



INTRODUCTION

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0 INTRODUCTION

0.1 WHAT IS THE *FIRST* ROBOTICS COMPETITION?

The *FIRST* Robotics Competition 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 program has resulted in life-changing, career-molding experiences for its participants. It is also a lot of fun.

In 2006, our reach will expand to over 28,000 students representing approximately 1100 teams. These teams will come from almost every state in the U.S., as well as from Brazil, Canada, U.K., Mexico, Ecuador, Ghana, and Israel. *FIRST* has truly become an international program and is continuously growing. These teams will participate in 33 Regional Competitions and can qualify for the Championship Event at The Georgia Dome in Atlanta, Georgia. The competitions combine the practical application of science and technology with the fun, intense energy, and excitement of a championship- sporting event.

This year's challenge will be presented at the 2006 *FIRST* Robotics Competition Kickoff on Saturday, January 7, 2006. At the Kickoff, all teams:

- Will be shown this year's game and field for the first time
- Will learn about the 2006 game rules and regulations
- Will receive a kit of parts. The Kit of Parts will include motors, sensors, chassis, transmissions, vision camera, bearings, and other materials that teams can use in the design and construction of their robots. They will also receive a multi-channel radio control system and a 12V battery power supply. The kit is meant to provide a level starting point for all teams. The rules also describe the additional items teams can purchase.

When you bring dedicated, enthusiastic students, teachers, engineers, and other professionals together, they will produce a wide range of amazing machines that are competition ready in six weeks of construction time.

0.2 GRACIOUS PROFESSIONALISM, A *FIRST* CREDO

Dr. Woodie Flowers, *FIRST* National Advisor, asks and provides his view regarding the question, "Why do *FIRST* folks talk so much about that phrase?"

Quoting Dr. Flowers, "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.

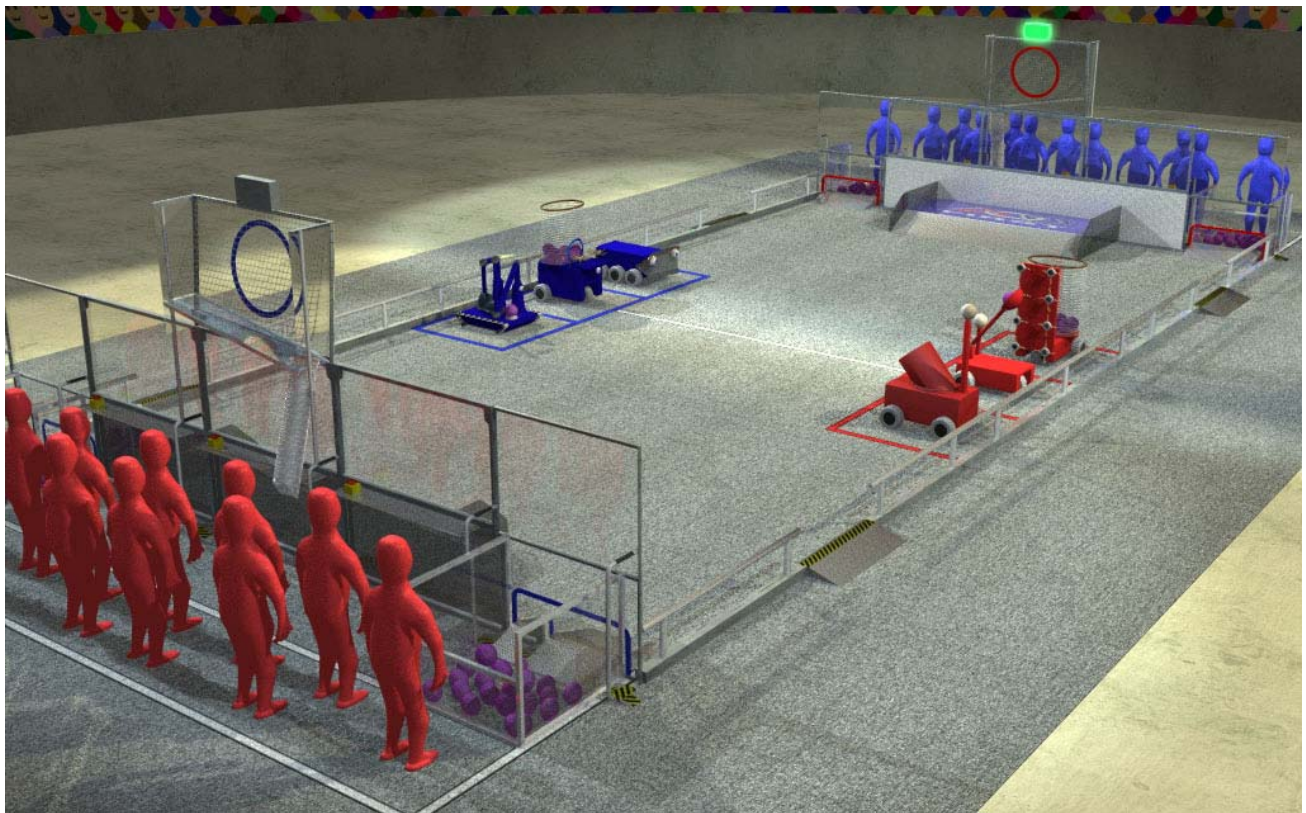
"In *FIRST*, one of the most straightforward interpretations of gracious professionalism is that we learn and compete like crazy, but treat one another with respect and kindness in the process. We try to avoid leaving anyone feeling like they are losers. No chest thumping barbarian tough talk, but no 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 SAFETY, A *FIRST* CULTURE

Safety is an important part of *FIRST* culture and should be observed by all participants at all times. As a part of the Industrial Safety Program, teams will be observed and evaluated at many different levels and by many individuals at the event. Safety Advisors will evaluate team safety behavior and practices in the Pit from the time the robot is uncrated, until the robot is re-crated for shipment. Referees will observe safety on the playing field as well as adherence to the rules. Judges will evaluate how a team has integrated safety into their robot designs when considering the team for technical awards.



0.4 THE 2006 GAME – “AIM HIGH”

“AIM HIGH” will present the teams with several new challenges:

- A 3 versus 3 alliance competition, with 3 vs 2 offense/defense periods
- A lighted target to improve vision system function (camera and associated electronics)
- Launching balls and pushing balls into goals..

This view (above) illustrates:

- Three Goals for each alliance
 - 1 Center Goal for each alliance
 - 2 Corner Goals for each alliance
- Alliance robots contained in alliance starting boxes.

3 **RED** human players and 3 **BLUE** human players stand in their alliance zones. Players must throw retrieved balls over the Plexiglas shields from behind the starting line to replenish alliance robot depleted balls, score single alliance points by manually throwing balls into corner goals, or throwing balls to disrupt opposing alliance ball launches.

Each alliance will have a maximum of 40 balls to start the game. Robots may contain up to a maximum of 10 balls at the start. Any balls not contained within the alliance robots will be provided to the alliance human players.

Robots will attempt to launch balls into the center goal for 3 points. Robots or human players may score a single point by throwing or pushing balls into the corner goals. Balls must stay in the goal and exit via the exit chute to count for a score. Human players may retrieve balls from the corner goals and / or center goal storage container. Human players can replenish any alliance robot and can share balls to maximize their scoring opportunities.

Each 2 minute, 10 second match, will feature two (2) three-team alliances playing from opposite ends of the field. The robots start from mid-field positions. Each match will consist of (4) periods: 1) period one autonomous mode (10 seconds), 2) a second (40 second) period, 3) a third (40 second) period, 4) and a final (40 second) period. After the autonomous period in which the robots control themselves, the robots are controlled by their drivers.

