ROBOT of the same ALLIANCE), or
- the ROBOT is in the process of HURDLING (except as noted in Rule <G43>).

<G41> Permitting To Pass - When a ROBOT has received a signal to pass (see Rule <G38>), or when the REFEREE signals that a ROBOT is pinning an opponent in place, the ROBOT shall have 6 seconds to move out of the way and create a "passing lane" to allow the opposing ROBOT through. ROBOTS that fail to do so within 6 seconds after the "signal to pass" shall receive a PENALTY. Repeated infractions will result in a YELLOW CARD being issued to the ROBOT.

<G42> Protection While HURDLING – Neither a ROBOT in the process of HURDLING, nor a TRACKBALL in its POSSESSION, shall be subjected to overt, blatant, or aggressive contact that interferes with the HURDLING attempt. Each incident will be PENALIZED. Bumping to signal to pass (see Rule <G38>) a HURDLING ROBOT is permitted if no passing lane is open (see Rule <G43>). Incidental contact while passing the HURDLING ROBOT or otherwise engaged in normal game play is permitted.

<G43> IMPEDING With Multiple HURDLERS- If multiple ROBOTS are HURDLING simultaneously and effectively blocking the width of the TRACK, then opposing ROBOTS may signal to pass and the HURDLING ROBOT must clear a passing lane within 6 seconds. A PENALTY will be awarded to the HURDLING ROBOT for each violation.

<G44> Detaching MECHANISMS - ROBOTS may not intentionally detach parts or leave multiple mechanisms on the TRACK. Violations will result in a PENALTY per incident. If an intentionally detached component or mechanism significantly impedes access to the TRACK or an ALLIANCE ROBOT, the offending ROBOT will be disqualified from the MATCH.

<G45> Arena Reset - ROBOTS must be designed to permit the release and removal of any TRACKBALLS from the ROBOT without being powered up after a MATCH. If a ROBOT violates this rule, the offending TEAM will be warned and requested to modify the ROBOT. If the modification is not made, the ROBOT may not be permitted to compete in future MATCHES.

7.3.6 Team Member Actions

<G46> TEAM Members In Arena – Each ALLIANCE shall have no more than the four designated members of each of the three participating TEAMS in the arena during a MATCH. Any ALLIANCE with additional personnel in the arena will be assigned a PENALTY, and the additional personnel must leave the area before the MATCH can proceed.

<G47> TEAM Positions During HYBRID PERIOD – During the HYBRID PERIOD, the DRIVERS and COACH must stand behind the PLAYERS LINE within their ALLIANCE ZONE. During the HYBRID PERIOD, the ROBOCOACH must stay within one of the two designated ROBOCOACH STATIONS (either local or remote). Each violation (stepping outside the designated area, or stepping across the PLAYERS LINE) will result in a PENALTY. Exceptions will be made in cases involving personal or OPERATOR CONSOLE safety.

<G48> TEAM Positions During TELEOPERATED PERIOD - During the TELEOPERATED PERIOD, the DRIVERS, the COACH and any local ROBOCOACH must stay within their ALLIANCE ZONE. They may travel anywhere within the ALLIANCE ZONE (note that the ALLIANCE ZONE includes the local ROBOCOACH STATION). Any ROBOCOACH starting in the remote ROBOCOACH STATION must stay within the remote ROBOCOACH STATION during the entire MATCH. Each incident of stepping out of the designated area will result in a PENALTY.

<G49> ROBOCOACH Signaling – If the ROBOCOACH will be providing signals to the ROBOT, then prior to the start of each MATCH the ROBOCOACH must place a Signaling Card in the ROBOCOACH STATION. The Signaling Card shall be a 3-inch by 5-inch card listing the one to four actions that can be commanded by the ROBOCOACH.

<G50> TRACKBALL Interaction - No TEAM member may contact TRACKBALLS at any time during the MATCH. Violations will result in a PENALTY.

<G51> DRIVERS Operating ROBOTS - During a MATCH, the OPERATOR CONSOLE shall be operated solely by the DRIVERS. SIGNALING DEVICES shall be operated solely by ROBOCOACHES. Any operation of the OPERATOR CONSOLE or SIGNALING DEVICE by other than the designated TEAM members will result in the ROBOT being disabled and the offending TEAM being disqualified from the MATCH.

<G52> Respect and professional demeanor - *FIRST* competitions promote respect and professional demeanor. In the event that any TEAM members in the arena are uncivil towards competition personnel or other TEAMS, the TEAM may be disqualified from the MATCH. This rule applies to TEAMS at all times while in the arena (including before and after the MATCH). TEAMS will not receive MATCH penalties for actions off-field, however event personnel will hold them accountable for their off-field actions.

7.3.7 Referee Interactions

<G53> REFEREE Discussions - Any discussions regarding calls, rules, scores, or penalties must be between the DRIVERS or ROBOCOACHES and the Head Referee. COACHES may not have discussions on these topics with the Head Referee.

<G54> Information Sources - When making a ruling, the Head Referee may receive input from other sources, particularly Game Design Committee members, *FIRST* personnel, and technical staff that may be present at an event. However, the Head Referee's decision is final (also see Rule <T04>).

Section 8

THE ROBOT

Table of Contents

8 THE ROBOT

8.1 OVERVIEW

This section of the 2008 *FIRST* Robotics Competition Manual provides rules applicable to the design and construction of the 2008 ROBOT. ROBOTS will be inspected at each *FIRST* Robotics Competition event to verify rules compliance before being allowed to compete.

COMPLIANCE WITH ALL RULES IS MANDATORY

8.1.1 What is a *FIRST* Robot?

A *FIRST* robot is a remotely operated vehicle designed and built by a *FIRST* Robotic Competition team to perform specific tasks when competing in the 2008 competition "*FIRST* Overdrive."

8.1.2 Getting Started

Please be sure to thoroughly read and understand Sections 4, 6, 7, 8, and 9 of this manual before designing your ROBOT. In particular, pay attention to ***Section 8.3.1. General Design & Safety Rules*** and ***Section 8.3 Robot Rules*** before proceeding. The following are just a few important points offered to help teams in getting started:

1. Evaluate the Game's physical challenges and identify those that the robot will have to overcome.

- Will it have to climb, pick and place items, push / pull objects or robots, possess a low profile, extend its height, lift items, hang, etc.?
- What are the game's implications regarding the ROBOT'S center of gravity?
- Are unique field surface characteristics important when determining robot driving mechanism design?
- Are there any particular offensive / defensive capabilities important to the ROBOT?

2. Inspect all items provided in the 2008 Kit Of Parts (KOP CJEC) and review their basic features. Note that suppliers' data sheets are referenced in the Kit Of Parts tables for many of the components in the kit.

3. We recommend that you carefully read the documents listed in ***Section 8.1.3 Related Documents & Resources.***

4. Look over the specifications and technical notes provided for the various Kit Of Parts components.

5. Note all safety rules relating to the robot's design. They include:

- The locations and ratings of circuit breakers where indicated in the wiring diagrams
- Wire size
- Stored energy guidelines
- Attention to sharp corners and edges
- Shields for moving parts and pinch points

8.1.3 Related Documents & Resources

In addition to this chapter, other sections in this manual and other documents should be reviewed before proceeding with the robot design process. Note, unless otherwise specified, that all referenced documents are available online at www.usfirst.org/frc/2008/manual

- ***Section 6: The Arena***, ***Section 7: The Game*** and ***Section 9: The Tournament***
- ***Section 4.9.4: Crate Shipping Deadlines*** as listed in ***Section 4: Robot Transportation***
- ***FIRST Guidelines, Tips, and Good Practices***
- Innovation First, Inc. instruction manuals for the *Robot Controller, Spike relay modules*, and *Victor 884 speed controllers* as provided by their manufacturer: www.ifirobotics.com/frc-robot-control-system-overview.shtml
- *FIRST* 2008 Chassis Kit Manual – Information to assemble chassis kit available at: www.ifirobotics.com/kitbot.shtml
- *FIRST* 2008 Pneumatics Manual - Valuable information about the pneumatic components and ordering processes are included.
- *FIRST* 2008 Sensors Manual – Helpful information regarding the application, assembly, and programming of the sensors included in the 2008 Kit Of Parts.
- User Guide - *FIRST* IR Learning Infrared Remote Control Decoder Board
- 2008 Robot Power Distribution Diagram
- *FIRST* Official Robot Inspection Sheet - it is strongly recommended that this be used as a guide to pre-inspect your ROBOT before it ships.

8.1.4 Conventions

Specific methods are used throughout this section to highlight warnings, cautions, key words or phrases to alert the reader to important information designed to help teams in constructing a robot complying with the rules in a safe and workmanlike manner.

Warnings, cautions, and notes appear in bordered boxes. Key words that have a particular meaning within the context of the 2008 *FIRST* Robotics Competition are defined in Sections 6, 7.2 and 8.2, and indicated in ALL CAPITAL letters throughout this text. References to other sections of the manual appear in ***bold italics***. References to specific rules within the manual are indicated with a bracketed reference to the rule (e.g. “Rule <S01>”). Operating keys, controls, buttons appear in bold capital letters (i.e. **OFF/ON** switch or **RESET** button).

8.2 DEFINITIONS

COMPONENT – A ROBOT part in its most basic configuration, which can not be disassembled without damaging or destroying the part, or altering its fundamental function.

- Example 1: raw aluminum stock, pieces of steel, wood, etc., cut to the final dimensions in which they will be used on the ROBOT, would all be considered components. Bolting pieces of extruded aluminum together as a ROBOT frame would constitute a MECHANISM, and the collection of pieces would not be considered a COMPONENT.
- Example 2: a COTS (See immediately below) circuit board is used to interface to a sensor on the ROBOT, and it includes the circuit board and several electrical elements soldered to the board. The board is considered a COMPONENT, as this is the basic form in which it was purchased from the vendor, and removing any of the electrical elements would destroy the functionality of the board.

COTS – A “Commercial, Off-The-Shelf” COMPONENT or MECHANISM, in it’s unaltered, unmodified state. A COTS item must be a standard (i.e. not custom order) part commonly available from the VENDOR, available from a non-team source, and available to all teams for purchase.

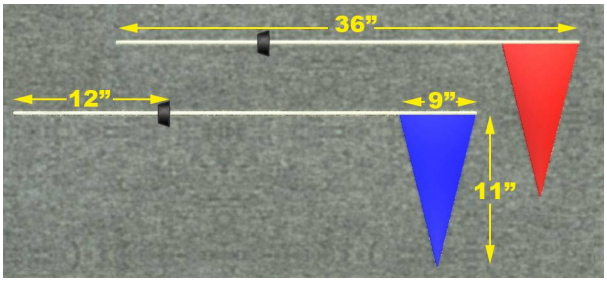
- Example 1: a team orders two robot grippers from RoboHands Corp. and receives both items. They put one in their store room and plan to use it later. Into the other, they drill “lightening holes” to reduce weight. The first gripper is still classified as a COTS item, but the second gripper is now a “custom part” as it has been modified.
- Example 2: a team obtains openly available blueprints of a drive component commonly available from Wheels-R-Us Inc. and has local machine shop “We-Make-It, Inc.” manufacture a copy of the part for them. The produced part is NOT a COTS item, because it is not commonly carried as part of the standard stock of We-Make-It, Inc.
- Example 3: a team obtains openly available design drawings from a professional publication during the pre-season, and uses them to fabricate a gearbox for their ROBOT during the build period following kick-off. The design drawings would be considered a COTS item, and may be used as “raw material” to fabricate the gearbox. The finished gearbox itself would be a FABRICATED ITEM, and not a COTS item.

FABRICATED ITEM – Any COMPONENT or MECHANISM that has been altered, built, cast, constructed, concocted, created, cut, heat treated, machined, manufactured, modified, painted, produced, surface coated, or conjured into the final form in which it will be used on the ROBOT.

- Example 1:A piece of extruded aluminum has been ordered by the team, and arrives in a 20-foot length. To make it fit in their storage room, the team cuts it into two ten-foot lengths. These would not be considered FABRICATED ITEMS, as they have not been cut to the final length in which they will be used on the ROBOT.
- Example 2: A team designs an arm mechanism that uses gears with a 1/2-inch face width. They order a 12-inch length of gear stock and cut it into precise 1/2 inch slices. They do not bore out the mounting bores in the center of the gears. The slices are now considered FABRICATED ITEMS, as they have been cut to final size, even though all the machining operations (the center bore) may not yet be completed.

FIX-IT-WINDOWS – Designated work periods following the deadline for shipping the ROBOT, or following the close of a regional competition, in which ALL teams may manufacture parts in preparation for future competitions. During the FIX-IT WINDOWS, software for either the ROBOT or Operator Interface may be developed without restriction. Part or all of the team may participate in the work conducted during this period.

FLAG – A colored (red or blue) bicycle flag used to display ALLIANCE assignments during a MATCH. The flag itself is made of a triangular piece of colored plastic or fabric, measuring approximately 9 inches tall by 11 inches long. The flag is mounted at the end of a 1/4 inch diameter fiberglass flagpole, approximately 36 inches long. The flagpole will run through a rubber stopper, which will be sized to fit in the top of the flag holder (as specified in Rule <R17>). The purpose of the stopper is to help prevent the FLAG from becoming dislodged from the flag holder during the MATCH.



LAP INDICATOR – A FIRST-provided device that is used to automatically record each time the ROBOT CROSSES the FINISH LINE. The LAP INDICATOR is provided to teams at each official competition event. The LAP INDICATOR is attached to the flag pole and must be mounted on the ROBOT as specified in Rule <R18>.

MECHANISM – A COTS or custom assembly of COMPONENTS that provide specific functionality on the ROBOT. A MECHANISM can be disassembled (and then reassembled) into individual COMPONENTS without damage to the parts.

OPERATOR CONSOLE – the Innovation First-provided Operator Interface unit and any associated equipment, control interfaces, display systems, structure, decorations, etc. used by the DRIVERS to operate the ROBOT.

PLAYING CONFIGURATION - The physical configuration and orientation of the ROBOT while playing the game (i.e. after the MATCH has started, and the ROBOT has deployed mechanisms, moved away from the starting location, and/or interacted with the field, GAME PIECES, or other ROBOTS). This configuration is dynamic, and may change multiple times during the course of a single MATCH.

REPLACEMENT PARTS – A COMPONENT or MECHANISM constructed as a functional duplicate of an existing part of the ROBOT, for the purpose of replacing a broken or defective part. REPLACEMENT PARTS may be either COTS items or FABRICATED ITEMS. They must be functionally identical to the original part but can be modified to provide more robust performance of the function.

- Example 1: A lever arm made of lexan on your ROBOT breaks. You manufacture a REPLACEMENT PART made of aluminum plate, using the design drawings of the original. As the new part provides the same function as the broken part, the new part is a valid REPLACEMENT PART.
- Example 2: A sensor on the ROBOT is connected to the control system with 24guage single-strand wire, and runs across a hinged joint. The flexing of the wire causes it to break, and you want to replace it with 18-guage multi-strand wire. If the new wire follows the same path as the original and connects only the same devices, then it is a valid REPLACEMENT PART (i.e. it has added robustness without changing function). But if the wire is then used to connect an additional sensor to the same circuit, it is providing a functionally different capability, and is no longer a “replacement.”

SPARE PARTS – A COMPONENT or MECHANISM constructed as an identical duplicate of an existing part of the ROBOT, for the purpose of replacing a broken or defective part. SPARE PARTS may be either COTS items or FABRICATED ITEMS, but they must be physically and functionally identical to the original part.

STARTING CONFIGURATION – The physical configuration and orientation of the ROBOT when the MATCH is started. This is the state of the ROBOT immediately before being enabled by the Arena Controller, before the ROBOT takes any actions, deploys any mechanisms, or moves away from the starting location. This configuration is static, and does not change during a single MATCH (although it may change from MATCH to MATCH).

STANDARD BUMPERS – Bumper assemblies designed to attach to the exterior of the ROBOT within the BUMPER ZONE, and constructed as specified in Rule <R08>. STANDARD BUMPERS may weigh up to 15 pounds, and are excluded from the weight and volume calculations specified in Rule <R11>.

UPGRADE PARTS - A COMPONENT or MECHANISM intended to provide additional functionality not currently available on the ROBOT. UPGRADE PARTS may be COTS items or custom FABRICATED ITEMS, and may either add to or replace existing functionality.

- Example 1: A ROBOT is designed with a four-wheel drive system. The system works well on flat floors, but high-centers when trying to drive up steps. The team adds two more wheels on the centerline of the ROBOT to prevent this problem, and the wheels are identical to those

already on the ROBOT. The new wheels would be considered UPGRADE PARTS even though they are the same as the ones already in place, as they alter the functionality of the ROBOT and provide new capability.

VENDOR – A legitimate business source for COTS items that, as a minimum, satisfies the following criteria:

- The VENDOR must have a Federal Tax Identification number. The Federal Tax Identification number establishes the VENDOR as a legal business entity with the IRS, and validates their status as a legitimate business. In cases where the VENDOR is outside of the United States, they must possess an equivalent form of registration or license with the government of their home nation that establishes and validates their status as a legitimate business licensed to operate within that country.
- The VENDOR shall not be a "wholly owned subsidiary" of a team or collection of teams. While there may be some individuals affiliated with both a team and the VENDOR, the business and activities of the team and VENDOR must be completely separable.
- The VENDOR must be normally able to ship any general (i.e., non-*FIRST* unique) product within five business days of receiving a valid purchase request. It is recognized that certain unusual circumstances (such as 1,000 *FIRST* teams all ordering the same part at once from the same VENDOR) may cause atypical delays in shipping due to backorders for even the largest VENDORS. Such delays due to higher-than-normal order rates are excused.
    - Note that the intent here is to protect the teams against long delays in availability of parts that will impact their ability to complete their ROBOT. The *FIRST* Robotics Competition build season is only six weeks long, so the VENDOR must be able to get their product, particularly *FIRST* unique items, to a team in a timely manner.
- The business should maintain sufficient stock or production capability to fill teams orders within a reasonable period during the build season (less than 1 week). Note that this criterion may not apply to custom-built items from a source that is both a VENDOR and a fabricator. For example, a VENDOR may sell flexible belting that the team wishes to procure to use as treads on their drive system. The VENDOR cuts the belting to a custom length from standard shelf stock that is typically available, welds it into a loop to make a tread, and ships it to a team. The fabrication of the tread takes the VENDOR two weeks. This would be considered a FABRICATED ITEM, and the two weeks ship time is acceptable. Alternately, the team may decide to fabricate the treads themselves. To satisfy this criterion, the VENDOR would just have to ship a length of belting from shelf stock (i.e. a COTS item) to the team within five business days and leave the welding of the cuts to the team.
- The VENDOR makes their products available to all *FIRST* Robotics Competition teams.
- VENDORS must not limit supply or make a product available to just a limited number of *FIRST* Robotics Competition teams.
- Ideally, chosen VENDORS should have national distributors.
    - Example distributors include Home Depot, Lowes, MSC, Radio Shack, and McMaster-Carr. *FIRST* competition events are not usually near home. When parts fail, local access to replacements is often critical.

FIRST desires to permit teams to have the broadest choice of legitimate sources possible, and to obtain COTS items from the sources that provide them with the best prices and level of service available. The intent of this definition it to be as inclusive as possible to permit access to all legitimate sources, while preventing *ad hoc* organizations from providing special-purpose products to a limited subset of teams in an attempt to circumvent the cost accounting rules.

8.3 ROBOT RULES

These rules establish the global ROBOT construction and performance constraints dictated by the characteristics of the provided Kit Of Parts, along with the size and weight design limits. **Compliance with the rules is mandatory! Any ROBOT construction not in compliance with the rules (determined at inspection) must be rectified before a ROBOT will be allowed to compete.**

When constructing the ROBOT, the team is allowed to use the items supplied in the one 2008 Kit Of Parts provided to each registered *FIRST* Robotics Competition team, and additional materials. Many of the rules listed below explicitly address what parts and materials may be used, and how those items may be used. There are many reasons for the structure of the rules, including safety, reliability, fairness, creation of a reasonable design challenge, adherence to professional standards, impact on the competition, compatibility with the Kit Of Parts, etc. When reading these Rules, please use technical common sense (engineering thinking) rather than "lawyering" the interpretation and splitting hairs over the precise wording in an attempt to find loopholes. Try to understand the reasoning behind a rule.

Part of the purpose of the *FIRST* Robotics Competition is to provide team members with the experience of conceptualizing, designing and constructing their own solution to the challenge posed by the game. This must be a consideration when obtaining MECHANISMS and COTS items as additional parts to use on the ROBOT.

This intent is clearly met when a team obtains a MECHANISM or COTS items that was designed for non-FIRST purposes, and then modifies or alters it to provide functionality for the ROBOT. For example, if a team obtains a gearbox from a power drill and modifies it to use on the ROBOT, they gain insight into the design of the original gearbox purpose, learn to characterize the performance of the original design, and implement the engineering design process to create their customized application for the gearbox.

However, COTS items that have been specifically designed as a solution to portion of the *FIRST* Robotics Competition challenge may or may not fit within the FRC intent, and must be carefully considered. If the item provides general functionality that can be utilized in any of several possible configurations or applications, then it is acceptable (as the teams will still have to design their particular application of the item). However, COTS items that provide a complete solution for a major ROBOT function (e.g. a complete manipulator assembly, pre-built pneumatics circuit, or full mobility system) that require no effort other than just bolting it on to the ROBOT are against the intent of the competition, and will not be permitted.

In addition, another intent of these rules is to have all energy sources and active actuation systems on the ROBOT (e.g. batteries, compressors, motors, servos, cylinders, and their controllers) drawn from a well-defined set of options. This is to ensure that all teams have access to the same actuation resources, and to ensure that the inspectors are able to accurately assess the legality of a given part.

8.3.1 Safety & Damage Prevention

<R01> Energy used by *FIRST* Robotics Competition ROBOTS, (i.e., stored at the start of a MATCH), shall come only from the following sources:

- Electrical energy derived from the onboard 12V and 7.2V batteries
- Compressed air stored in the pneumatic system, stored at a maximum pressure of 120 PSI in no more than four Clippard Instruments tanks. Extraneous lengths of pneumatic tubing shall not be used to increase the storage capacity of the air storage system.
- A change in the altitude of the ROBOT center of gravity.
- Storage achieved by deformation of ROBOT parts. Teams must be very careful when incorporating springs or other items to store energy on their ROBOT by means of part or material deformation. A ROBOT may be rejected at inspection if, in the judgment of the inspector, such items are unsafe.

<R02> ROBOT parts shall not be made from hazardous materials, be unsafe, or cause an unsafe condition. Items specifically PROHIBITED from use on the ROBOT include:

- Shields, curtains, or any other devices or materials designed or used to obstruct or limit the vision of any DRIVERS and/or COACHES and/or interfere their ability to safely control their ROBOT
- Speakers, sirens, air horns, or other audio devices that generate sound at a level sufficient to be a distraction or hindrance affecting the outcome of a MATCH
- Any devices or decorations specifically intended to jam or interfere with the remote sensing capabilities (including vision systems, acoustic range finders, sonars, infra-red proximity detectors, etc.) of another robot (i.e. changing ROBOT color to confuse opponent's vision system)
- Lasers of any type
- Flammable gasses
- Materials that off-gas noxious or toxic gasses
- Materials that produce hazardous inhalable particles
- Caustic chemicals
- Hydraulic fluids or hydraulic components

Teams should provide MSD Sheets for any materials they use that might be considered questionable during ROBOT inspection.

<R03> Custom circuits and electronics are expressly PROHIBITED if they:

- Interfere with the operation of other ROBOTS.
- Directly affect any output devices on the ROBOT, such as by providing power directly to a motor, supplying a PWM signal to a speed controller or supplying a control signal to a relay module.

<R04> Protrusions from the ROBOT shall not pose hazards to GAME PIECES, team members or event staff. If, in the judgment of the inspectors or referees, a device on the ROBOT poses a hazard (particularly puncture or impalement hazards), the team will be required to remedy the situation before the ROBOT will be allowed to play. If the ROBOT includes protrusions that form the "leading edge" of the ROBOT as it drives, and are less than one square inch in surface area, it will invite detailed inspection. For example, forklifts, lifting arms, grapplers. etc. may be carefully inspected for these hazards

Note that robot inspectors will be looking for sharp corners and edges that could cause injury, pinch points, entanglement hazards, and impaling projections. Please mitigate all such hazards. This is for the protection of team members as well as game equipment.

<R05> Exterior or exposed surfaces on the ROBOT shall not present undue hazards to the team members, event staff or GAME PIECES. Reasonable efforts must be taken to remove, mitigate, or shield any sharp edges, pinch points, entanglement hazards, projectiles, extreme visual/audio emitters, etc. from the exterior of the ROBOT. All points and corners that would be commonly expected to contact a TRACKBALL should have a minimum radius of 0.125 inches to avoid becoming a snag/puncture hazard. All edges that would be commonly expected to contact a TRACKBALL should have a minimum radius of 0.030 inches. All of these potential hazards will be carefully inspected.

<R06> ROBOT wheels, tracks, and other parts intended to provide traction on the playing field may be purchased or fabricated ("traction devices" include all parts of the ROBOT that are designed to transmit any propulsive and/or braking forces between the ROBOT and the playing field). In no case will traction devices that damage the carpet or other playing surfaces be permitted. Traction devices shall not have surface features such as metal, sandpaper, hard plastic studs, cleats, or other attachments. Anchors (i.e. devices that are deployed/used to keep one's ROBOT in one place and prevent if from being moved by another ROBOT) shall not use metal in contact with the carpet or other playing surfaces to "stay put." Gaining traction by using adhesives or Velcro-like fastener material is not allowed.

<R07> MECHANISMS or COMPONENTS on the ROBOT shall not pose obvious risk of entanglement. If, in the judgment of the inspectors, a device on the ROBOT poses an entanglement risk then the team will be required to remedy the situation before the ROBOT will be allowed to play. If the structure of a COMPONENT permits easy penetration by an object less than four square inches in cross section, it will invite detailed inspection. Willful entanglement actions are addressed in Rule <G37>.

- Note: nets, loose rope or wire, voluminous sheets of fabric, etc. may be carefully inspected for these hazards. A 1/8" x 1/8" tight-mesh net (or very loose mesh fabric, depending on your point of view) may be a reasonable material that would not automatically pose an entanglement hazard. However, any flexible material has the potential to become an entanglement hazard if it is not firmly attached to an appropriate structure or left in a loose, voluminous configuration. Therefore, you must use your best judgment to determine if your particular use of the material will pose an entanglement hazard. However, actual performance on the playing field will determine is the potential for entanglement is significant or not.

<R08> Teams are required to use STANDARD BUMPERS on their ROBOTS. Bumpers can reduce damage to ROBOTS when they contact another ROBOT or field elements. STANDARD BUMPERS have several advantages, such as being excluded from the calculation of the ROBOT weight and volume limitations specified in Rule <R11>. STANDARD BUMPERS must be constructed as described below.

- STANDARD BUMPERS must be designed as shown in figures 8-1 and 8-2. This is the only acceptable design for STANDARD BUMPERS.
- STANDARD BUMPERS must be removable so that they can be weighed separately from the ROBOT.
- STANDARD BUMPERS must be attached to the ROBOT with a bolt-and-fastener system to form a rigid, robust connection to the ROBOT structure (i.e. not attached with Velcro!).

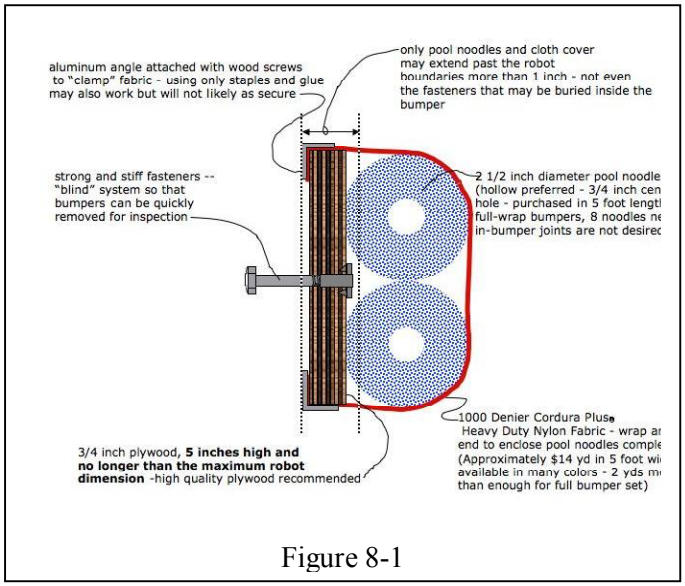


Figure 8-1

- STANDARD BUMPERS must weigh, in total, no more than 15 pounds including any fasteners that attach them to the ROBOT.
- STANDARD BUMPERS may be segmented. However, each STANDARD BUMPER segment must be a minimum of 6 inches in length and must not include sections that weigh more than 3 ounces per inch (i.e. no short bumpers with giant heavy fasteners).
- STANDARD BUMPERS must protect a minimum of 2/3 of the perimeter of the ROBOT within the BUMPER ZONE. Teams are encouraged to maximize the area of their ROBOT protected by bumpers. But up to 1/3 of the perimeter may be unprotected to provide flexibility in design options.
- STANDARD BUMPERS must use a stacked pair of 2-1/2 inch "pool noodles" as the bumper material.
- STANDARD BUMPERS must use 3/4 inch plywood backing 5 inches tall as the bumper structure to attach the bumper ("pool noodles") to the ROBOT.
- STANDARD BUMPERS must be covered with a tough smooth cloth (1000 denier Cordura Plus® strongly recommended).

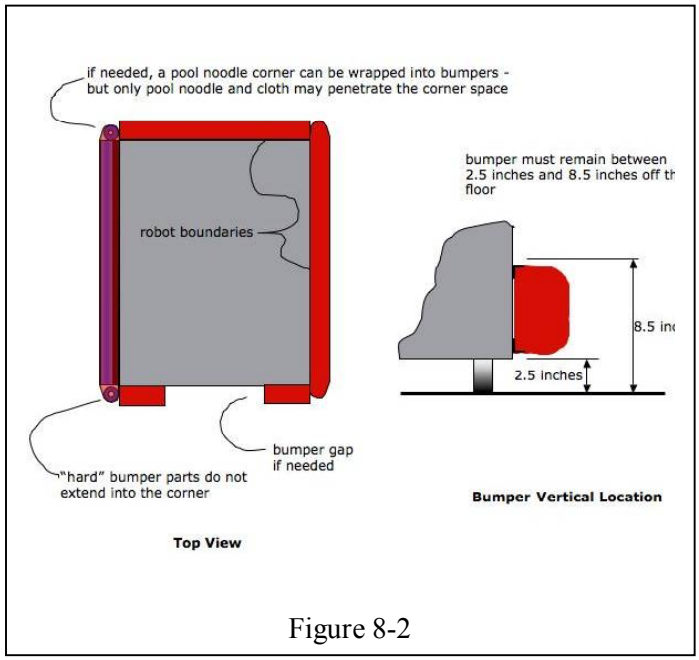


Figure 8-2

- In the STARTING CONFIGURATION, STANDARD BUMPERS may extend outside the horizontal dimensions for the ROBOT (as specified in Rule <R11>) by up to a maximum of 3-1/2 inches per side. Nothing other than pool noodles and cloth can extend more than 1 inch beyond the ROBOT boundaries.
- Hard bumper parts MUST NOT extend into the corners.
- STANDARD BUMPERS must remain within the BUMPER ZONE when the ROBOT is resting on the floor in PLAYING CONFIGURATION. They must not be articulated or moved outside of the BUMPER ZONE.
- For the purposes of the shipping deadlines, STANDARD BUMPERS are considered part of the ROBOT, and must be shipped in the crate with the ROBOT.

Bumper height has been specified so that ROBOTS will make contact bumper-to-bumper and so that the GAME PIECES will be pushed rather than pulled under the ROBOTS. As bumper mounts are being designed, please consider how the ROBOT will be carried (bumpers typically do not make good handles!). Also, note that the use of STANDARD BUMPERS may preclude the use of other technologies in their out-of-the-box configurations. Teams will need to carefully consider the interactions between bumper design options and other elements of their ROBOT design.

8.3.2 General Robot Design

<R09> Each registered *FIRST* Robotics Competition team can enter ONE (1) ROBOT into the 2008 *FIRST* Robotics Competition. That ROBOT shall fully comply with all rules specified in the 2008 *FIRST* Robotics Competition manual.

<R10> Robots entered into the 2008 *FIRST* Robotics Competition shall be fabricated and/or assembled from COMPONENTS, MECHANISMS and COTS items that are constructed from:

- Items provided in the *FIRST*-supplied Kit Of Parts (or their exact REPLACEMENT PART)
- Allowed additional parts and materials as defined in the rules, and in quantities consistent with the Budget Constraint rules (found in Section 8.3.3).

<R11> Prior to the beginning of the MATCH, the ROBOT shall be placed in a STARTING CONFIGURATION that fits within the dimensions listed below:

Maximum Width	Maximum Depth	Maximum Height	Maximum Weight
28 inches (71.12cm)	38 inches (96.52cm)	60 inches (152.40cm)	120 pounds (54.43Kg)

Any restraints (elastic bands, springs, etc.) that are used to restrain the ROBOT in its STARTING CONFIGURATION must remain attached to the ROBOT for the duration of the MATCH.

<R12> When determining weight, the basic ROBOT structure and all elements of all additional mechanisms that might be used in different configurations of the ROBOT shall be weighed together**.** Included in the weight limit are the robot control system, back-up 7.2V battery, decorations, and all other attached parts.