During the 10-second autonomous period at the start of a match, all robots can score points. The alliance with the highest score at the end of autonomous period will receive a 10 point bonus and be on “defense” in the next period. . During the second and third periods, one alliance is on offense and can score goals, and the other is on defense and cannot score goals. During these offense/defense periods, the defensive alliance must maintain a “BackBot”, which remains on its offensive side of the field either gathering balls, or setting up for shots, but not interfering with the offensive alliance.

In the third period, the scoring opportunity and the BackBot requirement switches. In the final period both alliances can score goals and/or play defense. Before the end of the match, alliance robots will speed back to their end zones and climb the ramp to the platform. Robots will score points for reaching their home platform before the end of the game: 5 points for one robot, 10 points for two robots and 25 points for 3 or more robots. Robots on an opposing alliances’ platform will be scored as points for their opponent.

Communication



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1 COMMUNICATION

1.1 OVERVIEW

This section provides teams with necessary information for contacting *FIRST* staff, using the *FIRST* logo, and other information regarding such topics as the Yearbook Page.

1.2 *FIRST* - CONTACT INFORMATION

You can reach *FIRST* via phone, fax, mail, and e-mail, or get information from our website at <http://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:
<i>FIRST</i> 200 Bedford Street Manchester, NH 03101	(603) 666-3906 or (800) 871-8326	Fax: (603) 666-3907 Engineering: (603) 666-0043 Finance: (603) 647-5772

1.3 TEAM SUPPORT

E-mail Address: frcteams@usfirst.org

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

The Operations group is ready to help your team. If you leave a voice mail, make it short but detailed and include your team number, name, e-mail address, and phone number. A Team Support representative will research the question and return your call or answer via e-mail.

1.3.1 E-mails and Subject Lines

Our program requires many requests in writing, so e-mail may be your best communication tool and the best way to get a quick answer to your question. E-mails save money, time, and provide information for a researched, more accurate answer. Please include your team number and short 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. We are a small group and must avoid duplicating efforts. We can usually answer questions or requests within one working day.

1.4 INNOVATION FIRST, INC.

(Control System-Speed Controllers)

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 Number: (903) 453-0802

Tech Support E-mail Address: info@innovationfirst.com

Website: <http://www.innovationfirst.com>

1.5 NEW: THE *FIRST* STORE (PARTS)

After Kickoff, Innovation First Inc. (IFI) will host an on-line store on behalf of *FIRST*. The purpose of this store is to assist teams in purchasing excess Kit of Parts items from *FIRST*. IFI will have the *FIRST* Store located on its website (www.ifirobotics.com). Only *FIRST* teams will be authorized to purchase the listed parts. *FIRST* will establish pricing for all parts, which will include handling charges, but not shipping charges.

Contact Tom Watson at (903) 453-0800 ext. 204 for *FIRST* Store matters (at Innovation First, Inc.).

1.6 GETTING ANSWERS TO YOUR COMPETITION QUESTIONS

The *FIRST* Robotics Competition Manual is available on the *FIRST* web site at http://www.usfirst.org/robotics/doc_updt.htm. *FIRST* will update this page twice a week with new information and clarifications about competing at *FIRST* Robotics Competition events.

FIRST also provides an on-line forum for questions and answers (Q & A). It is accessible at <http://www.usfirst.org/robotics/2006/qa.htm> and has for each section of the Competition Manual (e.g. "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 has been sent to the team's Main Contact.

To make it easier for FRC Team Rules Experts to post questions, we have redesigned the FRC Game Q & A forum so that Team Rules Experts may post directly to the moderators of the forum. Questions cannot be seen by others until a moderator accepts them.

The **Submit a Question** forum has been removed. Questions previously posted to that location prior to this change have been reviewed and the answers posted in the appropriate sections of FRC Game Q & A forum.

1.7 *FIRST* ROBOTICS COMPETITION WEBSITE

Visit *FIRST* Robotics Competition at its website at <http://www.usfirst.org/robotics/>

- **Check deadlines and dates**
- Find "Documents and Updates and Team Manual sections."
http://www.usfirst.org/robotics/doc_updt.htm
- Find team-sponsored events after the season
- *FIRST* event information. <http://www.usfirst.org/robotics/2006/rgevents.htm>
- Fundraising support materials. <http://www.usfirst.org/4vol/resourcectr/index.html>
- Find answers to administrative concerns

1.7.1 Team Website Links

The website also provides links to FRC teams' home pages. If you have a team-related web page, you can post it via our Team Information Management System (TIMS) as part of the registration / maintenance process. Remember to keep your website up-to-date for the website award review and related deadline.

1.7.2 Team Updates

After the Kickoff, *Team Updates* provide rules updates, important information about parts, administrative reminders/deadlines. 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. To find the updates on the *FIRST* Robotics website:

- Click the "Documents and Updates" button on the left side of the page
- Choose "Team Updates"

1.7.3 Recruitment & Public Relations Materials

You can find information on the *FIRST* website to enhance your team's recruitment efforts. Visit "About *FIRST*" for statements about the Impact of *FIRST*, testimonials, and *FIRST* financial information; and visit the Resource and Media areas for access to the documents you need to recruit new sponsors and volunteers.

<http://www.usfirst.org/4vol/resourcectr/index.html>

1.8 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. Refer to the "Calendar of Important Deadlines" to check: http://www.usfirst.org/robotics/2006/frc_time.htm

When teams use the system properly, the system provides *FIRST* with necessary, up-to-date:

1. Team Names: Official, Nickname, and the 21 letter Short Name for the scoreboard
2. Team Contact information for important, team messages, shipments, and *FIRST* e-mail blasts
3. Team Partner (Sponsor) information
4. Event attendance information for each team (Kickoff, Competition Events, Team Socials, Forums)
5. Team's FedEx or UPS shipping account number. (Purolator for Canadian teams)
6. Team Yearbook Page area (Judge Info)

TIMS "Team Information" provides options for:

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

1.8.1 NEW: TIMS Access for Both Main and Alternate Contacts

At the teams' requests, we have made it possible for each team to have two TIMS access persons.

Your adult Main and Alternate Contacts are responsible for accessing the TIMS, keeping the information current, and providing necessary information by the set deadlines. Each can enter the system with his/her logon information and make additions and changes as they occur. Keeping the system up-to-date is critical.

1.8.2 NEW: International Teams

If your team is an international team, 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 a Shipping, Main, or Alternate Contact.

1.8.3 "Off Season" and Current Contact Information

Each team contact listed in TIMS is responsible for informing the Main or Alternate Contact of any changes or additions to his/her TIMS record. If the team's phone numbers and addresses are incorrect, bad things can happen. This is especially crucial during team travel times and during school vacations. Be sure to provide the Main Contact with a secondary address, home and cell phone numbers, and e-mail addresses so we can reach you. If any of the team contacts leaves the team, replace his/her information with new contact information, and delete the former contact from TIMS.

1.8.4 Mentoring & Team Organization

If you wish to sign up to mentor or receive mentoring through TIMS, make sure your Main or Alternate Contact edits his/her TIMS record and clicks “yes” to the question “Share this address?” (or the e-mail, 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.

1.8.5 NEW: Team Names –Official, Short, and Nickname Deadlines

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

1.8.5.1 Your Official Team Name

The official team name includes sponsors and schools. We refer to them as Partners. This name is generated automatically when you enter the Partner information in TIMS, and appears in written materials, such as the *FIRST* Program Books. *Update TIMS with your partners whenever there is a change or addition.*

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

Our practice and match lists must be prepared early in the season. For this reason, we ask that you enter your short name and nicknames in TIMS by mid January.

Short Team Name: Once you have established your team partners (sponsors), 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. Remember, sponsors like and expect the recognition.

Nickname: Make sure to enter your team’s nickname. The announcer uses team nicknames during the game when doing the play-by-play descriptions.

1.8.6 Judges' Yearbook Page

The Yearbook Page is a team overview page. It is your team’s opportunity to share valuable information with *FIRST* and with the judges at the Regional and Championship events. Enter the information via TIMS under the “Pre-Event” information area.

The data you enter will provide important statistics about *FIRST* teams. 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.

1.8.6.1 Purpose of Yearbook Page

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

1.8.6.2 Enter Yearbook Page Information

The submission deadline is February 22, 2006.

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

Do not wait until the last minute: Many teams wait until the deadline date to start entering their information and have problems that they can’t resolve by closing time. Since we face a strict printing deadline preparing for events, we urge you to start and complete these pages as early as you can. If you ask early, Team Support will have time to help. Our small staff cannot help if too many teams wait until the last days.

No Time Extensions: *FIRST* cannot grant time extensions to complete the information. The printing deadline is rigid.

1.8.6.3 Required “Pre-Event” Information

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

- Number of years 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, parents on the team
- How many freshman, 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 the following:

- Team history
- Team goals
- *FIRST* impact on the team/community
- Community description
- Team strengths
- The most significant challenge the team overcame
- Robot game and strategy
- Team is most competitive for which awards this year?
- Funding sources
- Reasons for public awareness 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 these photos, and they 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 TIMS. To ensure proper archiving, carefully follow the directions.

1.9 NEW: AUTODESK CONTACT INFORMATION

Please refer below for contact information for various Autodesk areas:

General Autodesk questions: Kelly Stanphill
kelly.stanphill@autodesk.com

Autodesk training or purchase questions: Anthony Theos
anthony.theos@autodesk.com

General 3ds Max questions (NOT tech support): Kevin G Clark
kevin.g.clark@autodesk.com

Autodesk Inventor installation questions: John Elliott
Phone: (503) 692-8367
john.elliott@autodesk.com

To find a Autodesk education reseller: www.autodesk.com/avar

Change software installation option: (800) 225-1327
(From a network installation to a multiseat stand-alone installation)

1.10 EVENT-SPECIFIC INFORMATION

The *FIRST* Robotics website includes important information about specific events. We advise that you add to your FRC Manual information about the events you will attend. Critical items such as:

Site Maps

Forms for pre-ordered lunches

Team social events

Shipping and drayage We post specific information pertaining to Regional and Championship events on the website regarding site directions, team socials, pre-ordered lunches, and shipping and drayage. You will be able to download this information for the events you plan to attend. To find this information, do the following:

On the *FIRST* Robotics page, click on Regional Events or Championship, find your event, and click on "Site Info." or other links to pertinent information, such as pre-order lunch forms. Provide the information to your team people/subteams.

- a. Print the documents
- b. Distribute them to relevant team members
- c. Place them with your FRC Manual information

1.11 HOTEL INFORMATION - THE THS COMPANY

Each *FIRST* team must designate one person as the Team Travel Coordinator to manage this process. The THS Company handles hotel reservations for *FIRST* Robotics Competition events. All reservations are made on line at <http://www.ths-frc.com/>. Confirmations will come directly from THS.

The THS Company 306 High Street Hackettstown, NJ 07840	866-536-6966 888-536-TEAM http://www.thsweb.com/
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1.12 FIRST LOGOS

You have numerous creative opportunities of designing your own identity. Every year we see great examples of how teams "brand" their efforts with websites, 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 in your team effort.

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.

You can find the *FIRST* Logo with this url, <http://www.usfirst.org/4vol/FRCresourcectr/graphics/index.html>

1.12.1 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 "buzz" about your team in your community.

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

Unmodified: Use the *FIRST* logo without modification. This means that you will use our name and the triangle, circle and square as you see it on our website 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 *FIRST* logo from our website in JPEG (for electronic applications) or eps (for printed applications) format. Go to <http://www.usfirst.org/> and click on FRC Communications Resource Center in the Quicklinks menu. Select the “Graphics” Section.

Advertising Use Approval: All teams and sponsors must obtain approval from *FIRST* prior to incorporating our logo in any advertising. E-mail approval requests to Marian Murphy, murphy@usfirst.org or phone 800-871-8326, ext. 409.

1.12.2 Finding The Year’s Competition Logo

Now that the game has been announced, you can download the logo for “**AIM HIGH**” from the *FIRST* Robotics Competition Communications Resource Center portion of the website under “Graphics” at the following link: <http://www.usfirst.org/4vol/resourcectr/graphics/index.html>.

1.13 PROVIDING CORPORATE SPONSORSHIP TO *FIRST*

Please contact Charlie Clement, Director of Development, for information regarding the opportunity to provide sponsorship at (603) 666-3906 or (800) 871-8326, Extension 412. You can also contact him via e-mail at clement@usfirst.org.

1.14 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 can use your help. Please visit the *FIRST* website page, “For Volunteers,” to find out more about volunteer opportunities. You can register your preferences for events and volunteer positions via the *FIRST* Volunteer Information and Matching System (VIMS), an on-line registration system.

Team Organization



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2 TEAM ORGANIZATION

2.1 OVERVIEW

This section provides teams with suggestions for organizing a team, keeping team members up-to-date, and spreading the workload.

2.2 KEEP CONTACT RECORDS CURRENT IN TIMS

Communications between *FIRST* and teams is essential. 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 the Team Information Management System (TIMS) can be updated. Multiple phone numbers and e-mail addresses are needed so we can contact teams contacts during vacations, school shutdowns, and while the team is traveling.

Please keep your team record 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 DISTRIBUTE INFORMATION

Distributing information received from *FIRST* Headquarters is important. The Main and Alternate Contacts will receive the majority of communications from *FIRST*. He or she should disseminate information to relevant team and sub-teams members.

Highlighting specific topics of the communication is recommended. Reminding team members of specific responsibilities and impending deadlines is essential. A team bulletin board for *FIRST E-mail Blasts*, team happenings, meeting times, and deadlines is recommended.

2.4 SUGGESTED LEADERSHIP ROLES

This section recommends various team contact duties and responsibilities that are essential to maintain the competitive team effort in this season. ***Main Contacts must be adults, not pre-college students.*** Your team will ultimately decide which individual duties will be adopted and ensure that the individuals selected are up to the assigned tasks. It is the responsibility of these team leaders and other team members to establish, instill, and enforce team rules with regard to sportsmanship and conduct codes.

It is important that team members share the workload and equally commit to the team's success. Please make sure the team leaders understand each other's roles and can cover for each other if necessary.

Please examine the roles, and compare recommended qualities and abilities with your mentors from a *FIRST* perspective. *Of course, team structure is the team's prerogative and the following are only suggestions.*

2.5 REQUIRED CONTACT POSITIONS FOR TIMS

1. Main Contact
2. Alternate Contact
3. Shipping Contact

2.5.1 Main Contact

The Main Contact is the main source through which most information flows from *FIRST* to the team.