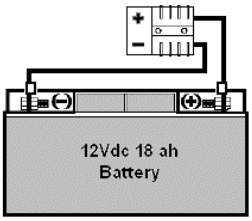
- Example: A team has decided to design their ROBOT such that, before any given MATCH, they may change the configuration of the ROBOT based on perceived strengths or weaknesses of an opponent. The team accomplished this by constructing a basic drive train platform plus two versions of a GAME PIECE manipulator, each manipulator being a quick attach / detach device such that either one or the other (but not both) may be part of the ROBOT at the beginning of a MATCH. Their ROBOT platform weighs 107 lb, version A of the manipulator weighs 6 lb, and version B weighs 8 lb. Although only one version will be on the ROBOT during a MATCH, both manipulators (and all components of the manipulators that would be used during the MATCH) must be on the scale along with the ROBOT platform during weigh in. This would result in a **rejection** of the ROBOT because its total weight comes to 121 lb.

<R13> For the purposes of determining compliance with the weight and volume limitations specified in Rule <R11>, these items are NOT considered part of the ROBOT and are NOT included in the weight and volume assessment of the ROBOT:

- The 12V battery and its associated half of the Anderson cable quick connect/disconnect pair (including no more than 12 inches of cable per leg, the associated cable lugs, connecting bolts, and insulating electrical tape) on board the ROBOT,
- Any STANDARD BUMPER assemblies included on the ROBOT that are in compliance with Rule <R08>, up to a maximum of 15 pounds,
- The FLAG is not considered part of the ROBOT (however, the flag holder specified in Rule <R17> IS considered part of the ROBOT, and is included in the ROBOT weight and volume),
- The OPERATOR CONSOLE.

NOTE

- Weight limit **excludes** the 12 volt battery and Anderson cable half.
- Weight and volume limits **exclude** any STANDARD BUMPERS constructed consistent with Rule <R08>.
- Weight and height limits **exclude** the FLAG



However, for all other purposes the items listed above are considered part of the ROBOT and must comply with all other applicable rules and requirements.

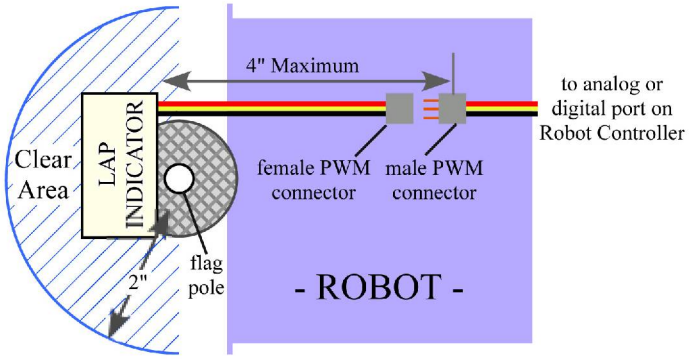
<R14> ROBOTS shall display their school name, and primary sponsor name and/or logo whenever the ROBOT is on the field (including practice sessions). The support provided by the corporate sponsors and mentors on your team is important, and is to be acknowledged with the appropriate display of their names/logos on the exterior of the ROBOT.

<R15> The judges, referees, and announcers must be able to easily identify ROBOTS by team number. Teams shall display their team number in four locations at approximately 90-degree intervals around the perimeter of the ROBOT. **The numerals must be at least 4 inches high, at least in 3/4 inch stroke width and in a contrasting color from its background**. Team Numbers must be clearly visible from a distance of not less than 100 feet.

<R16> Once the MATCH has started, the ROBOT may assume a PLAYING CONFIGURATION that exceeds the size dimensions specified in Rule <R11>. While in the PLAYING CONFIGURATION, the ROBOT may expand up to a maximum horizontal dimension of 80 inches (e.g. all parts of the ROBOT must fit within an imaginary 80-inch-diameter upright cylinder). There are no height limits for a ROBOT in its PLAYING CONFIGURATION at any time after the start of the MATCH.

<R17> ROBOTS must use one of the two FLAGS provided at the event queuing location to display their ALLIANCE color (red or blue). The FLAG shall be held in a flag holder mounted on the ROBOT. The only acceptable flag holder is a 12 inch long piece of 1/2" (nominal) Schedule 40 PVC tube. The tube must be a single, contiguous piece, capped with a commercial PVC pipe cap cemented at the bottom end. The tube must not have any "lightening holes" or other modifications other than mounting holes, paint, or other decorative surface finishes. The flag holder must be permanently mounted to the ROBOT such that when the ROBOT is in any PLAYING CONFIGURATION and the FLAG is in the flag holder, the FLAG is approximately vertical and the top of the FLAG is 75 inches above the floor. As the flag pole is approximately 36 inches long, that means the top of the flag holder must be 51 inches above the floor. The region above the flag holder must be kept open and clear of obstructions so that the FLAG can be placed in the holder and displayed during the MATCH and the LAP INDICATOR is visible to the Lap Detectors (see Rule <R18>). The intent of this rule is to insure that the FLAG is as high as possible so that it may be easily seen from any side during the entire MATCH play, while fitting under the OVERPASS as the ROBOT drives around the TRACK.

<R18> ROBOTS must use the LAP INDICATOR provided by the field personnel during all official tournament MATCHES. The LAP INDICATOR is attached to the stopper on the flag pole. When the FLAG is placed in the flag holder, the stopper will insert into the top of the holder. To accommodate the LAP INDICATOR, the area within a minimum 180—degree horizontal arc around the top of the flag holder must be kept clear of any obstructions within a 2-inch radius. This region must be kept uncovered and visible from above. To ensure that every FINISH LINE CROSSING is properly recorded, the LAP INDICATOR must be visible to the Lap Detectors when the ROBOT passes under the OVERPASS. The LAP INDICATOR is powered via a standard three-wire PWM cable. An easily accessible, powered, male PWM connector must be located within 4 inches of the LAP INDICATOR mounting location. The port may be either a direct connection to an analog or digital port on the Robot Controller, or a remote "pigtail" connection to the Robot Controller port.



<R19> "Wedge" ROBOTS are not be permitted. ROBOTS shall be designed so that interaction with opposing ROBOTS results in pushing rather than tipping or lifting. Neither offensive nor defensive wedges are allowed. All parts of a ROBOT between 0 and 8.5 inches from the ground (the top of the BUMPER ZONE) that are used to push against or interact with an opposing ROBOT must be within 10 degrees of vertical. Devices deployed outside the ROBOT footprint should be designed to avoid wedging. If a mechanism or an appendage (e.g. a harvester for retrieving GAME PIECES) becomes a wedge that interferes with other ROBOTS, penalties, disabling, or disqualification can occur depending on the severity of the infraction.

<R20> Any non-functional decorations included on the ROBOT must not affect the outcome of the MATCH, and must be in the spirit of "Gracious Professionalism."

8.3.3 Budget Constraints

<R21> The costs of all non-2008 Kit parts and materials used in the construction of a ROBOT (as defined in Section 8.1.1) shall be recorded (in US dollars) by the team, and a list of all such items and their costs presented at ROBOT inspection.

<R22> All costs are to be determined as explained in ***Section 8.3.3.1 – Cost Determination of Additional Parts***.

<R23> The total cost of all non-Kit Of Parts items shall not exceed $3,500.00 USD. No individual item shall have a value of over $400.00. The total cost of COMPONENTS purchased in bulk may exceed $400.00 USD as long as the cost of an individual COMPONENT does not exceed $400.00.

<R24> The costs of additional non-spare robot control system components obtained from Innovation First Inc. shall be included in the above $3,500.00 limit.

<R25> The following items are EXCLUDED from the total cost calculation:

- The cost of any non-functional decorations
- The cost of individual fasteners, adhesives, or lubricants, unless any one component exceeds $1.00
- The costs of SPARE PARTS. A SPARE PART used as a direct replacement for a failed or defective ROBOT part (either Kit Of Parts item or non-Kit Of Parts item) that has already been included in the cost accounting is covered by the accounting for the original part
- All costs for the construction of the OPERATOR CONSOLE

<R26> Individual COMPONENTS or MECHANISMS retrieved from previous ROBOTS and used on 2008 ROBOTS must have their undepreciated cost included in the 2008 robot cost accounting, and applied to the overall cost limits.

8.3.3.1 Cost Determination of Additional Parts

The "cost" of each non-Kit Of Parts item is calculated based on the following criteria, as applicable:

- The purchase price of a COTS item offered for sale by a VENDOR to any customer.
- The total cost (materials + labor) of an item you pay someone else to make.

- Example: A team orders a custom bracket fabricated by a VENDOR to the team's specification. The VENDOR'S material cost and normally charged labor rate apply.

- The fair market value of an item obtained at a discount or as a donation. Fair market value is that price at which the supplier would normally offer the item to other customers. Also considered to be "fair market value" are the discounted prices offered to all teams by suppliers with established relations with *FIRST*.
  - Example: Special price discounts from MSC Industrial Supply Co. and Terminal Supply Co. are being offered to all *FIRST* teams. The discounted purchase price of items from these sources would be used in the additional parts accounting calculations.
- The cost of raw material obtained by a team + the cost of non-team labor expended to have the material processed further. Labor provided by team members and/or by a recognized team sponsor whose employees are members of the team does not have to be included. Note: it is in the best interests of the teams and *FIRST* to form relationships with as many organizations as possible. Teams are encouraged to be expansive in recruiting and including organizations in their team, as that exposes more people and organizations to *FIRST*. Recognizing supporting companies as sponsors of, and members in, the team is encouraged - even if the involvement of the sponsor is solely through the donation of fabrication labor.
  - Example: A team purchases steel bar stock for $10.00 and has it machined by a local machine shop. The machine shop is not considered a team sponsor, but donates two hours of expended labor anyway. The team must include the estimated normal cost of the labor as if it were paid to the machine shop, and add it to the $10.00.
  - Example: A team purchases steel bar stock for $10.00 and has it machined by a local machine shop that is a recognized sponsor of the team. The machinists are considered members of the team, so their labor costs do not apply. The total applicable cost for the part would be $10.00.
- The cost of items purchased in bulk or large quantities may be prorated on the basis of the smallest commonly available unit that satisfies the need for the item.
  - Example: A team purchases a 4' x 4' sheet of aluminum, but only uses a piece 10" x 10" on their ROBOT. The team identifies a source that sells aluminum sheet in 1' x1' pieces. The team may cost their part on the basis of a 1' x 1' piece, even though they cut the piece from a larger bulk purchase. They do not have to account for the entire 4' x 4' bulk purchase item.
- Shipping costs of Non-Kit items are not counted.
- COMPONENTS or MECHANISMS that teams purchase to replace Kit Of Parts items that were not received from *FIRST* are not subject to the cost limitation (i.e., should not be charged against the $3,500.00 robot limit).
- If the item is part of a modular system that can be assembled in several possible configurations or applications, then each individual module must fit within the price constraints defined in Rule <R23>. If the modules are designed to assemble into a single configuration, and the assembly is functional in only that configuration, then the total cost of the complete assembly including all modules must fit within the price constraints defined in Rule <R23>.

8.3.4 Fabrication Schedule

FIRST recognizes that it is the responsibility of each team to design and construct their ROBOT within the schedule constraints defined below. As compliance with these rules takes place outside of the competition venues, *FIRST* is not able to directly monitor compliance. One of the fundamental values of *FIRST* is the concept of "gracious professionalism." We are relying upon the honor, integrity, and professional behavior of each team to recognize and abide by the fabrication schedule rules.

Note that the schedule rules apply to both hardware and software development. Hardware and software design processes are thought-intensive activities, and team members are likely to continue to consider and analyze their designs long after the ROBOT is shipped. Teams can not be prevented from thinking about their hardware and software designs, and it is not our intention to do so. However, the timeline permitted for the development of the actual competition version of the ROBOT is severely, and intentionally, restricted. Pondering software issues to be resolved, researching general case solutions, discussing solutions with teammates, collecting raw materials, sketching mechanisms, preparing tools, and outlining high-level descriptions of software algorithms are all reasonable activities outside of the scheduled build periods. But completing detailed dimensioned drawings of parts, and any actual fabrication of any hardware items intended to go on the actual competition ROBOT is prohibited outside of the approved fabrication periods. On the software side, developing detailed pseudo-code, writing actual lines of code, verification of syntax, final debugging, etc would all be considered development of the final software implementation, and must be completed during the approved fabrication periods.

<R27> Prior to the Kick-off: Before the formal start of the Robot Build Season, teams are encouraged to think as much as they please about their ROBOTS. They may develop prototypes, create proof-of-concept models, and conduct design exercises. Teams may gather all the raw stock materials and COTS COMPONENTS they want. But absolutely no fabrication or assembly of any elements intended for the final ROBOT is permitted prior to the Kick-off presentation

<R28> During the Build Season: During the period between the Kick-off and ROBOT shipment deadline, teams are to design and fabricate all the COMPONENTS and MECHANISMS required to complete their ROBOT. They are encouraged to use all the materials, sources and resources available to them that are in compliance with the rules of the 2008 *FIRST* Robotics Competition. When the ROBOT shipment deadline arrives, all work on the ROBOT must cease and the ROBOT must be placed in a "hands-off" condition. The entire ROBOT (including all FABRICATED ITEMS intended for use during the competition in alternative configurations of the ROBOT) and OPERATOR CONSOLE must be crated and out of team hands by the shipment deadline specified in Section 4.5.1.1.

<R29> During the "FIX-IT WINDOWS" following the shipment of the ROBOT: During this period, all teams may utilize up to 10 hours of FIX-IT-WINDOWS to manufacture SPARE and REPLACEMENT PARTS and develop software for their ROBOT at their home facility. Fabrication of UPGRADE PARTS is not permitted during this period. The timing of these "FIX-IT WINDOWS" is at the discretion of the team. However, the total time utilized as FIX-IT WINDOWS during this period must not exceed 10 hours, and all work must be completed by 5:00pm on the Saturday following the ROBOT shipment deadline. Teams may manufacture all the SPARE and REPLACEMENT parts they want, but the amount of parts they can bring to a competition event is limited (as specified in Rule <R41>).

The intent of the FIX-IT WINDOWS is to permit teams to prepare parts that have, or are likely to, become damaged during the course of a competition event, so they may continue to participate. Teams do not have direct access to their ROBOT during these periods, and must rely on information they generated and documented during the design and build process to determine the fit and function of any parts developed during FIX-IT WINDOWS. This is true for both hardware and software.

<R30> Prior to the competitions: After the close of the "FIX-IT WINDOWS" and prior to the competition, the team must put down their tools, cease fabrication of ROBOT parts, and cease all development of ROBOT software. Take this opportunity to rest, recover from the build season, and relax. Teams may scout other teams, gather and exchange information, develop game-playing strategies, collect raw materials, prepare tool kits, plan how to make repairs, etc. in preparation for the upcoming competitions. But no construction or fabrication of any hardware, or development of any software, is allowed.

<R31> At the competitions: Teams are allowed to repair, modify or upgrade their competition ROBOT while participating in a competition event. To support this, teams may bring SPARE, REPLACEMENT and UPGRADE PARTS and COTS items to the competitions (within the limits specified in Rules <R40> and <R41>). Work can only be done on-site in the Pits or at any facility made available to all teams at the event (e.g., in a team's repair trailer or a local team's shop offered to all teams to use). Fabrication may be done when the Pit area is open for normal operations during the period starting with the opening of the Pit area on Thursday and ending at 4:00PM on Saturday. All work must be completed when the Pit area closes each evening. Parts shall not be removed from the competition site and retained overnight after the Pit area closes**.**

<R32> During the "FIX-IT WINDOW" following each Regional Competition weekend: During this period, all teams (not just those teams attending a Regional Competition) may utilize up to 10 hours of FIX-IT-WINDOWS to manufacture SPARE, REPLACEMENT and UPGRADE PARTS and develop software for their ROBOT at their home facility (not at the competition site). The timing of these "FIX-IT WINDOWS" is at the discretion of the team. However, the total time utilized as FIX-IT WINDOWS during this period must not exceed 10 hours, and all work must be completed between the opening of the Competition (at 8:30 am on the Thursday of the Competition weekend) and 8:30 am on the Thursday following the Competition weekend. At the conclusion of a regional competition event, teams may take a limited amount of broken or malfunctioning COMPONENTS or MECHANISMS back to their home facility to make SPARE or REPLACEMENT PARTS. Teams may manufacture and/or repair all the parts they want, but the amount of parts they can bring to the competition event is limited (as specified in Rule <R41>).

The purpose of this rule is to allow teams to make critical repairs to existing parts to enable them to compete in following events. The intent of this rule is not to have teams take their entire ROBOT back home and make large-scale revisions or upgrades to the ROBOT.

8.3.5 Material Utilization

<R33> The use of non-Kit Of Parts items or materials shall not violate any other robot design or fabrication rule.

<R34> Teams may replace lost or damaged Kit Of Parts COMPONENTS only with identical COMPONENTS of the same material, dimensions, treatment, and/or part number.

<R35> COTS ITEMS that are generally available may be used on the ROBOT. The parts shall be generally available from suppliers such that any other *FIRST* team, if it so desires, may also obtain them at the same price. A specific device **fabricated by a team** from non-2008 Kit Of Parts materials for their use does not have to be available to others; however, the materials it is made from must be available to other teams.

<R36> COTS ITEMS from ROBOTS entered in previous FIRST competitions or COTS MECHANISMS that are no longer commercially available may be used under the following conditions:

- The item must be unmodified, and still in its original condition as delivered from the VENDOR
- The item must not be a part custom made for the *FIRST* competition and provided in the Kit Of Parts for a previous *FIRST* Robotics Competition (e.g. 2006 FRC transmissions, custom-made motor couplers, custom sensor strips, 2006 IFI CMUcam II modules, etc. are not permitted)
- The item must satisfy ALL of the rules associated with materials/parts use for the 2008 *FIRST* Robotics Competition)

<R37> FABRICATED ITEMS from ROBOTS entered in previous *FIRST* competitions shall not be used on ROBOTS in the 2008 competition.

<R38> Adhesive backed tapes shall not be used as a structural fastener, or to connect two or more parts together. Adhesive backed tapes may only be used as follows:

- Textured or coated tapes may be used to provide an alternate surface finish or treatment to a portion of the ROBOT.
- Velcro tape, any hook and loop tape or double-sided sticky foam may be used for attaching components to the ROBOT.
- Reflective tape may be used with optical sensors in small amounts.
- Adhesive backed tape and labels may be used for labeling purposes on wires, cables, pneumatic lines, etc.
- Electrical tape may be used as an electrical insulator.

<R39> Lubricants may be used only to reduce friction within the ROBOT. Lubricants shall not be allowed to contaminate the playing field or other ROBOTS.

<R40> Teams may acquire and bring an unlimited amount of COTS items to the competitions to be used to repair and/or upgrade their ROBOT at the competition site.

<R41> Teams may bring a maximum of 25 pounds of custom FABRICATED ITEMS (SPARE PARTS, REPLACEMENT PARTS, and/or UPGRADE PARTS) to each competition event to be used to repair and/or upgrade their ROBOT at the competition site. All other FABRICATED ITEMS to be used on the ROBOT during the competition shall arrive at the competition venue packed in the shipping crate with the ROBOT.

<R42> Teams participating in the 2008 *FIRST* Robotics Competition that are located outside North America may not be able to acquire the exact part (as identified by specific part numbers) or materials of the specified dimensions as defined in these rules. In such situations, international teams must submit a request for approval of nearest-equivalent parts (e.g. nearest metric equivalent, etc.) to *FIRST* Headquarters. *FIRST* will determine suitability of the part. If approved, a confirming e-mail will be sent to the team. The team must bring a copy of the e-mail to any competition event to verify that the use of an alternate part has been approved.

8.3.6 Power Distribution

<R43> The only legal main source of electrical energy on the ROBOT during the competition is the 12VDC non-spillable lead acid battery provided in the 2008 Kit Of Parts. That 12V battery is the MK Battery, ES17-12. Additional batteries may be purchased through a local MK Battery supplier. Teams may use other equivalent 12V batteries during development, testing and practice MATCHES. However, during the qualifier and elimination MATCHES, only the MK Battery, ES17-12 can be used **(this means NO pre-2007 batteries can be used during qualification and elimination MATCHES at any official 2008 *FIRST* competition)**.

<R44> Additional electrical system items specifically permitted on 2008 FRC ROBOTS include:

- Additional Innovation First, Inc. Victor 884 speed controllers
- Additional Innovation First, Inc. Spike relay modules
- One additional 4-slot Maxi-block circuit breaker panel may be utilized on their 2008 ROBOT in addition to, or in replacement of, the circuit breaker panels provided in the Kit Of Parts

<R45> Items specifically PROHIBITED from use on the ROBOT include:

- Primary 12v batteries different from those provided in the Kit Of Parts (i.e. manufacturer and part number must be the same as those provided in the Kit Of Parts)
- More than one primary battery, or more than one back-up battery
- Circuit breakers different from those provided in the Kit Of Parts. Note: the Snap Action brand circuit breakers provided have unique "trip" characteristics. No substitute brands are permitted.
- Fuse panels different from those provided in the Kit Of Parts
- Motor speed controllers other than Innovation First, Inc. Victor 884 speed controllers
- Relay modules other than Innovation First, Inc. Spike relays

<R46> Electrical devices shall be wired using commercially available copper wire for all electrical connections. Aluminum (or other non-copper material) wire is prohibited.

<R47> All main and branch circuits shall be wired with appropriately sized wire:

- ***12 AWG or larger*** diameter wire must be used for all circuits protected by a 40A circuit breaker.
- ***14 AWG or larger*** diameter wire must be used for all circuits protected by a 30A circuit breaker.
- ***18 AWG or larger*** diameter wire must be used for all circuits protected by a 20A circuit breaker.
- ***24 AWG*** *or larger* diameter wire must be used for providing power to pneumatic valves.

<R48> The ES17-12 shall only be charged between MATCHES by a 6-ampere rated automatic battery charger. When recharging the Kit Of Parts batteries, either the charger provided by *FIRST* or an automatic charger with an equivalent charging current rating may be used.

<R49> The 7.2v backup battery may be charged on or off the ROBOT. When off the ROBOT, the battery is to be charged with a 7.2V backup battery charger. When mounted on the ROBOT, the backup battery may be charged from the 12VDC primary battery by using the custom charging circuit available from Innovation First Inc. or any similar charging circuit (note: IFI will provide the design for this circuit on the IFI website, however teams must obtain the parts for this circuit and assemble it themselves). The use of this circuit is strongly encouraged.

<R50> The 12V battery, the main 120-amp circuit breaker, the power distribution block, and circuit breaker distribution panels shall be connected as shown in the ***2008 Power Distribution Diagram***. In particular:

- The battery must be connected to the ROBOT power system through the use of the Anderson Power Products (APP) connector.
- The APP connector must be attached to the battery with either the copper lugs provided in the FCI Burndy Bag or appropriate crimp-on lug connectors.
- The battery terminals and the connecting lugs must be insulated with shrink tubing and/or electrical tape.
- The main 120-amp circuit breaker must be directly connected to the hot (+) leg of the ROBOT-side APP connector. Only one 120 amp main circuit breaker is allowed. This breaker must not be bypassed.
- The power distribution block must be directly connected to the APP connector and main 120-amp circuit breaker. No other loads may be connected to the main 120-amp circuit breaker.
- All circuit breaker distribution panels must be connected directly to the power distribution block. No intermediate connections are permitted.
- Additional lengths of #6 red and #6 black wire may be used to reach the panels as needed to make the above connections.
- Circuit breakers must be accessible for inspection at each *FIRST* Robotics Competition event.

<R51> All wiring and electrical devices shall be electrically isolated from the ROBOT frame; the ROBOT frame must not be used to carry electrical current (this isolated ground arrangement is necessary due to polarity reversals that occur under certain operating conditions such as during motor direction reversals).

<R52> All 12v electric power used on the ROBOT shall be obtained from the load terminals of the circuit breaker distribution panels.

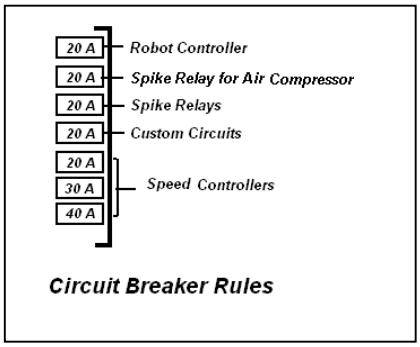
<R53> Custom circuits shall NOT directly alter the power pathways between the battery, fuse blocks, speed controllers, relays, motors, or other elements of the robot control system (including the power pathways to other sensors or circuits). Custom high impedance voltage monitoring or low impedance current monitoring circuitry connected to the ROBOT'S electrical system is acceptable, because the effect on the ROBOT outputs should be inconsequential.

<R54> All wires distributing power with a constant polarity (i.e., except for relay module, speed controller, or sensor outputs) shall be color-coded as follows:

- Use red, white, or brown wire for +12 Vdc and +5 Vdc connections.
- Use black or blue wire for common (-) connections.

<R55> All active circuit breaker / power distribution panel branch circuits shall be protected from overload with an appropriate value auto resetting Snap Action circuit breaker from the Kit Of Parts.

- The Robot Controller power feed must be protected with a 20A circuit breaker. No other electrical load can be connected to this breaker.
- If the compressor is used, the air compressor Spike relay power feed must be protected with a 20A fuse or 20A circuit breaker. No other electrical load can be connected to this breaker.
- Power feeds to custom circuits and additional electronics must be protected with a 20A circuit breaker. For custom circuits and sensors connected to the +5V power pin(s) on the RC, the RC's 20A circuit breaker provides the necessary protection.



Circuit Breaker Rules

- Each speed controller must be protected by one and only one 20A, 30A, or 40A circuit breakers.
- Each relay module must be protected with one and only one 20A circuit breaker.

In addition to the required branch power circuit breakers, smaller value fuses or breakers may be incorporated into custom circuits for additional protection.

<R56> Each power regulating device (Victor speed controller or Spike relay) shall control one and only one electrical load (motor, actuator or compressor). Multiple low-load devices (e.g. pneumatic valves) may be connected to relay modules (but only one motor may be connected to each relay module).

<R57> Decorations may draw power from the 12v electrical system as long as they are powered via a dedicated 20A circuit breaker and do not affect the operation of other control system components.

8.3.7 Motors & Actuators

<R58> Motors, pumps, and, Robot Controllers from previous robots shall not be used in addition to those provided in the 2008 Kit Of Parts. They may be used as direct one-to-one SPARE PARTS for those provided if the provided part fails or is damaged. They can only be used if they are identical to the part being replaced.

- Note that the Fisher-Price motor found in the 2008 Kit Of Parts (Part number 00968-9015) is different from the Fisher-Price motors used in most previous FIRST competitions. Only the Fisher-Price 00968-9015 motor may be used as a SPARE PART for the Fisher-Price motors provided in the 2008 Kit Of Parts.

<R59> Additional motors specifically permitted on 2008 FRC ROBOTS include:

- All motors, actuators, and servos provided in the 2008 Kit Of Parts,
- HITEC HS-322HD servos,
- FIRST Tech Challenge (FTC) servos (Innovation First part number 276-2162),
- FIRST Tech Challenge (FTC) motors (Innovation First part number 276-2163),

- One or two additional 2-1/2" CIM motors (part #FR801-001 and/or M4-R0062-12 in addition to those provided in the Kit Of Parts. This means that up to four, and no more, 2-1/2" CIM motors can be used on the ROBOT.

<R60> Items specifically PROHIBITED from use on the ROBOT include:

- Electric motors and/or servos different from, or in addition to, those in the Kit Of Parts, with the exception of those specifically permitted by Rule <R59>.
- Electric solenoid actuators (note: electric solenoid actuators are NOT the same as pneumatic solenoid valves – the latter are permitted, the former are not).

<R61> So that the maximum power level of every ROBOT is the same, motors used on the ROBOT shall **not** be modified in any way, except as follows:

- The mounting brackets and/or output shaft/interface of the motors may be modified to facilitate the physical connection of the motor to the ROBOT and actuated part.
- The gearboxes for the Fisher-Price and Globe motors are not considered "integral" and may be separated from the motors.
- The electrical input leads on the motors may be trimmed to length as necessary.

The intent is to allow teams to modify mounting tabs and the like, not to gain a weight reduction by potentially compromising the structural integrity of any motor. The integral mechanical and electrical system of the motor is not to be modified. Note that *FIRST* will not provide replacements for modified parts.

<R62> All electrical loads (motors, actuators, compressors) must be controlled by relay or PWM output signals sent by the Robot Controller to an appropriate power regulating device

- Each CIM motor and Fisher-Price motors must be connected to one Victor speed controller. They must not be connected to relay modules.
- Servos must be directly connected to the PWM ports on the Robot Controller. They must not be connected to speed controllers or relay modules.
- FTC motors must be directly connected to the Robot Controller. They must not be connected to speed controllers or relay modules.
- If used, the compressor must be connected to one Spike relay module.
- Each other electrical load (motors or actuators) must be connected to one Victor speed controller or one Spike relay module.

8.3.8 Control, Command & Signals System

<R63> ROBOTS must be controlled via the wireless, programmable Innovation First 2008-Robot Control System provided in the 2008 Kit Of Parts.

<R64> The radio modems provided in the 2008 Kit Of Parts are the only permitted method for communicating to and from the ROBOT during the MATCH (except as noted below in Rule <R65> and Rule <R84>). Radio modems from previous *FIRST* competitions must not be used. The radio modem must be connected directly to the Robot Controller using one of the DB-9 cables provided in the 2008 Kit Of Parts. No other form of wireless communications shall be used to communicate to, from or within the ROBOT (e.g. no Bluetooth devices are permitted on the ROBOT).

<R65> SIGNALING DEVICES shall be designed to communicate signals from the ROBOCOACH to the ROBOT. SIGNALING DEVICES are excluded from Rule <R64>. SIGNALING DEVICES shall:

- use either passive (no emission of any electromagnetic radiation) or active (emits some restricted form of electromagnetic radiation) means of communication
- be hand held and completely supported by the ROBOCOACH when operated
- does not attach to anything or anyone other than the ROBOCOACH
- exclusively receives input from, and is operated by, the ROBOCOACH
- not receive any input or feedback directly from the ROBOT (the ROBOCOACH may receive feedback from the ROBOT and use it to control the SIGNALING DEVICE)
- be no larger than 3 feet tall by 3 feet wide by 1 foot deep (to fit within the confined volume of the ROBOCOACH STATION
- remain entirely within the ROBOCOACH STATION
- use a maximum of four different inputs from the ROBOCOACH (e.g. use four different buttons) during any single MATCH
- communicate no more than four messages, states or conditions to the ROBOT (please refer to Rule <R69> and Rule <G01> for additional information) during any single MATCH.

Active SIGNALING DEVICES shall:

- use visible light, infrared communications, or sound as the transmission method – no other form of electro-magnetic radiation is permitted
    a. All radio frequency communications (as defined by the United States Federal Communications Commission) are explicitly prohibited.
    b. All laser-based communications by any device classified by the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) as a laser are explicitly prohibited.
    c. All communications must satisfy Rule <S01>.
- not be used to interfere with any other ROBOT
- be able to switch between no more than four states or conditions (i.e. send no more than four messages)
- be operated through only a single input at any given time (e.g. may not be operated by depressing two buttons at one time)
- not use changes in the signal states to encode or transmit larger messages (e.g. Morse code)

<R66> ROBOTS shall use the diagnostic LED flasher provided in the Kit Of Parts. Field personnel will use the LED flasher during the MATCHES for diagnostic purposes. Up to (4) LEDs can be installed on one robot. The diagnostic LED flasher is supplied with a four–wire cable with a length of approximately 6 feet. The cables are hard-wired at the lights and plug into the "Team Color" header pins on the Robot Controller. The Black wire of the ribbon cable must be plugged into the header pin marked BLK on the RC. It must be mounted on the ROBOT such that it is easily visible while standing three feet in front of the ROBOT in the STARTING CONFIGURATION. The excess cabling needs to be secured into a harness and anchored to the chassis. There is no direct method of attachment on the module; the attachment method is at the discretion of the team (usually some industrial-grade adhesive backed Velcro is suitable for this purpose). Instructions for connecting the LED flasher are provided on the *FIRST* website at www.usfirst.org/frc/2008/manual. The Robot Controller directly powers and controls the LED flasher. The team has no direct control over the LED flasher and no programming is required.

<R67> The control system is provided to allow wireless control of the ROBOTS. The Operator Interface, Robot Controller, speed controllers, relay modules, radio modems, batteries, battery charger, AC adapter, and 9-pin cables shall not be tampered with, modified, or adjusted in any way (tampering includes drilling, cutting, machining, gluing, rewiring, etc.), with the following exceptions:

- Dip switches on the Operator Interface may be set as appropriate.
- User programmable code in the Robot Controller may be customized.
- Speed controllers may be calibrated as described in owner's manuals.
- The fuse on the Spike relay for the air compressor may be replaced with a 20 Amp Snap-Action circuit breaker.
- The alligator clips on the battery charger may be replaced with an Anderson PowerPole quick-disconnect fitting to improve the reliability of the connection to the battery when charging (this is a recommended modification.)

<R68> Additional electronic components for use on the ROBOT must be either COTS items, or assembled from COTS items. Additional electronic components include any object that intentionally conducts electricity, other than Innovation First Inc. relays and speed controllers, wires, connectors, solder, and fabricated printed circuit boards.

<R69> Reaction of the ROBOT to communications received from the SIGNALING DEVICE must meet all of the following criteria:

- For a single MATCH, the ROBOT shall be limited to react to a maximum of four distinct commands - either through hardware or software limitations, or a combination of the two.
- The ROBOT shall not dynamically change the recognized command set during a MATCH.
- The ROBOT may only seek out and react to permitted SIGNALING DEVICES belonging to the assigned ALLIANCE (as defined in Rule <R65>). Intentionally reacting to other SIGNALING DEVICES is prohibited.