Main Contact's Responsibilities	
Team logon and password:	Receive, and keep secret, her/his Team Information Management System (TIMS) logon and password.
TIMS (Team Info System):	Maintain and update TIMS record.
Registration:	Register the team for events.
Communications:	Receive <i>FIRST</i> communications and reply when necessary. Review Safety Policies and Procedures on the <i>FIRST</i> website and ensure all team members have this information.
<i>FIRST</i> Information distribution:	Receive and disseminate all information from <i>FIRST</i> , including E-mail Blasts and Updates from the website, and to handle replying/complying with <i>FIRST</i> requests.
Scholarship Opportunities:	Keep students/teachers informed about scholarship opportunities well in advance of the deadlines.
Updates:	Disseminate e-mailed and web "Updates" information to relevant sub-teams.
Event Information:	Supply event information to <i>FIRST</i> , via TIMS.
Contact Information:	Verify up-to-date alternate mailing addresses and phone numbers are posted to TIMS for use during vacations or team travel.
UPS, FedEx, Purolator Account Number for TIMS:	Enter the team's UPS or FedEx number for TIMS. This is mandatory. The Shipping Contact should obtain this and provide it to the Main Contact. A sponsor or your school may let you use their account, or you can get a number from either shipping company's website.
Website Calendar:	Monitor the <i>FIRST</i> website calendar for changes, additions.
Yearbook Page:	Enter this submission into TIMS by the deadline.
On-Line Submissions	Ensure submissions of Woodie Flowers, Website, Chairman's, and other Awards by the respective deadlines.
NEW: FedEx Donation:	Confirm the Shipping Contact understands the FedEx donation process and use of the on-line FedEx PassKey System. See Section 6 – Transportation of this manual.
Release Forms:	Designate someone to distribute Release Forms and collect the completed signed forms. The Forms must be presented at the team's initial competition registration of the season. NOTE: The forms for students under 18 require a parent/legal guardian's signature. They are required for: a. Kickoff events b. Any of the <i>FIRST</i> Regional or Championship events. If a person does not attend the team's initial event, he/she must still provide one at a subsequent event. You must turn them in at that event.
Safety:	Work together with your team's Safety Captain and entire team to ensure safety while working and traveling.
Participation Medallions:	Ensure they are obtained at your team's initial event. See Section 7.10 –At the Event of this manual for details.

2.5.2 Alternate Contact

This person is the Main Contact's "right hand" and is important in the team's structure. This person should share the team administrative duties, and be ready to help in ways the team decides.

Alternate Contact's Responsibilities	
Team Logon and Password:	Receive, and keep secret, her/his Team Information Management System (TIMS) logon and password.
Support:	Provide any support the Main Contact may need.
Contact Information:	Provide the Main Contact with current contact information for TIMS.
Vacation Coverage:	The Main Contact and the Alternative contact will receive and be asked to disseminate <i>FIRST</i> communications.
Alternate Information:	Provide an alternate phone number and address in case <i>FIRST</i> has to make contact during vacation or while the team is traveling.
Scholarship Opportunities:	Inform students about scholarship opportunities and associated deadlines.
Public Relations:	Confer with Main Contact. Notify Public Relations Contact of any upcoming team fundraising or events.
Communications:	Receive relevant <i>FIRST</i> communications and reply when necessary. Chairman's Award project - Ensure any unusual stories about the team's overcoming obstacles are included in the Chairman's Award submission.

2.5.3 Shipping Contact

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

Shipping Contact's Responsibilities	
Contact Information:	Provide the Main Contact with current contact information for TIMS. Provide an alternate phone number and address in case <i>FIRST</i> needs to make contact during vacation or while the team is traveling.
Team's UPS, Purolator, or FedEx Account Number:	Provide the Main Contact with a shipping account number for the Team Information Management System (TIMS). This is a necessary and a mandatory portion of the <i>FIRST</i> system and directly impacts the missing, defective, or broken parts replacement system for your team. (A sponsor or your school may let you use their shipping number, or you can get a number from the company's websites).
Communications:	Receive relevant <i>FIRST</i> communications and reply when necessary.
Robot Shipment:	<ol style="list-style-type: none"> 1. Read the "Robot Transportation" Manual Section 6 and download your event(s) from the Events portion of the website, "Site Info." http://www.usfirst.org/robotics/2006/rgevents.htm 2. Be familiar with and conform to the following: <ul style="list-style-type: none"> • Deadlines and specifications of shipping your robot • The drayage system and its deadlines and specifications • On-time robot shipment and within the <i>FIRST</i> specifications. 3. Domestic Teams: Be completely familiar with the FedEx on-line PassKey system and print airbills. 4. Foreign and teams from AK, PR, HI: Become familiar with the FedEx donation system and keep airbills safe.
FedEx Donated Shipments: Obtain and maintain airbills	<p>Read the "Robot Transportation" Manual Section 6 and become familiar with the FedEx shipping donation, its specifications, and related on-line PassKey system for the contiguous states.</p> <p>Write down the airbill storage place, and tell someone else where they are in case you forget their location. The airbills are not replaceable.</p>

2.6 RECOMMENDED ADDITIONAL CONTACTS

2.6.1 Travel Contact

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

Travel Contact's Responsibilities	
Manual and Website:	Become familiar with any Travel Contact duties.
Comparative Pricing:	Obtain, consider, and compare travel costs prior to registering for an event(s). The web has many opportunities to compare airfares.
Hotel Reservations:	THS is a company that obtains reasonable hotel packages for <i>FIRST</i> teams. Look on the website for this benefit. Obtain and remember any password or logon for using the reservation system. Conform to the <i>FIRST</i> guidelines and deadlines regarding travel.
Contact Information:	Provide up-to-date contact information for TIMS. Provide an alternate phone number and address in case <i>FIRST</i> needs to make contact during vacation or while the team is traveling.
Communications:	Receive relevant <i>FIRST</i> communications and reply when necessary.

2.6.2 Public Relations Contact

This person's role in advertising the team's goals and accomplishments is critical.

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

2.6.3 Corporate / University Contact

This contact provides information about the team to the University or Corporation sponsoring the team.

Corporate/University Contact's Responsibilities	
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.
Scholarships:	Inform students about scholarship opportunities and deadlines. Encourage and assist students interested in applying for scholarships
Communications:	Receive related team e-mails. Provide information if necessary.
Contact Information:	Provide up-to-date contact information for the Main Contact and TIMS. Provide an alternate phone number and address in case <i>FIRST</i> needs to make contact during vacation or while the team is traveling.

2.6.4 School Contact

This adult representative is responsible for knowing and enforcing all school rules regarding team participation. A teacher or principal may be best qualified for the role.

School Contact's Responsibilities	
Public Relations:	Notifying Public Relations Contact of any upcoming team fundraising or events. Conferring with Main Contact.
Scholarships:	Inform students about scholarship opportunities and deadlines. Encourage and assist students interested in applying for scholarships.
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. Check with other team mentors for information. <ol style="list-style-type: none">1. Chairman's Award project - Continuously help record/document any unusual stories about the team overcoming obstacles during the year.2. Woodie Flowers Award3. Yearbook Page. (Look in on-line Manual, "Awards Section.")4. Website Award5. Autodesk Awards
Contact Information:	Provide up-to-date contact information for the Main Contact and TIMS
Safety:	Stress safety whenever possible.

2.6.5 Technical Contact

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

Technical Contact's Responsibilities	
Public Relations:	Notify Public Relations Contact when your robot nears completion or when you have an opportunity to show off your robot. If the Public Relations contact is not available, notify local media of any upcoming team fundraising or events. Plan these opportunities with your Main Contact.
Scholarships:	Encourage students to try for engineering scholarships. Inform them of the deadlines.
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 TIMS. Provide an alternate phone number and address in case <i>FIRST</i> needs to make contact during vacation or while the team is traveling.
Safety:	Stress safety and ensure safe working conditions, safety glasses use, etc.
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.

2.7 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 agree and find responsible candidates. *FIRST* does not need their contact information in 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 first event for each team's Safety Captain. If a team has more than one captain, these persons can take turns wearing the badge at the events.

2.7.1 Game Rules Monitor

Game/Rules Monitor's 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 Updates:	Communicate any changes in the updates to the team.

2.7.2 Safety Captain

This person can be an adult or student.

Safety Captain's Responsibilities	
Read Manual:	<ul style="list-style-type: none">• 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:	<ul style="list-style-type: none">• Obtain enough safety glasses for the team. Make sure all persons wear them over their eyes when working on the robot or in when they are 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.
Safety Policies:	Review Safety Policies and Procedures on the <i>FIRST</i> website and ensure all team members have this information and understand the importance of each person following them.
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 we use to ensure a safe environment. Use common sense and good judgment when bringing an infraction to a team's attention. Please be kind and positive. The Safety Captain is an ambassador for your team.
At Competitions:	<ul style="list-style-type: none">• Bring enough safety glasses for the team and its guests.• Make sure persons who will unpack your robot crate will have them to wear as soon as they arrive.• Make sure all persons wear safety glasses/goggles properly.• Know where the EMT area is.• Report any injuries to the Pit Supervisor at the time of injury or treatment.• Discourage running in the Pit or Competition Arena.• Help keep 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.