<R70> ***24 AWG*** *or larger* diameter wire must be used for:

- connecting sensors, switches, potentiometers, accelerometers, and other detection devices
- connecting a vision system to Robot Controller inputs,
- extending the PWM cables,
- connecting small muffin fans,
- wiring LEDs

<R71> Ribbon cable smaller than 24 AWG may be used to connect signal lines to the 9-pin ports on the Robot Controller.

<R72> The Robot Controller must be positioned within the ROBOT so that its indicator lights can be seen during inspection and when standing three feet in front of the ROBOT while the ROBOT is in the STARTING CONFIGURATION at the beginning of a MATCH. This will greatly facilitate analysis in case of problems.

<R73> The 7.2V Robot Control backup battery shall be connected to the Robot Controller as described in the Robot Controller manual. The 7.2v "backup" battery is considered an integral part of the Robot Controller, and shall not be used for any other purpose. The 7.2v battery should be charged to at least 7.0v before entering a MATCH. As a replacement for the *FIRST*-supplied battery, any other commercially available 7.2V NiCad battery pack may be used.

<R74> A remote reset and remote programming switch may be wired to the Robot Controller RESET/PROG header. Any switch may be used. See the ***Robot Controller Reference Guide*** for wiring information.

<R75> Digital outputs of the Robot Controller may be connected directly to brake/coast headers on the speed controllers to permit programmable control of this speed controller function. The brake/coast header on the speed controller may NOT be connected to any other circuit or input.

<R76> 12Vdc power, relay module outputs, speed controller outputs, or PWM outputs must not be connected to the analog or digital I/O on the Robot Controller.

<R77> Every speed controller, relay module, servo and FTC motor shall be connected via PWM cable to the Robot Controller, and be controlled by signals provided by the Robot Controller. They shall not be controlled by signals from any other source.

<R78> Unaltered software modules developed by the team during prior competitions shall not be directly re-used. Just as designs for hardware COMPONENTS may be reused from one year to the next, software algorithms and designs may be reused. However, the specific lines of code must be customized for each ROBOT each year.

<R79> For the purposes of the *FIRST* Robotics Competition, generally available software modules obtained from open sources (e.g. professional publications, commonly used FRC community-accessible web resources, industry source code repositories, etc.) that are not specifically affiliated with individual FRC teams shall be considered COTS items, and may be used.

<R80> Teams are responsible for any software bugs introduced into the Robot Controller's control program when using a custom program, or for any unwanted or unanticipated ROBOT behavior when using additional electronics.

<R81> The use of additional electronics (beyond those provided in the Kit Of Parts) is permitted to allow teams to construct custom circuits for their ROBOTS. Custom circuits may be used to indirectly affect the robot outputs by providing enhanced sensor feedback to the Robot Controller to allow it to more effectively decide how to control the ROBOT.

<R82> Inputs to custom circuits can be connected to the following sources:

- Branch circuit breaker outputs
- Speed controller or relay module outputs
- PWM, relay or digital outputs on Robot Controller
- Switches, potentiometers, accelerometers, sensors, and other additional permitted electronics.

<R83> All outputs from sensors, custom circuits and additional electronics shall connect to other custom circuits or the Robot Controller. If connected to the Robot Controller, they must connect through the analog inputs, digital I/O, TTL Serial Port, or Program Port only. Custom circuits must not connect to the Robot Controller through any other ports. Custom circuit outputs shall not be connected to speed controllers, relay modules, pneumatic valves, servos, motors, or actuators.

<R84> A signal filter may be wired across motor leads or PWM leads. For the purposes of inspection and rules compliance, such filters will not be considered custom circuits, and will not be considered a violation of Rule <R53> or Rule <R83>. Acceptable signal filters are:

- A one microfarad (1 µF) non-polarized capacitor may be applied across the power leads of any motor on your ROBOT (as close to the actual motor leads as reasonably possible)
- A ten kilo-ohm (10 kΩ) or larger resistor may be used as a shunt resistor in-line with the PWM control signal feeding a servo

<R85> Any decorations that involve broadcasting a signal to/from the ROBOT, such as remote cameras, must be cleared with *FIRST* Engineering prior to the event and tested for communications interference at the venue. Such devices, if reviewed and approved, are excluded from Rule <R64>. Note that 900 MHz camera systems will not be approved, and are not permitted at any time.

8.3.9 Pneumatic System

<R86> To satisfy multiple constraints associated with safety, consistency, robot inspection, and constructive innovation, no pneumatic parts other than those explicitly permitted by the Pneumatic System Rules may be used on the ROBOT.

<R87> Additional pneumatic system items specifically permitted on 2008 FRC ROBOTS include:

- One or two additional Clippard air storage tanks (Clippard Part Number AVT-32-16), equivalent to those provided in the kit. This means that up to four, and no more, Clippard air storage tanks can be used on the ROBOT.
- Pneumatic pressure relief valves identical to those provided in the Kit Of Parts (Parker Part Number PV609-2).
- Prior year *FIRST* Kit Of Parts solenoid valves, and pneumatic tubing may be used in addition to those provided in the 2008 Kit Of Parts. Their costs must be accounted for as explained in ***Section 8.3.3 Budget Constraints.***
- Additional 0.160” inch inside diameter pneumatic tubing functionally equivalent to that provided in the Kit Of Parts, with the pressure rating clearly factory-printed on the exterior of the tubing (note: alternate tubing colors are acceptable).
- Pressure transducers may be used as long as they are rated to at least 125psi.
- For the purposes of the *FIRST* competition, a device that creates a vacuum is not considered to be a pneumatic device and is allowed. This includes, but is not limited to, venturi-type vacuum generators and off-the-shelf vacuum devices (as long as they are powered by provided or permitted motors).
- For the purposes of the *FIRST* competition, closed-loop pneumatic (gas) shocks are not considered pneumatic devices, and are permitted additions to the ROBOT.

<R88> There is no limit to the number of solenoid valves, pressure regulators, pressure gauges, and connecting fittings that may be used on the ROBOT. All such devices must be "off the shelf" pneumatic devices rated by their manufacturers for pressure of at least 125psi.

<R89> In addition to the pneumatic cylinders provided in the Kit Of Parts and the "free" pneumatic cylinders available for order through the Free Pneumatic Components Order Form, additional air cylinders or rotary actuators may be used. All cylinders, regardless of source, must be identical to those listed on the Free Pneumatic Components Order Form (e.g. same part numbers). Any additional air cylinders must source from Bimba or Parker Hannifin, or be recovered from prior year *FIRST* Kit Of Parts.

<R90> Items specifically PROHIBITED from use on the ROBOT include:

- Any air compressor other than, or in addition to, the one provided in the Kit Of Parts.
- Pneumatic cylinders and actuators different from those in the Kit or found on the Free Pneumatic Components Order form, with the exception of those specifically permitted by Rule <R89>.

<R91> If pneumatic components are used on the ROBOT, the pneumatic system on the ROBOT must contain <u>as a minimum</u> the following components, connected in accordance with this section.

- Pressure gauges to display the "working" and "stored" air pressure.
- An easily visible and accessible pressure vent valve to manually relieve the stored pressure.
- A pressure relief valve, calibrated and set to release at 125psi.
- A pressure switch, calibrated and connected to the Robot Controller.

<R92> Pneumatic components supplied in the Kit Of Parts (compressor, regulators, pressure switches, cylinders, valves, fittings, tubing, etc.) can not be modified except as follows:

- The tubing may be cut.
- The wiring for the valves and pressure switch may be modified as necessary to interface with the control system.
- Mounting and connecting pneumatics components using the pre-existing threads, mounting brackets, etc., is not considered a modification of the components. Removing the pin from the rear of an air cylinder is allowed as long as the cylinder itself is not modified.

Do not, for example, file, machine, or abrasively remove any part of an air cylinder. Consider pneumatic components sacred. They must remain in "out of the shipping box" condition.

<R93> Compressed air for the pneumatic system on the ROBOT must be provided by the Thomas Industries compressor provided in the 2008 Kit Of Parts. Compressed air shall not come from any other source.

<R94> The compressor may be mounted on the ROBOT, or it may be left off the ROBOT and used to pre-charge compressed air in the storage tanks prior to bringing the ROBOT onto the playing field. Off-board compressors must be controlled and powered by the ROBOT. The only difference between an on- and off-board compressor is that the off-board compressor is physically removed from the ROBOT. Note: the intent of this rule is to permit teams to take advantage of the weight savings associated with keeping the compressor off-board. But using the compressor off-board of the ROBOT does NOT permit non-compliance with any other applicable rules.

<R95> **Teams are not allowed to adjust the 125-psi relief valve**. The valve has been calibrated prior to shipping. The relief valve must be attached to the compressor. If the compressor is not used on the ROBOT, then an additional relief valve must be obtained and included in the primary pneumatic circuit on the ROBOT (see Rule <R91>).

<R96> The Nason pressure switch must be connected to the high-pressure side of the pneumatic circuit (i.e. prior to the pressure regulator) to sense the "stored" pressure of the circuit. The two wires from the pressure switch must be connected directly to a digital input and ground terminal on the Robot Controller, and the controller must be programmed to sense the state of the switch and operate the relay module that powers the compressor.

<R97> The Parker pressure vent valve must be connected to the pneumatic circuit such that, when manually operated, it will vent to the atmosphere to relieve all stored pressure. The valve must be placed on the ROBOT so that it is visible and easily accessible.

<R98> "Working" air pressure on the ROBOT must be no greater than 60psi. All working air must be provided through the Norgen adjustable pressure regulator, and all other pneumatic components must be downstream from this regulator. A pressure gauge must be placed adjacent to the pressure regulator and display the downstream pressure.

8.3.10 Operator Interface

<R99> Innovation First, Inc. Operator Interface units from pre-2008 competitions shall not be used.

<R100> The team number settings on the Operator Interface must be set to the team number assigned to the team by *FIRST*. Every time changes are made to the team number setting on the Operator Interface, the Robot Controller must be tethered to the Operator Interface to transfer the team number setting to the Robot Controller.

<R101> The OPERATOR CONSOLE designed by the team must fit on the 60" wide by 12" deep shelf in the Alliance Station (excluding any items that are held or worn by the DRIVERS during the MATCH).

<R102> Teams are permitted to connect a portable computing device (Laptop computer, PDAs, etc.) to the RS-232 output of the dashboard port of the Operator Interface for the purpose of displaying feedback from the ROBOT while participating in competition MATCHES. Please note that ***AC power will not be available at the playing field so these devices will have to run on internal batteries.***

<R103> The Operator Interface must be positioned within the OPERATOR CONSOLE so that the indicator lights can be clearly seen during inspection and during operation in a MATCH. The ports on the Operator Interface must be easily and quickly accessible. This will greatly facilitate analysis by field personnel in case of problems during the competition.

<R104> Nothing can be connected to the tether port of the Operator Interface during a MATCH.

<R105> All equipment connected to the joystick ports of the Operator Interface must be powered solely through the power available through the port. External power sources of any type are not permitted on any equipment connected to the joystick ports. Portable computing devices *must not* be connected to joystick input ports on the Operator Interface. Power-passive devices (e.g. joysticks that draw their power solely through the Operator Interface joystick port) are permitted.

<R106> Devices connected to the joystick ports of the Operator Interface via a FIRST-approved USB adapter (the only approved USB adapter is IFI Part Number USB-CHICKLET) are excluded from Rule <R105>. If used, this USB adapter must be powered with a 7.2V battery functionally identical to the back-up battery. Power from the competition port or any other source shall not be used to power the USB adapter. The USB adapter must be positioned within the OPERATOR CONSOLE so that the indicator lights may be seen during inspection and operation in a MATCH.

<R107> During competition MATCHES, the competition cable at the Alliance Station must connect directly to the competition port on the Operator Interface. No intermediate connectors, cables, or "pigtails" are permitted.

8.3.11 Robot Inspection

<R108> The ROBOT will be inspected for compliance with the maximum permissible dimensions while in its STARTING CONFIGURATION. The ROBOT must fit within a *FIRST* Sizing Device that has inside surface dimensions as specified in Rule <R11>. Other than resting on the floor of the Sizing Device, no part of the ROBOT can break the plane of the sides or top of the Sizing Device during size inspection. The ROBOT must be self-supporting while in the Sizing Device.

<R109> All ROBOTS shall pass inspection for compliance with the rules herein before being allowed to compete in qualification MATCHES. At the time of inspection, teams must present a list of all non-Kit Of Part items and costs used in the construction of their ROBOT to the inspector.

<R110> Any ROBOT construction technique or element that is not in compliance with the Robot Rules (Rule <R01> through Rule <R116>) must be rectified before a ROBOT will be allowed to compete or continue competing Any ROBOT used during a MATCH when a Robot Rule violation is detected will automatically be assigned a PENALTY and may receive a Yellow Card, depending on the severity of the infraction (unless otherwise noted).

<R111> Decorations must be on the ROBOT at the time of final inspection, and must not cause the ROBOT weight or size to exceed the limits specified in Rule <R11>.

<R112> ROBOTS will normally be allowed to participate in scheduled practice MATCHES prior to passing inspection. However, the lead inspector and/or head referee may determine at any time that the ROBOT is unsafe, and may prohibit further participation in practice MATCHES until the condition is corrected and the ROBOT passes inspection.

<R113> If a team makes a modification to the ROBOT after it has passed inspection, that team must have the ROBOT re-inspected. If an observation is made that another team's ROBOT may be in violation of the robot rules, please approach *FIRST* officials to review the matter in question. This is an area where "Gracious Professionalism" is very important.

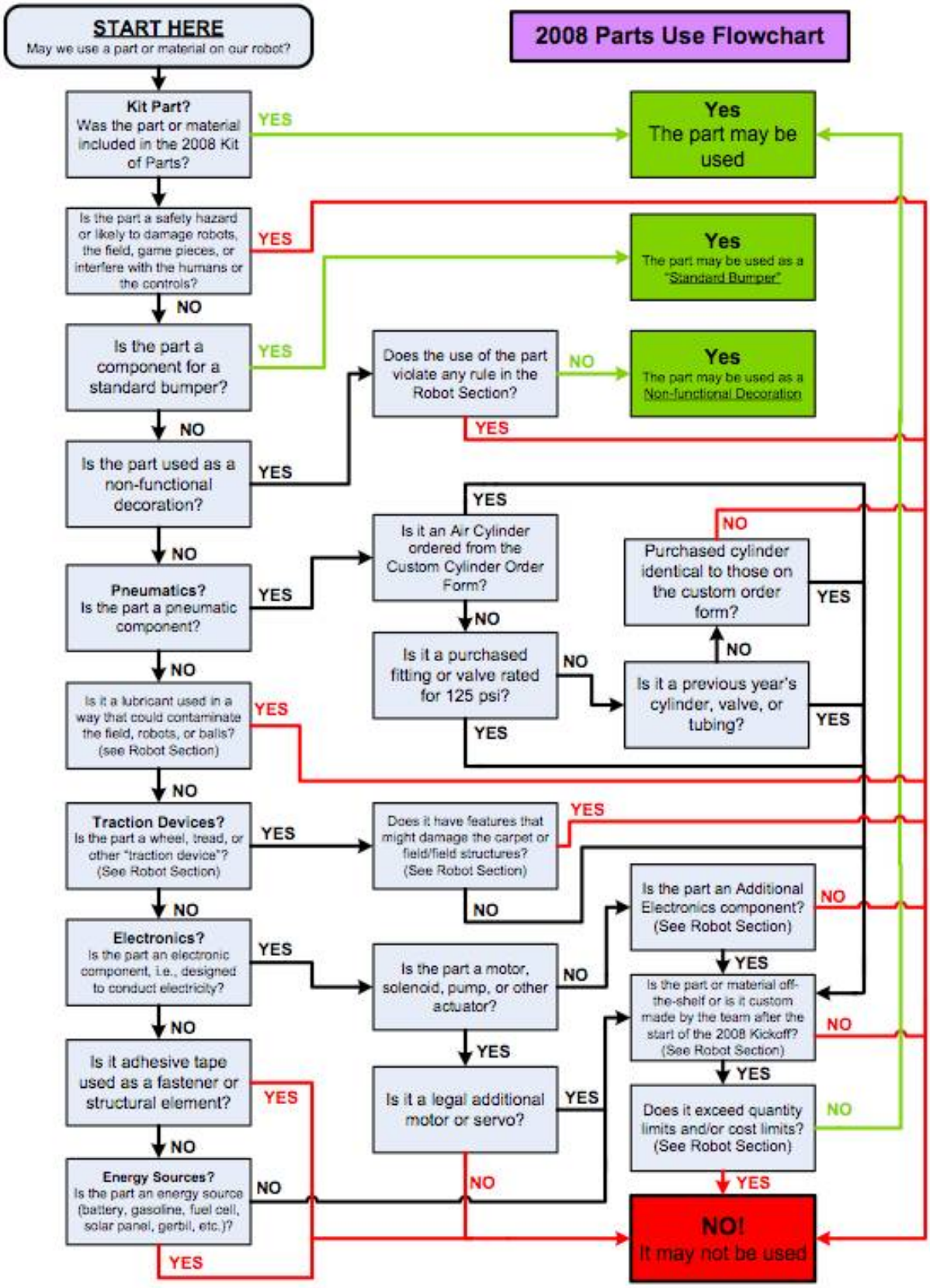
<R114> At the time of inspection, the ROBOT must be presented with ***all*** MECHANISMS (including ***all*** COMPONENTS of each MECHANISM) ***and configurations*** that will be used on the ROBOT during the entire competition event. It is acceptable, however, for a ROBOT to play MATCHES with a **subset** of the MECHANISMS that were present during inspection. Only MECHANISMS that were present during the inspection may be added, removed or reconfigured between MATCHES. If subsets of MECHANISMS are changed between MATCHES, the reconfigured ROBOT must still meet all inspection criteria.

<R115> If a ROBOT is rejected by inspectors due to a safety issue or concern related to the team's method of storing energy (see Rule <R01>), the concerned items must be disabled or removed from the ROBOT before it can compete in a MATCH. The team bears the burden of proof that such a rejection is not valid. Teams should be prepared to provide justifiable test data or calculations during inspection to support their design.

<R116> *FIRST* Officials may randomly re-inspect ROBOTS participating in competition MATCHES to assure compliance with the rules.

8.4 PARTS USE FLOWCHART

To help determine the legality of a part, please refer to the following 2008 Parts Use Flowchart:


2008 Parts Use Flowchart
START HERE
May we use a part or material on our robot?
Kit Part?
Was the part or material included in the 2008 Kit of Parts?
YES
Yes
The part may be used
Is the part a safety hazard or likely to damage robots, the field, game pieces, or interfere with the humans or the controls?
YES
Yes
The part may be used as a "Standard Bumper"
NO
Is the part a component for a standard bumper?
YES
Does the use of the part violate any rule in the Robot Section?
NO
Yes
The part may be used as a Non-functional Decoration
YES
NO
Is the part used as a non-functional decoration?
YES
YES
Is it an Air Cylinder ordered from the Custom Cylinder Order Form?
NO
Purchased cylinder identical to those on the custom order form?
YES
NO
NO
Pneumatics?
Is the part a pneumatic component?
YES
NO
Is it a purchased fitting or valve rated for 125 psi?
NO
Is it a previous year's cylinder, valve, or tubing?
YES
YES
NO
Is it a lubricant used in a way that could contaminate the field, robots, or balls? (see Robot Section)
YES
NO
Traction Devices?
Is the part a wheel, tread, or other "traction device"? (See Robot Section)
YES
Does it have features that might damage the carpet or field/field structures? (See Robot Section)
YES
NO
Is the part an Additional Electronics component? (See Robot Section)
NO
NO
Electronics?
Is the part an electronic component, i.e., designed to conduct electricity?
YES
Is the part a motor, solenoid, pump, or other actuator?
NO
YES
Is the part or material off-the-shelf or is it custom made by the team after the start of the 2008 Kickoff? (See Robot Section)
NO
NO
Is it adhesive tape used as a fastener or structural element?
YES
YES
Is it a legal additional motor or servo?
YES
Does it exceed quantity limits and/or cost limits? (See Robot Section)
NO
NO
Energy Sources?
Is the part an energy source (battery, gasoline, fuel cell, solar panel, gerbil, etc.)?
NO
NO
YES
NO!
It may not be used
YES

Section 9

THE TOURNAMENT

FRC FIRST Robotics Competition

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9 THE TOURNAMENT

9.1 OVERVIEW

Each 2008 FRC Regional Competition and the 2008 FRC Championship will be played in a tournament format. Each tournament will consist of three sets of matches called “practice matches,” “qualification matches,” and “elimination matches.” The purpose of the practice matches is to provide each team a chance to run its ROBOT on the playing field prior to the start of the competition matches. The purpose of the qualifying matches is to allow each team to earn a seeding position that may qualify them for participation in the elimination matches. The purpose of the elimination matches is to determine the event Champions.

9.2 PRACTICE MATCHES

9.2.1 Schedule

The practice matches will be played throughout the first day of each competition. The practice match schedule will be available on the morning of the practice day. Practice matches will be randomly assigned. Each team will be assigned an equal number of practice matches. At some events, additional matches may be available on a standby basis. Each practice match will consist of a ten-minute period in which teams may operate their ROBOT on the field.

- The first five minutes of each practice match will start with a 15-second hybrid period, followed by a “free-form” session, in which the ROBOTS may be exercised to evaluate operational characteristics, gain driver experience, determine system robustness, etc. During this five-minute period robots avoid robot-to-robot interaction.
- The second five minutes of each practice match will be conducted as a “competition match” with approximately two minutes for set up, two minutes and fifteen seconds of regular game play (including operations), and one minute to clear the field.

9.3 QUALIFICATION MATCHES

9.3.1 Schedule

The qualification matches will be played throughout the second day of the competition and the first half of the third day, ending approximately at noon. The qualification matches will consist of a series of matches, with an arena reset between each match. The qualification match schedule will be available on the second morning of the competition.

9.3.2 Match Assignment

The scoring system will assign each team two ALLIANCE partners for each qualifying match played using a predefined algorithm. The algorithm employs the following list of criteria:

a. Maximum time (in number of matches) between each match played for all teams
b. Minimum possible number of times a team plays opposite any team
c. Minimum possible number of times a team is allied with any team
d. Minimize the use of surrogates.
e. Even distribution of matches played on Blue and Red Alliance (without sacrificing a, b, c and d)

See the FRC Manual web site (http://www.usfirst.org/frc/2008/manual) for a white paper detailing the algorithm as well a stand-alone program demonstrating its capabilities.

All teams will play the same number of qualifying matches **except** if the number of team appearances (number of teams multiplied by number of rounds) is not divisible by six; in that case

the scoring system will randomly select some teams to play an extra match. For purposes of seeding calculations, those teams will be designated as SURROGATES for the extra match. If teams play a match as a SURROGATE, it will be indicated on the match schedule, and it will always be their third match.

9.3.3 Earning Points

At the conclusion of each match, each participating team will earn both qualifying points and ranking points. These will be accumulated during the tournament to determine each team's qualifying score and ranking score. The scoring system will use the combination of qualifying score and ranking score to continuously determine the seeding of teams during the qualification matches. The ranking information will be displayed in the pit area.

9.3.4 Match Qualifying Points

At the completion of each qualification match, each team will receive a win, loss or tie depending on the final score:

- Each team on the winning ALLIANCE will receive two (2) qualifying points.
- Each team on the losing ALLIANCE will receive zero (0) qualifying points.
- In the event of a tied score, all six teams will receive one (1) qualifying point.

9.3.5 Match Ranking Points

All teams on the winning ALLIANCE will receive a number of ranking points equal to the un-penalized score (the score without any assessed penalties) of the losing ALLIANCE.

All teams on the losing ALLIANCE will receive a number of ranking points equal to their final score (with any assessed penalties).

In the case of a tie, all participating teams will receive a number of ranking points equal to their ALLIANCE score (with any assessed penalties).

9.3.6 Match Point Exceptions

A SURROGATE team will receive zero qualifying points and zero ranking points.

A team is declared a no-show if **no** member of the team is in the ALLIANCE ZONE at the start of the match; a no-show team will be disqualified from that match.

During the qualification matches, teams can be individually disqualified in a match. A disqualified team will receive zero qualifying points and zero ranking points.

In the very unlikely case that all three teams on an ALLIANCE are disqualified, all three teams on the winning ALLIANCE would get their own score as their ranking points for that match.

9.3.7 Qualifying Score

The total number of qualifying points earned by a team throughout their qualification matches will be their qualifying score.

9.3.8 Ranking Score

The total number of ranking points earned by a team throughout their qualification matches, divided by the number of matches played (excluding any SURROGATE matches), then truncated to two decimal places, will be their ranking score.

Note: because your ranking score is derived directly from the match scores of your opponent ALLIANCES, it is in your interest that both your ALLIANCE and the ALLIANCES you "defeat" obtain a high score. The most valuable "WIN" results from a close, high-score match.

9.3.9 Highest Match Score

The scoring system will keep track of the highest match score earned by each team during the qualification matches but this score will not be displayed.

9.3.10 Qualification Seeding

All teams in attendance will be seeded during the qualification matches. If the number of teams in attendance is 'n', they will be seeded '1' through 'n', with '1' being the highest seeded team and 'n' being the lowest seeded team.

The scoring system will use the following seeding method:

- Teams will be broken into tiers based on their qualifying score. A tier is made up of all teams with the same qualifying score. Tiers will be seeded in decreasing order by qualifying score.
- Within each tier, teams will be seeded in decreasing order by their ranking score.
- If any teams within a tier have the same ranking score, they will then be seeded in decreasing order by their highest match score.
- If any teams within a tier have the same ranking score and the same highest match score, then the scoring system will seed those teams based on a random electronic coin toss.

9.4 ELIMINATION MATCHES

At the end of the qualification matches, the top eight seeded teams will become the Alliance Leads. The top seeded ALLIANCES will be designated, in order, Alliance One, Alliance Two, etc., down to Alliance Eight. Using the alliance selection process described below, each team will choose two other teams to join their ALLIANCE.

9.4.1 Alliance Selection Process

Each team will choose a student Team Representative who will proceed to the playing field at the designated time to represent their team (before the lunch break on the third day of the Competition). The Team Representative for each Alliance Lead is called the ALLIANCE CAPTAIN.

The alliance selection process will consist of two rounds during which each ALLIANCE CAPTAIN will invite a team seeded below them in the standings to join their ALLIANCE. The invited team must not already have declined an invitation.

Round 1: In descending order (Alliance One to Alliance Eight) each ALLIANCE CAPTAIN will invite a single team. The invited Team Representative will step forward and either accept or decline the invitation.

If the team accepts, it is moved into that ALLIANCE.

- If an invitation from a top eight ALLIANCE to another Alliance Lead is accepted, all lower Alliance Leads are promoted one spot and the next highest seeded unselected team will move up to become Alliance Eight.

If the team declines, it is not eligible to be picked again and the ALLIANCE CAPTAIN extends another invitation to a different team.

- If an invitation from a top eight ALLIANCE to another Alliance Lead is declined, the declining team may still invite teams to join their ALLIANCE, however, it cannot accept invitations from other ALLIANCES.

The process continues until Alliance Eight makes a successful invitation.

Round 2: The same method is used for each ALLIANCE CAPTAIN'S second choice except the selection order is reversed, with Alliance Eight picking first and Alliance One picking last. This process will lead to eight ALLIANCES of three teams.

9.4.2 Elimination Match Pit Crews

(DELETED)

9.4.3 Backup Teams

Of the remaining eligible teams, the highest seeded teams (up to eight) shall remain on standby and be ready to play as a BACKUP TEAM. If a ROBOT from any team in an elimination match ALLIANCE becomes inoperable the ALLIANCE CAPTAIN may have the highest seeded BACKUP TEAM join the ALLIANCE. The resulting ALLIANCE would then be composed of four teams, but only three teams will be permitted to continue with match play. The inoperable team remains part of the ALLIANCE for awards but can not play, even if their ROBOT is repaired.

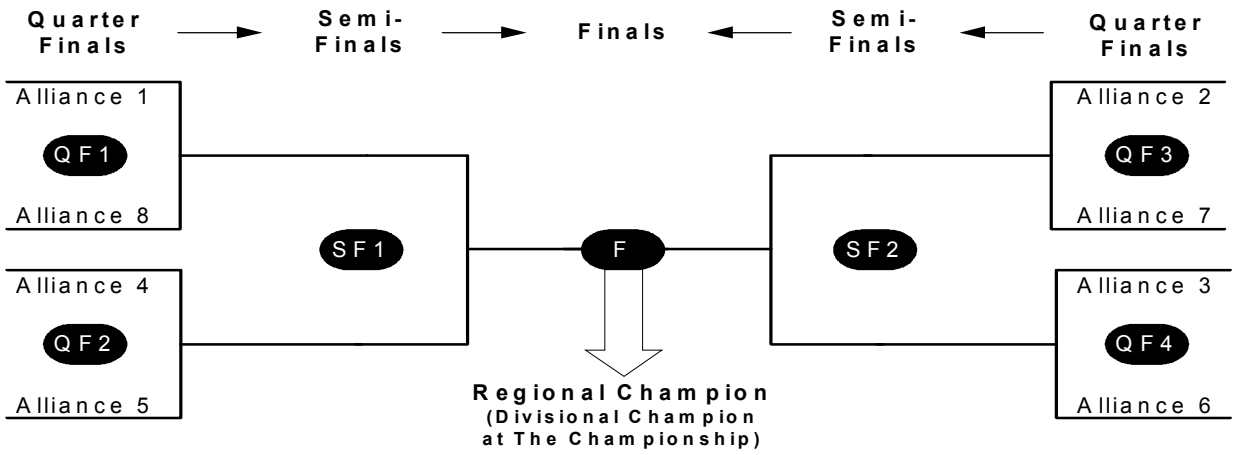
The original three-team ALLIANCE shall only have one opportunity to draw from the BACKUP TEAMS. If a second ROBOT from the ALLIANCE becomes inoperable, then the ALLIANCE must play the following matches with only two (or even one) ROBOTS. It is in the best interest of all teams to construct their ROBOTS to be as robust as possible to prevent this situation.

- Example: Three teams, A, B and C, form an ALLIANCE going into the elimination matches. The highest seeded team NOT on one of the eight ALLIANCES is Team D. During one of the elimination matches, Team C has their ROBOT disabled. The ALLIANCE CAPTAIN decides to bring up Team D to replace the disabled ROBOT. Team C and their ROBOT may not play in any subsequent elimination matches.

In the case where a BACKUP TEAM is called up onto the winning ALLIANCE, there will be a four-team Champion Alliance.

9.4.4 Elimination Match Ladder

The elimination matches will take place on the third afternoon in a ladder format as follows:



In order to allow equal time between matches for all ALLIANCES, the order of play will be:

QF1-1, QF2-1, QF3-1, QF4-1,

Then QF1-2, QF2-2, QF3-2, QF4-2,

Then QF1-3*, QF2-3*, QF3-3*, QF4-3*

Then any QF replays due to ties*

Then SF1-1, SF2-1, SF1-2, SF2-2, SF1-3*, SF2-3*

Then any SF replays due to ties*

Then F-1, F-2, F-3*

Then any F replays due to ties*

(* - if required)

9.4.5 Elimination Scoring

In the elimination matches teams do not earn qualification points; they earn a win, loss or tie. Any tied matches will be replayed.

Within each bracket of the elimination match ladder, matches will be played to determine which ALLIANCE advances, as follows:

The first ALLIANCE to win two matches advances.

9.5 CHAMPIONSHIP ADDITIONS

For the 2008 FRC Championship, teams will be split into four divisions. Each division will play exactly like a Regional Event and produce the Division Champions. Those four ALLIANCES will then proceed to the Championship Playoffs to determine the 2008 FRC Champions.

Procedures in Sections 9.1-9.4 apply during the Championship , with the following additions:

9.5.1 Championship Pit Crews

During the elimination matches, extra team members are often needed to move the team ROBOT from the team's pit area to the queuing area and onto the playing field. For this reason, each team is permitted to have three (3) additional "pit crew" members who can also help with needed ROBOT repairs/maintenance. We suggest that all teams assume they may be chosen for an ALLIANCE and think about the logistics of badge distribution and set a plan prior to the pairings. It is each ALLIANCE CAPTAIN'S responsibility to get the team's badges to the team pit crewmembers.

Only team members wearing proper badges are allowed on the arena floor**.** *FIRST* will distribute these badges to the ALLIANCE CAPTAINS during the ALLIANCE CAPTAIN meeting, which takes place on the division fields. These badges will provide the necessary access to the field for pit crewmembers.

9.5.2 Championship Backup Teams

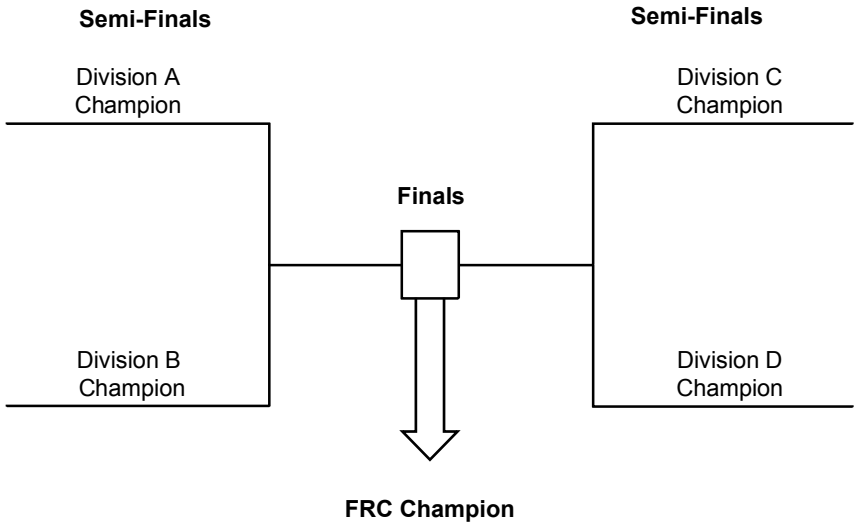
If an ALLIANCE has not previously brought in a BACKUP TEAM, and a ROBOT becomes disabled during the Championship Playoffs and can not continue, the ALLIANCE may request a BACKUP TEAM. The ALLIANCE CAPTAIN will be presented the option of having one of the three lead Division Finalist teams, chosen randomly, from their division join the ALLIANCE as a BACKUP TEAM.