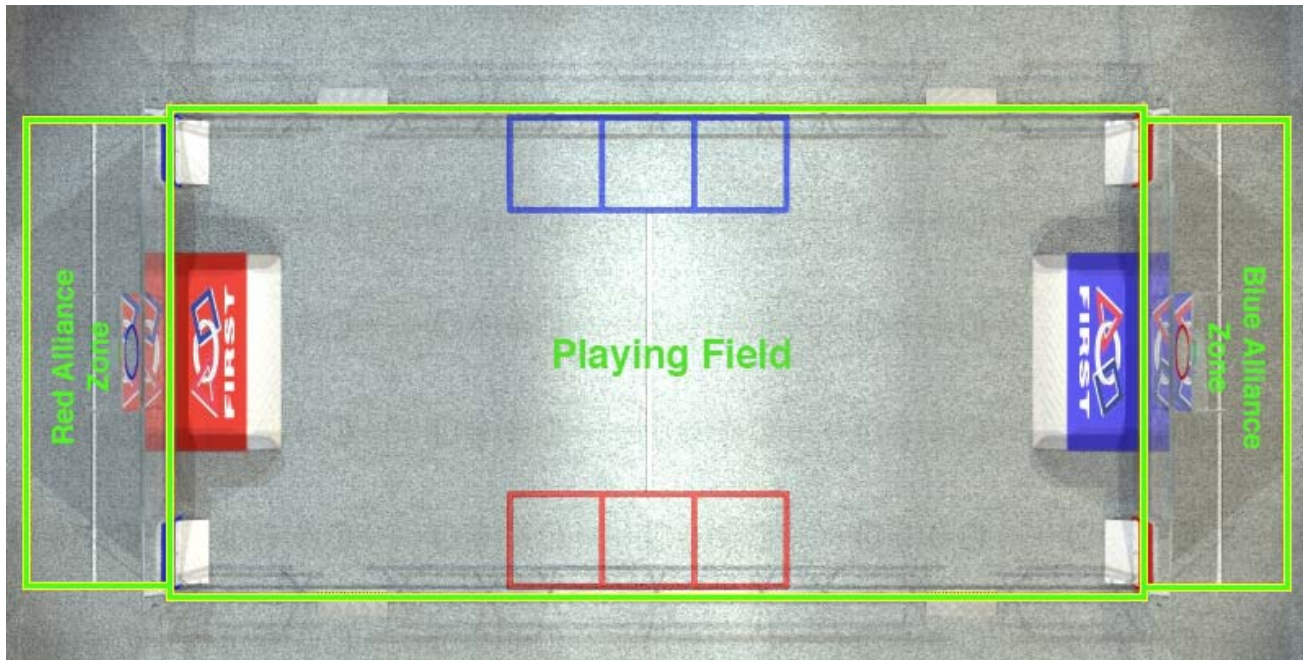
THE ARENA

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3 THE ARENA

3.1 OVERVIEW



Note: The illustrations in this section of the manual are for a general visual understanding of the field only. Teams should refer to the drawings for exact dimensions and field construction.

The Playing Field is a rectangular area in which the Robots compete. The Red and Blue Alliance Stations are rectangular areas, each consisting of three team stations, which are located outside of the ends of the Playing Field. The three teams that make up each Alliance play the game from these stations.

The specifications below are for the FIRST playing fields used in competition. These fields are welded aluminum, which are built to withstand rigorous play and damage from frequent shipping. Specifications and drawings for low cost versions of the field components are available on the FIRST website at http://www.usfirst.org/robotics/doc_updt.htm. Refer to “Team Drawings” in Section 3 of the 2006 First Robotics Competition Document.

3.1.1 Dimensions and Tolerances

All official dimensions are on the following drawings:

FRC DRAWINGS			
TITLE LINE 1	TITLE LINE 2	DWG NO.	SHEET/S
2006 FIELD	LAYOUT AND MARKING	6F-001	1 SHEET
DRIVERS STA. PANEL	FABRICATION	F05-0001	1 SHEET
DRIVERS STA. PANEL	ASSEMBLY	F05-0002	1 SHEET
DRIVERS STA. SUPPORT	FABRICATION	F05-0003	1 SHEET
DRIVERS STA. 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

TITLE LINE 1	TITLE LINE 2	DWG NO.	SHEET/S
FIELD, RAIL / GATE	FABRICATION & ASSEMBLY	F05-0008	1 SHEET
FIELD, LEFT END RAIL	FABRICATION & ASSEMBLY	F05-0009	1 SHEET
FIELD, RIGHT END RAIL	FABRICATION & ASSEMBLY	F05-0010	1 SHEET
FIELD, TOP RAIL	FABRICATION & ASSEMBLY	F05-0011	1 SHEET
FIELD BORDER PANELS	FABRICATION & ASSEMBLY	F05-0012	1 SHEET
OUTRIGGER	FABRICATION & ASSEMBLY	F05-0013	1 SHEET
FIELD SUPPORT WEIGHT	FABRICATION & ASSEMBLY	F05-0014	1 SHEET
HINGE INSERT	FABRICATION	F05-0015	1 SHEET
2006 VISION TARGET	FABRICATION & ASSEMBLY	2F-202	2 SHEETS
2006 CORNER GOAL	FABRICATION & ASSEMBLY	2F-100	3 SHEETS
2006 PLATFORM	FABRICATION & ASSEMBLY	2F-401	1 SHEETS
2006 CENTER GOAL	FABRICATION & ASSEMBLY	2F-500	4 SHEETS

TEAM FIELD ELEMENT DRAWINGSS			
TITLE LINE 1	TITLE LINE 2	DWG NO.	SHEET/S
2006 TFE CENTER GOAL	FABRICATION & ASSEMBLY	2F-T500	3 SHEETS
2006 TFE VISION TARGET	FABRICATION & ASSEMBLY	2F-T202	1 SHEETS
2006 TFE CORNER GOAL	FABRICATION & ASSEMBLY	2F-T100	3 SHEETS
2006 TFE PLATFORM	FABRICATION & ASSEMBLY	2F-T401	3 SHEETS

Where surfaces are indicated as flush, expect variations as much as 1/4 inch. This is not considered abnormal and is part of the game challenge. The reasons for these variations are numerous; different arenas are manufactured at different sites, set up by different volunteers, and undergo different temperature extremes. Volunteers and FIRST staff at each competition site will do their best to make the Arena and its elements as close to nominal as reasonably possible.

3.2 PLAYING FIELD

Note: The official Playing Field description, layout, dimensions and parts list are contained in the “2006 Arena Layout and Marking” Drawing. Diagrams and dimensions below are for illustrative purposes only.

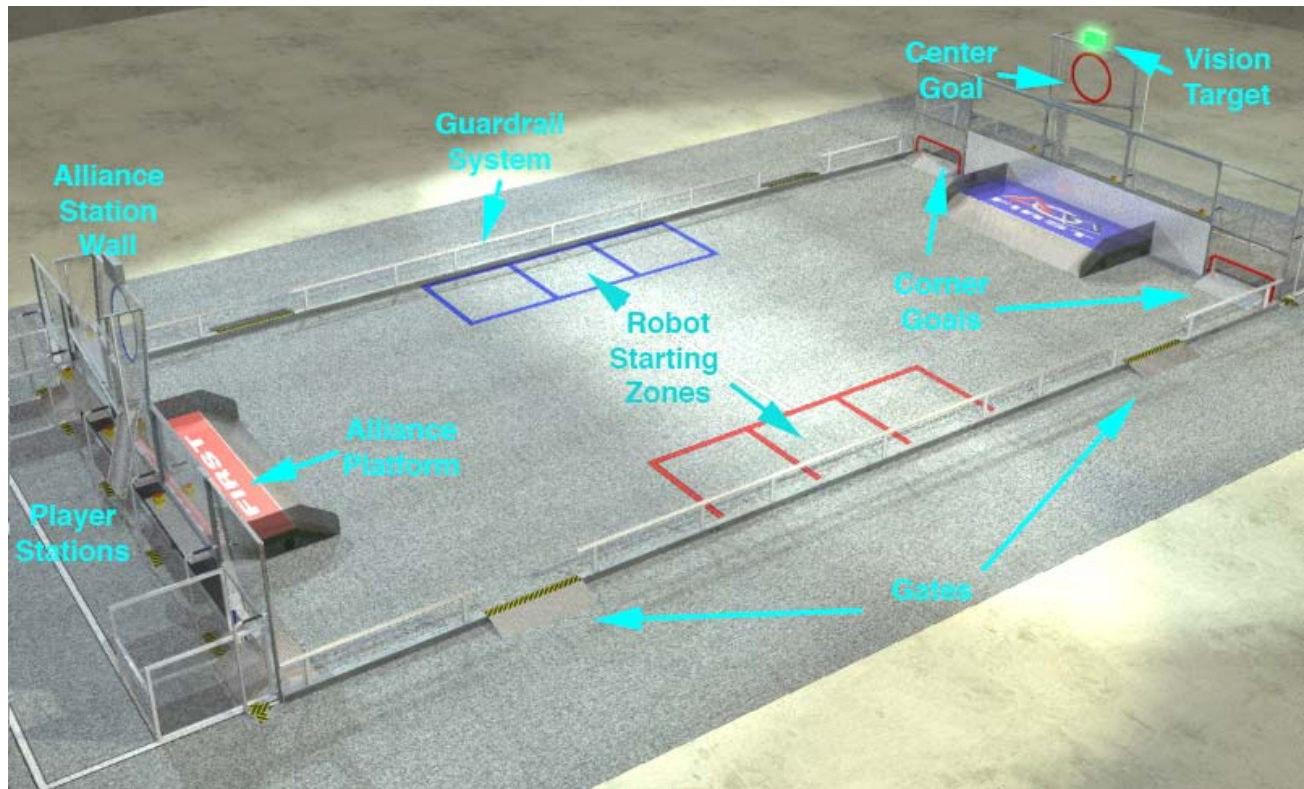
3.2.1 Boundaries and Markings

The carpeted Playing Field is 54 feet by 26 feet, bounded by two Alliance Station Walls and a Guardrail System.

The Alliance Station Wall is 6-1/2 feet high. The entire Alliance Station Wall is 26 feet wide, centered on the ends of the field. The center 18 feet of 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 outer four-foot section of either end of the Alliance Station Wall is made of transparent polycarbonate from floor to top.

The Guardrail System is a 20-inch high horizontal pipe with vertical supports mounted on a 3” aluminum angle. A shield is attached on the field side 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 Playing Field except where it is bounded by the Alliance Station Wall.

Four gates in the Guardrail System allow easy access to the Playing Field for placement and removal of robots. The gates are four feet wide and are located in each quadrant of the field. The gates are closed during game play.



At each side of the Playing Field, two-inch wide lines of gaffers tape define three five-by-five foot areas. These areas are the Robot Starting Zones. The tape is colored red or blue, to indicate which alliance should use the Robot Starting zone. The tape is not part of the Robot Starting zone. There is a 2" white line across the center of the field between the robot starting zones.

Scoring platforms are located at each end of the Playing Field. The scoring platform is colored red or blue, to correspond to the alliance located at the same end of the field.

3.2.2 Corner Goals

The Corner Goals are openings at the outer corners of the Alliance Station Wall through which the scoring objects (balls) may pass from the field into the Ball Corrals. The openings are 44 inches wide by 10 inches tall, and outlined with a 2-inch wide border of red or blue acrylic. The bottom of the opening is approximately 6-1/2 inches above the floor. A 24-inch long ramp leads up from the floor level to the bottom of the opening. The ramp permits easy entry of the scoring objects into the opening, while preventing them from rolling back out through the opening once they have passed through.



3.2.3 Center Goal

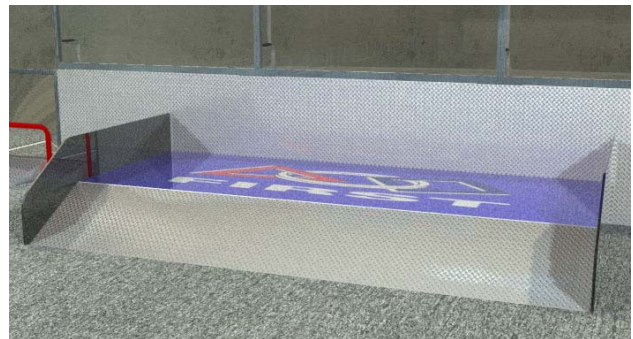
The Center Goal is located above each Alliance Station. The center six-foot section of each Alliance Station Wall extends to approximately 10-1/2 feet above the floor. A 30-inch diameter opening is located in the extended portion of the wall, centered at 8 feet, 6 inches above the floor. The opening is outlined by a 4-inch wide border of red or blue acrylic. The opening is backed by a rope mesh and suspended chains to absorb the impact of any scoring objects going through the opening. Scoring objects passing through the opening will be deflected downward by the mesh, and will exit the Center Goal by dropping into a collection tube at the bottom of the goal. There, they can be retrieved by the Human Players.



A vision system target is located immediately above the Center Goal. This target is an illuminated panel measuring 8 by 16 inches that is back-lit by a series of cold cathode tubes mounted in an aluminum enclosure. The vision system target will be illuminated when the Center Goal is “active” and available for scoring.

3.2.4 Alliance Platform

An Alliance Platform is located at each end of the field adjacent to the Alliance Station Wall. The horizontal surface of the platform is 12 inches above the field, 48 inches deep, and 11 feet wide. The surface of the platform is covered by clear polycarbonate. An aluminum diamond-plate ramp leads up from floor level to the top of the platform at a 30-degree angle. 24-inch tall walls made of 1/2 inch polycarbonate form the ends of the platform to prevent robots from falling off the platform.



3.3 SCORING OBJECTS

The Scoring Objects are 7-inch diameter self-skinning foam balls. They are “7-inch Foam Basketballs” made by Poof-Slinky, Inc. Each alliance will have forty balls at the start of each match.

3.4 ALLIANCE ZONES



Each Alliance Zone is 8' x 26', with three identical player stations. All Human Players stand behind the Alliance Station Wall, where they can move between the Center Goal and Side Goals.

3.4.1 Boundaries and Markings

Each Alliance Zone shares the Alliance Station Wall with the Playing Field and has its outer and back edges marked on the carpet with white gaffer tape. The Alliance Zone extends eight feet back from the Alliance Station Wall, and is the width of the field. Four feet from the Alliance Station Wall, the Starting Line is marked on the carpet with a two-inch wide white gaffers tape. The tape boundaries are considered “in” the Alliance Zone.

3.4.2 Ball Returns

A Ball Return is located at the lower edge of each Center Goal, to guide scored balls safely down to the player stations for retrieval by the Human Players. The Ball Return is a section of 9 inch diameter corrugated plastic pipe through which the balls descend from an opening in the bottom of the Center Goal.

3.4.3 Ball Corrals

A Ball Corral is located at the ends of the Alliance Station Wall to restrain any balls that enter through the Corner Goals. The Ball Corral covers a four-by-four foot area. The side walls of the Ball Corral are three feet tall and constructed of square aluminum tube and polycarbonate. The back wall of the Ball Corral is of similar construction, except it is only 20 inches tall to permit easy retrieval of balls from the interior of the corral.