If an ALLIANCE has won their division with a BACKUP TEAM and moved on to the FRC Championship Playoffs, the BACKUP TEAM continues to play for the ALLIANCE in the Championship Playoffs.

As noted in Section 9.4.3, the original three-team ALLIANCE shall only have one opportunity to draw from the BACKUP TEAMS. If the ALLIANCE has brought in a BACKUP TEAM during the division elimination matches or the Championship Playoffs, they cannot bring in a second BACKUP TEAM. If a second ROBOT from the ALLIANCE becomes inoperable during the Championship Playoffs, then the ALLIANCE must play the following matches with only two (or even one) ROBOTS.

In either case, the replaced team remains part of the ALLIANCE for awards but can not rejoin match play, even if their ROBOT is repaired. If the ALLIANCE wins the Championship Playoffs, the FRC Champions will be all three original members of the Division Champion ALLIANCE and the BACKUP TEAM.

9.5.3 FRC Championship Match Ladder



The FRC Championship matches will play exactly like the Semi-Finals and Finals of the elimination matches.

9.6 TOURNAMENT RULES

9.6.1 Safety Rules

<T01> All competition attendees must wear safety glasses while on the field.

<T02> Radio control mode of ROBOT operation is not permitted areas anywhere off the field. ROBOTS must only be operated by tether when not on the competition field.

9.6.2 Referee Interaction Rules

<T03> The Head Referee has the ultimate authority on the field during the competition. THE HEAD REFEREE RULINGS ARE FINAL! The referee will not review recorded replays under ***any*** circumstances.

<T04> If a team needs clarification on a ruling or score, a pre-college student from that team should address the Head Referee after a field reset has been signaled. Depending on timing, the Head Referee may postpone any requested discussion until the end of the subsequent match. Head Referees will only discuss calls, scores, penalties or match outcomes with pre-college team members.

9.6.3 Yellow and Red Card Rules

<T05> The Head Referee may assign a YELLOW CARD as a warning of egregious ROBOT or team member behavior. This will occur at the completion of a match, before the field is reset, and will be indicated by the Head Referee standing in front of the team's PLAYER STATION and holding a yellow card in the air. In the first match that a team receives a YELLOW CARD, it acts as a warning.

<T06> After a team receives a YELLOW CARD, a yellow flag will be placed on their ROBOT at the beginning of all subsequent matches as a reminder to the team, the referees, and the audience that they have been issued a YELLOW CARD.

<T07> A team will be issued a RED CARD (disqualification) in any subsequent match that they receive an additional YELLOW CARD. This will occur at the completion of a match, before the field is reset, and will be indicated by the Head Referee standing in front of the team's PLAYER STATION and holding a yellow card and red card in the air simultaneously. The team will still carry their YELLOW CARD into subsequent matches.

<T08> YELLOW CARDS do not carry forward between qualification matches and elimination matches. All teams move into the elimination matches with a clean slate.

<T09> If a team is disqualified during a match for a reason other than receiving an additional YELLOW CARD, they will receive a RED CARD. This will occur at the completion of a match, before the field is reset, and will be indicated by the Head Referee standing in front of the team's PLAYER STATION and hold a red card in the air.

<T10> During the qualification matches, a team that receives a RED CARD will receive zero ranking points and zero qualification points. The rest of the team's in their ALLIANCE will still receive the earned qualification points and ranking points.

<T11> During the elimination matches, a team receiving a RED CARD will cause the disqualification of their entire ALLIANCE for that match.

9.6.4 Field Reset Rules

<T12> At the conclusion of a match, all players shall remain in the Player Zone until the Head Referee issues the "field-reset" signal. Once the Head Referee issues this signal, the 3-minute "match-reset" period will begin. During this time, the field must be cleared of ROBOTS from the match just ended, and the ROBOTS and OPERATORS CONSOLES for the following match must be in position and ready to start before the expiration of the "match-reset" period. Field Attendants will reset the field elements during this time.

<T13> Field power to the ROBOTS will **not** be re-enabled after a match. ROBOTS must be designed to permit removal of TRACKBALLS or other ROBOTS without requiring activation of the ROBOT power system. Teams should design mechanisms that allow easy release of TRACKBALLS. At the discretion of the head referee or field manager, ROBOTS may be powered up and controlled via tether to collapse the ROBOT to permit safe and/or rapid removal from the field and transport to the pits. Teams that power up to collapse their ROBOTS must do so in a timely manner. For information on using the tether, please refer to the control system documentation from Innovation First, Inc.

<T14> The qualification match schedule will indicate ALLIANCE partners and match pairings. It will also indicate the ALLIANCE color assignment, RED or BLUE, for each match. The color is used to determine the placement of each team's ROBOT, drivers, ROBOCOACHES, and COACHES around the playing field. Teams must line up behind their team LED at the Player's Station.

<T15> During Elimination Matches, the higher seeded ALLIANCE will have the last opportunity to orient their ROBOTS within the selected locations. During the Qualification Matches, the ALLIANCES will position and orient their ROBOTS simultaneously.

<T16> If, in the judgment of the Head Referee, a "field fault" occurs that affects either the play or the outcome of the match, the match will be replayed. Example field faults include broken field elements, power failure to a portion of the field, improper activation of the field control system, errors by field personnel, etc.

9.6.5 Time-out and Backup Team Rules

<T17> There are **no** time-outs in the qualifying rounds. If a ROBOT cannot report for a match, the queuing manager must be informed and at least one member of the team should report to the field for the match to avoid disqualification.

<T18> During the elimination rounds, if circumstances require an ALLIANCE to play in back-to-back matches, they will be granted an additional minute of set-up time to reset and allow their ROBOTS to cool down.

<T19> In the elimination matches, each ALLIANCE will be allotted one TIME-OUT of up to 6 minutes. If an ALLIANCE wishes to call for a TIME OUT, they must submit their TIME OUT coupon to the Head Referee within two minutes of the Head Referee issuing the field reset signal preceding their match. When this occurs, the Time-out Clock will count down the six minutes starting with the expiration of the arena-reset period. Both ALLIANCES will enjoy the complete 6-minute window. In the interest of tournament schedule, if an ALLIANCE completes their repairs before the Time-out Clock expires, the ALLIANCE CAPTAIN is encouraged to inform the Head Referee that they are ready to play and remit any time remaining in the TIME-OUT. If ALLIANCES are ready before the 6-minute window, the next match will start. There are no cascading time-outs. An opposing ALLIANCE may not offer their unused TIME-OUT to their opponent.

<T20> If during a TIME-OUT an ALLIANCE CAPTAIN determines that they need to call up a BACKUP TEAM, they must submit their BACKUP TEAM coupon to the Head Referee while there is still at least two minutes remaining on the Time-out Clock. After that point, they will not be allowed to utilize the BACKUP TEAM. Alternatively, an ALLIANCE CAPTAIN may choose to call up a BACKUP TEAM without using their TIME-OUT by informing the Head Referee directly within two minutes of the Head Referee issuing the Field Reset Signal preceding their match.

<T21> In the case where the ALLIANCE CAPTAIN's team is replaced with the BACKUP TEAM, the ALLIANCE CAPTAIN is allowed in the Team Zone as a thirteenth ALLIANCE member so they can serve in an advisory role to their ALLIANCE.

9.6.6 Special Equipment Rules

<T22> The only equipment that may be brought on to the field is the OPERATOR CONSOLE, reasonable decorative items, and special clothing and/or equipment required due to a disability. Other items, particularly those intended to provide a competitive advantage for the ROBOCOACH, are prohibited.

Devices used solely for the purpose of planning or tracking strategy of game play are allowed inside the ALLIANCE ZONE, if they meet ALL of the following conditions:

- Do not connect or attach to the OPERATOR CONSOLE
- Do not connect or attach to the FIELD or ARENA
- Do not connect or attach to another alliance member
- Do not communicate with anything or anyone outside of the ALLIANCE ZONE (for example wireless communications must be disabled).
- Do not in any way affect the outcome of a MATCH, other than by allowing team members to plan or track strategy for the purposes of communication of that strategy to other alliance members.

Section 10

THE KIT OF PARTS

TABLE OF CONTENTS

10. THE KIT OF PARTS

10.1 THE KIT OF PARTS - GENERAL

FIRST provides a Kit of Parts (KoP) to each FRC team. The exact parts provided in the KoP (or their exact replacement), plus the *FIRST* IR board sent out as a game hint are considered Kit Parts. Some Kit Parts may legally be used in additional quantities as described in Section 8 of the Manual. Additional quantities of these parts are considered to be "Additional Parts" and not "Kit Parts".

Section 10 is dedicated to important information about certain specific kit items. For instructional tips, please refer to the *2008 Tips & Good Practices* document posted on the *FIRST* website off of the manual landing page, http://www.usfirst.org/frc/2008/manual

Some of the exciting and important additions found in the 2008 KoP include the following items:

- AndyMark Toughbox gearbox
- Automation Direct direct mount terminal strips
- Automation Direct rotary limit switch
- BaneBots RS-540 motor
- BaneBots RS-550 motor
- BishopWisecarver aluminum extrusion
- FCI BURNDY Products compression lugs
- FCI BURNDY Products large tie wraps
- *FIRST* IR board
- Gates Corporation rubber belts
- Gates Corporation sprockets
- Innovation First, Inc. Toughbox mounting plates (with the Kitbot)
- Mabuchi RS-385 motors
- MSC Direct sprockets
- Sample bumper pool noodle
- Sample bumper fabric
- Taigene motor
- Trackball shell
- Trackball bladder

The *FIRST* 2008 KoP is provided in multiple containers. They consist of the following packages:

1 – *FIRST* large black plastic tote for pickup at Kickoff

1 – *FIRST* large grey plastic tote for pickup at Kickoff

1 – Innovation First, Inc. KitBot box for pickup at Kickoff

1 – Innovation First, Inc. Electronics Kit for pickup at Kickoff

2 – BaneBots motors for pickup at Kickoff (RS540 & RS550)

1 – FedEx envelope for pickup at Kickoff

10.1.1 Replacement Parts Requests

Use the *2008 Kit of Parts Checklist* provided at www.usfirst.org/frc/2008/manual to inventory your KoP. The inventory must be completed within 48 hours of receiving the kit in order to determine that all items are present.

The first column on the checklist should be marked when the item and quantities are correct. Photos are included in the checklist in case you are not sure what a particular part looks like.

If you find that certain Kit Parts are missing or damaged, you will need to submit a "Replacement Parts Request" by 11:59pm (EST), January 9, 2008. The Replacement Parts Request link will be

posted on the Team Information Management System (TIMS) after the Kickoff event. Replacement parts will be shipped only via this online request system.

The steps required to submit a Replacement Parts Request (after the kickoff) are as follows:

- Log into TIMS with your Logon ID and Password
- Click on the "Submit a Replacement Parts Request" link on right side of the Team Summary page
- Follow TIMS instructions to complete a Replacement Parts Request. Please be specific when describing the issue with the part (missing, damaged, etc).

Please remember that this is a **time limited**, **one-time only** opportunity to submit your Replacement Parts Request. Make sure that your request is both accurate and complete prior to pressing the "Submit Request" button. Once the request is submitted you cannot make any changes to it. Please note that the system will not allow teams to request a quantity of parts higher than the number originally sent with the kit. This system is also not to be used to order additional and/or purchased parts.

Any kit irregularities must be reported by 11:59pm (EST), Wednesday, January 9, 2008 per the instructions here.

Replacement Parts Requests will be processed daily and shipped during the next open shipping window. Items will be shipped to the shipping contact listed in your team's TIMS record.

10.1.2 Obtaining Additional or Spare Parts

Depending on what parts are left over after kitting and replacement parts shipments, we will provide spare parts at the Regional events. The items included in this limited group will be listed during the build season. If your robot uses parts that are not included on this list, and there is a reasonable possibility that the part could be damaged or broken during competition, it is recommended that you bring the appropriate SPARE PARTS with you to events in accordance with Section 8.

If, at any event, your team needs to borrow a Robot Controller, Operator Interface, Victor Speed Controller, Spike Relay, Radio, or AC Adapter, your team must provide Credit Card information to ensure proper return of the items immediately upon completion of the event. If the borrowed part is not returned by the end of the event, *FIRST* retains the right to bill the provided credit card number for the item(s). All "loan" items will be available on a first-come, first-served basis.

Innovation First, Inc. hosts the *FIRST* Store on behalf of *FIRST* on the Innovation First, Inc. website. The purpose is to assist teams with the ability to procure additional Kit of Parts items from *FIRST*. Only *FIRST* teams will be authorized to purchase the listed parts. *FIRST* establishes the pricing for all parts, which will be inclusive of handling charges, but exclusive of shipping charges.

Some additional Kit Parts and all Innovation First, Inc. parts are available and may be purchased by visiting the IFI Store at www.ifirobotics.com/ The Innovation First, Inc. contact for *FIRST* Store matters is Tom Watson at 903-453-0800, extension 204.

The table below includes information about where to get additional kit part items.

Item	Supplier	Where to get more…
Toughbox gearbox	AndyMark, Inc.	www.andymark.biz/
Battery connector safety plug		
Wheels		
Joysticks	American Anko	www.avbusa.com/
Quick disconnect battery connectors	Terminal Supply Co.	www.terminalsupplyco.com/
Rotary limit switch	AutomationDirect	http://support.automationdirect.com/FIRST
Direct mount terminal switch		
RS540 12VDC motor	BaneBots	www.banebots.com/
RS550 12VDC motor		
Aluminum framing	BishopWisecarver	www.bwc.com/
Accumulators	Clippard	www.clippard.com/
Keyang terminals	Delphi	www.powerandsignal.com/
Keyang connector housing		www.powerandsignal.com/
6AWG wire (red & black		Please do not contact Delphi for additional wire - it is available commercially.
Denso motors	DENSO International	These were overstock items. Please do not contact DENSO to request additional motors
Battery lugs	FCI BURNDY Products	Find distributors online at www.fciconnect.com/
FESTO solenoid valve	FESTO Corporation	www.festo.com/
FIRST IR Board & ribbon cable	*FIRST* Store	http://www.ifirobotics.com/first-store.shtml (availability TBD)
Pneumatic tubing	Freelin-Wade	www.freelin-wade.com/ (but call 888-373-9233 with your order to take advantage of the discount offered to FRC Teams
Compressor	Thomas Products	Find distributors online at www.thomaspumps.com/
Belt sprockets	Gates Corporation	www.gates.com/
PowerGrip belts		
igus parts	igus	www.igus.com/yesprogram/FIRST2007_request.asp or contact Courtney Toomey at (800) 521-2747 ext. 146 or ctoomey@igus.com.
Control system components	Innovation First, Inc.	www.ifirobotics.com/
Kitbot chassis components		
12V Batteries	MK Battery	1-800-372-9253, Jason Smith (Jasons@mkbattery.com) Please identify yourself as a *FIRST* team and provide your team number.
Terminal block components	Rockwell Automation	Kendall Electric, Michael Hunt, 269.963.5585 (There will be a limited number in stock, and teams will be limited to four of each color. This will be cash sales only requiring a credit card.)
Trackball shell	Sportogo	www.sportogo.com/
Trackball bladder		
IR sensor	Vishay	www.vishay.com/, www.arrow.com/, www.avnet.com/, www.future.com/, www.newark.com/

10.2 PART INFORMATION

This section of the manual provides additional information about *some* of the parts included in your KoP. For a complete list of the 2008 KoP contents, please refer to the 2008 KoP Checklist located on the *FIRST* homepage (www.usfirst.org/community/frc/content.aspx?id=452).

10.2.1 Control System Components

10.2.1.1 Innovation First, Inc. Control System

The control system provided in the 2008 KoP is from Innovation First, Inc. Innovation First, Inc. has published much information and instruction on their website at www.ifirobotics.com/frc-robot-control-system-overview.shtml.

10.2.1.2 Backup Battery

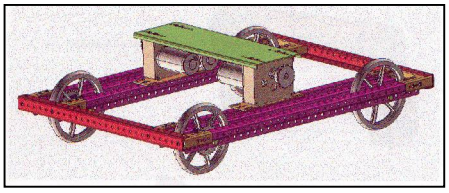
Innovation First, Inc. provides a 7.2V backup battery for use with your control system. Please note that batteries will perform best for your competition season if they are charged for at least 24 hours before the first use.

10.2.1.3 Joysticks

The analog joysticks provided in the 2008 KoP use serial connections. Details can be found online at www.avbusa.com/gc1000fr.htm.

10.2.2 Chassis

10.2.2.1 Innovation First, Inc. Kitbot Chassis



The 2008 KoP includes Innovation First, Inc.'s Kitbot Chassis. The Kitbot provides a lightweight, rugged, and adaptable solution for constructing a serviceable robot frame quickly and efficiently.