3.4.4 Player Stations

Attached to the Alliance Station Wall are three aluminum shelves to support the alliance robot control systems of the three teams. At each setup location a Competition Cable (to attach to the “Competition Port” of the Operator Interface) for each team will be available. This cable provides power control for the team’s Operator Interface and communications with the robot. Emergency Stop (E-Stop) buttons for each team are located on the left end of each Player Station shelf.

3.5 DRAWING NOTES

The materials required to construct the “Aim High” playing field are commonly available from multiple sources. In most cases, teams should be able to obtain all the materials required to construct a practice field from local hardware stores, home improvement centers, and/or industrial supply resources. If all materials are not available through your local outlets, some sources for field construction materials are listed below:

- Supplier for the White Gaffer’s Tape for field markings: Go to <http://www.tapemonster.com>
 - Order Shurtape PC-628 2” x 60 yds Red Gaffers Tape for the line that marks the Red Alliance End Zone. It is ~\$8 per roll.
 - Order Shurtape PC-628 2” x 60 yds Blue Gaffers Tape for the line that marks Blue Alliance End Zone. It is ~\$8 per roll.
 - Order Shurtape PC-628 2” x 60 yds White Gaffers Tape for the lines that mark the Team Zones. It is ~\$8 per roll.
- Supplier for plastics & HDPE: Plastic Supply Inc., located in Manchester, NH. Go to <http://www.plasticsupply.com/> or call 800-752-7759 or 603-669-2727 (Fax 603- 668-1691; Email: plasticsupply@conversent.net). Identify yourself as a FIRST team and give them your team number.

THE GAME



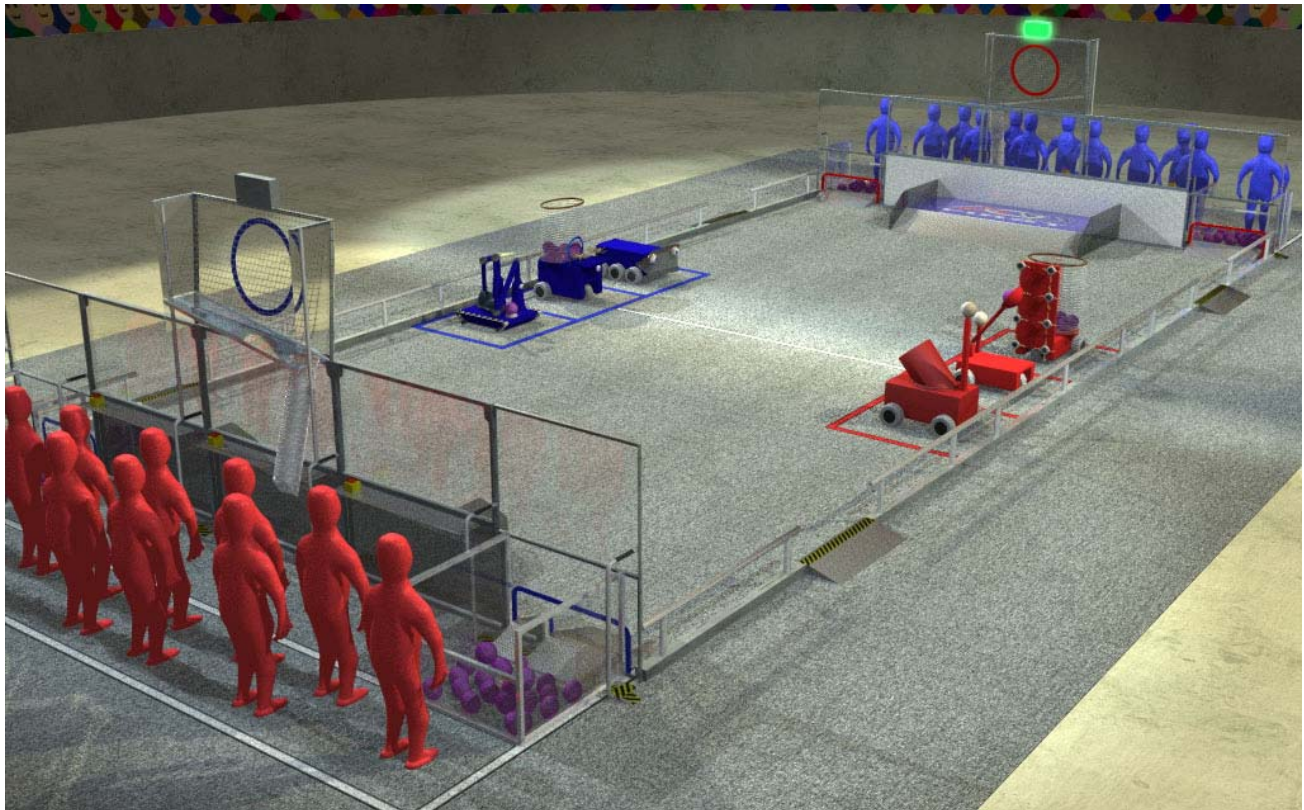
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4 THE GAME

4.1 GAME OVERVIEW

AIM HIGH is a game played on a field as 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 alliance by scoring balls in the center or corner goals, and/or by having ROBOTS on your platform or ramp at the end of the match. 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 field and game only. Teams should refer to the drawings for exact dimensions and field construction.*

4.2 THE GAME

4.2.1 Definitions

ALLIANCE: A set of three FIRST Robotics Competition teams that work together during a match to play *AIM HIGH* against an opposing **ALLIANCE**. **ALLIANCEs** are identified during the match by alliance color, either red or blue.

ALLIANCE PLATFORM: The raised platform at each end of the field directly beneath the center goal. The **ALLIANCE PLATFORM** includes the horizontal platform, the ramp between the floor and the platform, and the vertical side walls on each side of the platform and ramp.

ALLIANCE ZONE: The 26' x 8' area behind the Alliance Station Wall at either end of the field, where the alliance team members stand during the match. The **ALLIANCE ZONE** includes the area behind the **STARTING LINE**.

BACKBOT: The robot that an ALLIANCE keeps on their offensive side of the field while their ALLIANCE is on defense. The BACKBOT can be any of the three ALLIANCE ROBOTS, and can change during the match.

BUMPER ZONE: The volume between two planes parallel to the floor, the lower bound being 2 1/2 inches above the floor, and the upper bound being 8 1/2 inches above the floor. The BUMPER ZONE is defined with respect to the robot at the start of the match and moves with the robot as it climbs the ALLIANCE PLATFORM.

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.

DRIVER: A pre-college student team member responsible for operating and controlling the ROBOT.

HUMAN PLAYER: A pre-college student team member designated as the only team member permitted to enter balls onto the field.

GAME PERIODS:

- **AUTONOMOUS PERIOD:** The 10 second period at the beginning of the match in which the ROBOTS operate and react only to sensor inputs and to commands programmed by the team into the onboard robot control system.
- **SECOND PERIOD:** The first 40-second period after AUTONOMOUS PERIOD, following AUTONOMOUS PERIOD after a time delay.
- **THIRD PERIOD:** The second 40-second period after AUTONOMOUS PERIOD, immediately following the SECOND PERIOD.
- **FINAL PERIOD:** The third 40-second period after AUTONOMOUS PERIOD, immediately following the THIRD PERIOD.

ON-SIDES: The half of the field farthest from the ALLIANCE’s driver’s stations. This is the offensive half of the field for the ALLIANCE on defense. The centerline is part of the ON SIDES half of the field.

ROBOT: Anything that has passed ROBOT inspection that a team places on the field prior to the start of a match.