There are a number of ways that Kitbot components can be configured to form a chassis. The actual assembly is contingent on the design decisions defined by your team's game strategy. Once the basic chassis style is determined and has been assembled, the motor and transmission assemblies can be mounted and the drive wheels added.

The *2008 Chassis Kit Manual* can be found on the Innovation First, Inc. web site at www.ifirobotics.com/kitbot.shtml. Some robot styles and strategies are not permitted in the competitions. Please read Section 8 carefully before you begin your chassis design and/or assembly.

10.2.2.2 Bishop-Wisecarver MCS Profile Aluminum Machine Framing

The 2008 KoP includes two (2) 20mm x 20mm pieces of aluminum extrusion that can be used for mounting additional components, adding structural support, etc. Detailed specifications for the extrusion provided in the 2008 KoP can be found in the online catalog found at www.bwc.com/pdf/catalog/MCS_Catalog.pdf.

10.2.3 Motors

10.2.3.1 Denso window motors

The Kit includes one Denso window motor. Either a left hand version OR a right hand version of the motor is supplied.

10.2.3.2 FisherPrice Motors

The FisherPrice motors are provided seperately from the plastic gearboxes in the 2008 KoP. Assembly screws are included in the kit if you decide to use the gearboxes with the motors. For the motor curve, please refer to www.usfirst.org/community/frc/content.aspx?id=482.

10.2.3.3 BaneBots RS-540 & RS-550

The BaneBots motors were supplied separately at the kit pickup locations. More information about the motors and their performance can be found on the BaneBots website at http://banebots.com/pc/MOTOR-BRUSH/M2-RS540-120 and http://banebots.com/pc/MOTOR-BRUSH/M1-RS550-120.

10.2.3.4 Taigene van door motor

Taigene has donated a van door motor to the 2008 KoP. The specifications are not posted on their website, but are posted on the FIRST website at www.usfirst.org/community/frc/content.aspx?id=482.

10.2.4 The Drive Train

10.2.4.1 The Toughbox gearbox

The 2008 KoP includes two Toughbox gearbox kits for use in your drive train. For assembly instructions and further details please refer to the Toughbox User Guide found at www.andymark.biz/

10.2.4.2 Wheels

The wheels supplied in the 2008 KoP are very similar to the 2007 KoP wheels, but with minor differences. The hubs have been reinforced with more material and the tread material has a slightly higher durometer (75A compared to 60A in 2007). The “driving” coefficient of friction is 0.60 and the “sideways” coefficient of friction is 0.95.

10.2.5 Electrical Components

10.2.5.1 Batteries

The batteries supplied in the 2008 KoP are the same as those provided in the 2007 KoP. The part number is ES17-12, and they are 12V, 18AH batteries. MK Battery ES17-12s are the only permitted batteries in the *FIRST* Robotics Competition.

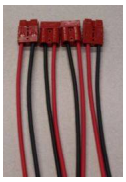
Please remember that if you plan to ship your batteries in your crate, it’s important to save the box and the rest of the packaging for further transport!

10.2.5.2 FCI Burndy Battery terminal lugs

FCI Burndy Products has donated two types of lugs for connecting your quick-disconnect battery connectors to your battery terminals. The mechanical lugs, PN YA6C, should only be used if you have the appropriate crimp tool. Lugs with part number KPA4C are screw lugs, and no crimp tool is required. For details about these parts and information about recommended crimp tools, please visit the FCI Burndy Products website at
http://portal.fciconnect.com/portal/page/portal/FcicntPublic/ComergentConnect?appname=catDisplayStyle$domProductQueryName=KPA4C*$OP=search
and

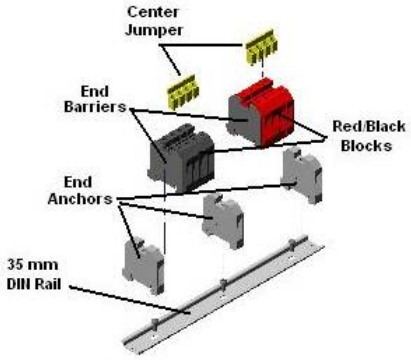
http://portal.fciconnect.com/portal/page/portal/FcicntPublic/ComergentConnect?appname=catDisplayStyle$domProductQueryName=YA6C*$OP=search.

10.2.5.3 Quick Disconnect Battery Connector



Each 2008 KoP contains four quick-disconnect battery connectors. They are assembled from Delphi red and black 6 AWG wire and Anderson Power Products quick-disconnect connector, SB-50. The datasheet for the connector can be found on Anderson Power Products website at www.andersonpower.com/products/multipole-sb.html.

10.2.5.4 Rockwell Automation Power Distribution Block



DIN Power Distribution Block Assembly

In the Kit of Parts you will find a ½ meter rail, most commonly known as DIN Rail. It is steel hat-shaped rails 35 mm wide and supplied to *FIRST* teams 18" in length.

DIN is an acronym from an old German national standard (Deutsches Institut für Normung). You often hear DIN referenced to various electronic components, particularly for audio connectors.

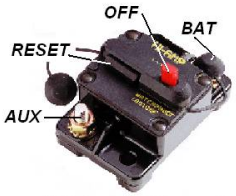
The DIN rails are primarily intended to mount the red and black terminal blocks found in the Power Distribution Block bag. The Power distribution block is used and featured in the 12 V Power System section of this chapter.

Typically the DIN rail is cut to the length required for the termination devices. In this case the block assembly shown below is 5 inches wide and the DIN rail has been cut to about 7 inches length to expose the mounting slots on each side of the block assembly.

In the bag you should find 4 Red and 4 Black Feed-thru Connector blocks, 3 ea. - End anchor blocks, 2 ea. - Center jumpers, and 2 ea. - End barriers. These parts are illustrated in the diagram above and shown in the typical order in which, and where they are assembled (each piece is slid onto on the DIN rail in sequence. The end anchors lock the assemblies in place on the rail. The bank of four black blocks are linked together with a center jumper. The second center jumper links the red blocks. Use an end barrier to cover the "open" end of each connection block as indicated in the assembly figure.

Tighten all the anchoring and linking screws securely. The *2008 Power Distribution wiring diagram*, and the discussions that follow will guide you in making proper power connections for your robot.

10.2.5.5 120A Circuit Breaker



120 Amp CB Layout

The 120A main circuit breaker/disconnect switch functions as the Main Power **ON/OFF** switch for the robot and as a Safety current overload protection device.

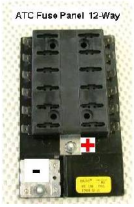
To power down the robot power manually, push the Red **OFF** button on the breaker. To reset Robot Power to ON, push the **RESET** lever back into its nested position.

The Positive (Red) wire on the output side of the Anderson connector should have a ¼" Ring lug crimped/soldered on and then be connected directly to the **BAT** post of the 120A main circuit breaker. Tighten the nut. Finish by fully pushing the rubber-insulating cap back down over the nut. This will assure that all power from the 12v battery now flows directly to the 120A breaker. Do not connect anything other than the 120A main circuit breaker/disconnect switch directly to the 12v battery's positive (+) terminal.

A fully charged 12Vdc battery can deliver current in excess of 200 Amps for a sustained period of time (minutes) in a short circuit situation. This amount of current can make wires smoke,

melt through insulation in a fraction of a second, start a fire, cause the battery to leak highly corrosive acid or explode, and result in serious burns or other injuries. Always make sure that the 120A main circuit breaker/disconnect switch is wired in series with the 12v battery positive (+) terminal and can break the circuit when necessary.

10.2.5.6 The ATC Fuse Panels



The Positive 12Vdc output of the 120 Amp Circuit Breaker typically is fed from the **AUX** terminal to the DIN Power Distribution block via a length of # 6 AWG (Red) wire. The output wiring (#12 AWG) is connected to the **+** Plus connection on the ATC panels. The battery negative connection from the ATC panel connects to the battery negative post on the power distribution block.

The 6 and 12-way ATC panels can hold a population of 30A, and 20A Snap-Action re-settable circuit breakers. The 20 and 30 Amp circuit breakers can be plugged into any available socket running the length of the panel. The Positive load wires are attached to the panel male tabs at the desired circuit breaker using the slip-on terminals provided in the Terminal Bag.

The Negative (Black) # 6 AWG wire on the output side of the Anderson connector must be connected to the GND Distribution block.

The battery negative connection must **NOT be connected** to chassis ground.

10.2.5.7 Maxi Style Fuse Block

The Maxi fuse block is used to support the 40 Amp service requirements of the larger drive motors. Up to four 40 Amp Snap Action circuit breakers can be fitted into the clips on the single Maxi fuse block shown here. If necessary, teams could use a second Maxi block for added 40-amp service. One end of the Maxi, the +12V feed block (top end in this photo), accepts up to three #6 AWG wires to distribute the +12V.

The load end of the Maxi provides 4 independent circuit feeds to the Victor 884 speed controllers. The negative wires of each load should be attached to the Battery negative side of the Power Distribution block.

Current ratings of the circuit breakers are the *maximum ratings* allowed. The AWG wire sizes to be connected to the different sized breakers are specified by the Rules as the *minimum AWG gauge* allowed.

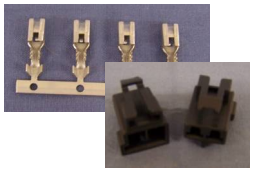
10.2.5.8 Quick Disconnect Battery Connector - Plugs

The battery plugs included in your kit are to help protect the contacts of the Anderson connectors when not in use. They can also be used to indicate the charge state of a battery.

10.2.5.9 Direct Mount Terminal Strips

Specifications for the AutomationDirect Direct Mount Terminal Strips provided in the 2008 KoP were included with the part, but can also be found online at http://web4.automationdirect.com/adc/Shopping/Catalog/Terminal_Blocks_-a-_Wiring_Solutions/Standard_DIN-Rail_Terminal_Blocks_(order_by_Component_Type)/Direct_Mount_Terminal_Blocks/BM-M092CS

10.2.5.10 Keyang motor terminals & housing



The 2008 KoP includes terminals and housing compatible with the connector on the 16627961 Keyang motor. You must crimp the terminals to your wire and then assemble them to the connector housing.

10.2.6 Sensor Modules

10.2.6.1 Sensor Strip

The 2008 Kit of Parts contains a sensor strip including two gear tooth sensors, a yaw rate gyro, and a dual axis accelerometer. For details about these devices, please reference the 2008 Sensors Manual posted on the *FIRST* website at www.usfirst.org/frc/2008/manual

10.2.6.2 *FIRST* IR Board

The FIRST IR board is considered a 2008 KoP item, however it was shipped to paid teams before Kickoff. More information about the FIRST IR board can be found online at www.usfirst.org/frc_decgift

10.2.6.3 IEC Rotary Limit Switch

Specifications for the AutomationDirect rotary limit switch provided in the KoP were included with the part, but can also be found online at http://web4.automationdirect.com/static/specs/limitaap.pdf.

10.2.6.4 Microswitch

Details for the microswitch, also known as a limit switch, can be found on the Honeywell website at http://sensing.honeywell.com/index.cfm?ci_id=140301&la_id=1&pn=V7%2D2B17D8%2D048.

10.2.7 Pneumatic Components

Please refer to the 2008 Pneumatics Manual posted on the *FIRST* website at www.usfirst.org/frc/2008/manual for details about the 2008 pneumatic kit items.

10.2.8 Game Pieces

10.2.8.1 Trackball Inflation

The 2008 Trackballs require some care in assembly and inflation. Each Trackball consists of two parts: a Bladder and a Cover. The bladder has a 120cm diameter and is made of 2500g PVC. These are shown here in un-inflated, as-shipped condition. The Cover is shipped inside out but don't hurry to correct this just yet.

Unfold both parts and lay them on a table or the ground. Inserted into the fill-spout of the Bladder (the light-colored vinyl part on top) is a small plastic Stopper. Using a fingernail or dull prying tool, remove the Stopper and put it aside safely: DO NOT LOSE IT! The Stopper is as shown here partly removed from the Bladder (1).

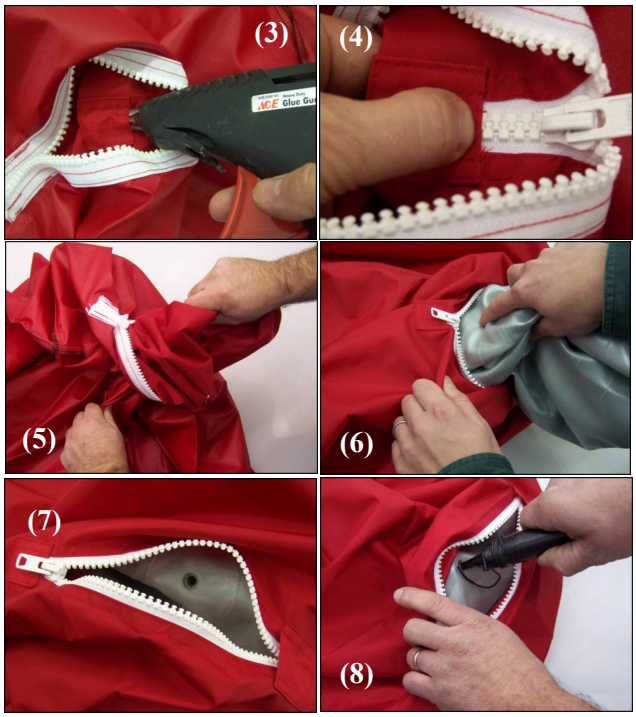
As you unfold your Cover (but not yet inverting it), you need to find the zipper. As shipped, there is a possibility that the Slider (the part of the zipper that moves) may inadvertently come off the Trackball cover and get lost. The following corrective procedure will ensure that this does not happen:

Position the zipper as shown in (2). The “pocket” is the square-shaped piece of colored nylon fabric that is stitched in place to cover the end of the zipper.

Safety first: When using a hot melt glue gun, always observe the manufacturer’s warnings about how to protect yourself!

Using a hot melt glue gun to dispense glue under the end of the pocket as shown (3). Use enough glue to ensure full adhesion between the underside of the pocket with the top of the zipper and its white edging, but not so much that it will ooze out of the pocket when it is squeezed together.

Taking care not to get burned, press gently to flatten the pocket as shown (4). If you get glue on your skin, remove the glue immediately. Place the Cover carefully aside to allow the glue to cool and set for at least five minutes. If you don’t have access to a hot-glue gun you may substitute an air-dry rubber based glue instead, being sure to allow adequate time for drying. Another option is to stitch this section of the pocket shut.



You are now ready to invert the Cover. As shown (5), pull it through the zipper opening until it is completely right side out.

Insert the Bladder into the zipper hole, keeping careful track of where the fill-spout is located. (6) It may take some fussing to insert the Bladder into the Cover; be careful not to tear the Bladder or exert excessive force on the zipper or any portion of the Cover.

Because you have kept track of the fill-spout, you can now shift the Bladder and Cover as necessary to center the fill-spout in the zipper opening as shown. (7) It may be helpful to pick up the Cover and Bladder and shake downward to encourage the Bladder to spread out somewhat inside the Cover.

Insert the nozzle of your inflator/compressor and begin to inflate the Trackball. (8) As the Trackball enlarges, stop occasionally to ensure that the fill-spout continues to be well centered in the zipper opening.

Inflate the Trackball so that the zipper appears as in the center photo. (9b) The Trackball on the left is under-inflated (9a), the Trackball on the right is over-inflated (9c). When properly inflated, the zipper will be able to be pulled and closed, not too hard, not too easy.

Under-inflated **Just right** **Over-inflated**


(9a)


(9b)


(9c)

Another good clue as to when the Trackball is properly inflated is to examine the seams on the outside of the ball. If they appear generally wrinkled and loose, your Trackball is under-inflated (10a). If they appear taut but not about to bust at the seams, it's about right (10b). If the seams look stretched and overstressed, and if the Trackball feels quite hard to the touch, there's too much air (10c).

Under-inflated **Just right** **Over-inflated**


(10a)


(10b)


(10c)

Once you arrive at a Trackball inflation that seems right, insert the Stopper all the way and pull the zipper slider closed. If the zipper seems really hard to pull, you may still have too much air, let some out.

It is important to insert the "tongue" of the slider as shown in the photo (11), to allow it to be opened more easily in the future.


(11)

10.2.8.2 Trackball Maintenance

The first time you inflate your Trackball the Nylon cover begins to slowly stretch out to its non-wrinkled condition. What you will probably see is that after a few hours the Trackball will slightly increase in size as the Nylon fabric relaxes, but the apparent hardness of the Trackball will decrease.

Should this happen, you can unzip the cover, pull out the Stopper and add some air. Using the methods described above, ensure that you are not over or under inflating the Trackball, then insert the Stopper and close the zipper.

The temperature of the surroundings can also affect the Trackball. For example, if you inflate in a cold area and then put the Trackball in a heated room, it will get harder as the air expands. The inverse is also true. In short, keep an eye on Trackball inflation and be prepared to adjust it up or down as required.

Note: Some teams may receive a blue Trackball instead of red. This is normal.