ROBOT STARTING ZONE: Three 5 by 5 foot areas on each side of the field marked by Blue or Red 2”-wide tape corresponding to the alliance colors.

SHOOTING MECHANISM: the mechanism that delivers the final dynamic impulse that ejects the ball from the robot, and any parts of the robot that contact the ball while and/or after this impulse is delivered.

STARTING LINE: A line 4 feet behind the Alliance Station Wall, indicated by a line of 2” white gaffer’s tape on the floor.

4.2.2 Match Format

A match is 2 minutes and 10 seconds long. An AUTONOMOUS PERIOD starts the match, which lasts 10 seconds. Following AUTONOMOUS PERIOD, there are 2 minutes of tele-operated game play, which are broken up into three 40-second periods. There may be a short pause between AUTONOMOUS PERIOD and the start of the tele-operated periods as the players stations are activated. The SECOND PERIOD and THIRD PERIOD are offense/defense, where only one ALLIANCE can score. During the FINAL PERIOD, both ALLIANCEs can score.

4.3 RULES

4.3.1 Safety

- <S01> If at any time a ROBOT's operation or design is deemed unsafe by the head referee, it will receive a 10-point 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 field unless the design has been corrected. An example of unsafe operation is repeatedly throwing balls off the field at audience members, media personnel, judges, referees, etc. An example of an unsafe design is a SHOOTING MECHANISM that has a large mass that is stopped abruptly at the end of travel and is at risk of breaking off the ROBOT and becoming a projectile. Another example of an unsafe robot design is a bright targeting light or laser pointer that could interfere with driver's ability to control their robot.
- <S02> Muzzle Velocity - No ROBOT may throw a ball with an exit velocity of greater than 12 m/s (26.8 mph). As a reference, a ball traveling at this velocity when leaving the ROBOT at an angle of 30° from horizontal with no spin will travel approximately 35 feet. A robot that violates this rule will be considered unsafe per <S01>.
- <S03> The SHOOTING MECHANISM must remain inside the ROBOT - Any mechanism used to throw balls must be contained within the original 28" x 38" x 60" starting envelope of the ROBOT and must be shielded such that the mechanism cannot make contact with other ROBOTS. A ROBOT that violates this rule will be considered unsafe per <S01>.
- <S04> HP/DRIVER/COACH cannot touch a ROBOT - HUMAN PLAYERS, DRIVERS, and COACHes may not directly contact the ROBOT at any time during the match. Violating this rule will result in the disabling of the team's ROBOT for the remainder of the match.
- <S05> E-Stop - Three Emergency Stop (E-Stop) buttons are located in each alliance station, one for each team. Pressing an E-Stop button will cause the corresponding 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, including COACHes, may press the E-Stop button.

4.3.2 Game Periods

- <G01> AUTONOMOUS PERIOD - During AUTONOMOUS PERIOD both ALLIANCES may play offense or defense, and all goals are active for scoring. During AUTONOMOUS PERIOD the ROBOTS react only to sensor inputs and commands programmed into the onboard control system. Human control of the ROBOT is not permitted at this time. All ROBOT safety rules are still applicable during AUTONOMOUS PERIOD.
- <G02> SECOND PERIOD - The ALLIANCE with the highest score at the end of AUTONOMOUS PERIOD will play on defense during the SECOND PERIOD. In the event of a tie at the end of AUTONOMOUS PERIOD, the ALLIANCE playing on defense during SECOND PERIOD will be chosen at random. Any balls scored in the defensive ALLIANCE's goals (opposite their DRIVER's station) during this period will not be counted.
- <G03> THIRD PERIOD - The ALLIANCE that was on offense for the SECOND PERIOD will play on defense during the THIRD PERIOD. Any balls scored in the defensive ALLIANCE's goals during this time will not be counted.

<G04> FINAL PERIOD - Both ALLIANCES may play offense or defense during the FINAL PERIOD. Balls scored in all goals will be counted.

4.3.3 Scoring

<G05> In order for a ball to score, it must enter the goal and exit via the exit chute. A ball that bounces out of the goal is not scored. Once a ball is scored for a particular ALLIANCE, it cannot score again until it is entered onto the field by the opposing ALLIANCE's HUMAN PLAYER.

Point Values:

<G06> Center Goal - A ball scored in the center goal is worth 3 points for the ALLIANCE whose DRIVER's station is opposite the goal, when that ALLIANCE is designated as playing offense.

<G07> Corner Goal - A ball scored in the either of the corner goals is worth 1 point for the ALLIANCE whose DRIVER's station is opposite the goal, when that ALLIANCE is designated as playing offense.

<G08> AUTONOMOUS PERIOD Bonus - The ALLIANCE that has the highest point total at the end of AUTONOMOUS PERIOD will receive a 10 point bonus.

<G09> ROBOTS on ALLIANCE PLATFORMs - ROBOTS score points if they are entirely on an ALLIANCE PLATFORM when they come to rest at the end of the match. ALLIANCES receive points for ROBOTS belonging to either ALLIANCE that are on the ALLIANCE PLATFORM closest to the ALLIANCE's DRIVER station. If any part of the ROBOT is touching the carpet, the ROBOT is not considered on the platform. If a ROBOT is entirely on an ALLIANCE PLATFORM and is touching another ROBOT that is not entirely on the ALLIANCE PLATFORM, it still is considered on the platform. One ROBOT on a platform or ramp is worth 5 points, two ROBOTS are worth 10 points, 3 or more ROBOTS are worth 25 points.

4.3.4 Robot Operations

4.3.4.1 Starting Conditions

<G10> Starting Positions - At the beginning of a match, the three alliance ROBOTS must be placed inside one of the three 5' x 5' robot starting zones located at mid-field to the right of the DRIVER's station and not touching the tape boundaries. It is the responsibility of the head referee to verify that this rule is satisfied prior to the start of the match. The match will not be started until all robots are in the starting position.

<G11> Alignment Devices - Alignment devices (templates, tape measures, 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 by the head referee.

<G12> Starting Size - At the beginning of a match, each ROBOT must not exceed a volume of 28 inches by 38 inches by 60 inches tall, excluding its bumpers. It is the responsibility of the head referee to verify that this rule is satisfied prior to the start of the match. An offending ROBOT will be removed before the start of the match at the head referee's discretion.

<G13> Balls Contained in ROBOTS at the Start of a match - Each ALLIANCE will start a match with 40 balls. Each ROBOT may contain up to 10 balls at the start of a match. Any balls not contained within the robot will be distributed between **totes located outside** the alliance zone. All of the balls must be contained within the ROBOT's 28" x 38" x 60" starting volume and must be clearly visible from outside the

ROBOT. The Head Referee will require that balls outside of the starting volume be removed. It is the responsibility of the head referee to verify that this rule is satisfied prior to the start of the match.

4.3.4.2 Robot Out Of Bounds

<G14> ROBOT Out of Bounds - Any ROBOT that touches the floor (the surface co-planar with the playing surface) outside of the field boundary will be disabled for the remainder of the match. No penalty points will be assessed.

<G15> Grace Period After Autonomous - If a ROBOT should touch the floor outside of the field boundary during the AUTONOMOUS PERIOD, it will have a 10 second “grace period” to right itself and return to the playing field at the beginning of the tele-operated period. If it is able to do so within the 10-second grace period, it will not be disabled. If at any time the referee should determine that the attempts to recover from the situation constitute unsafe operations, Rule <S01> will take precedence.

4.3.4.3 Robot Dimensions

<G16> Maximum Height - A ROBOT may not extend above 60” above the floor or the ALLIANCE PLATFORM in a stable configuration at any time during a match. Each violation shall result in a penalty of 5 points per occurrence or 5 points per ball shot or ball blocked during the occurrence, whichever is greater. ROBOTS designed to violate this rule are not allowed. For example, a ROBOT that extends a blocking device in front of the center goal will be disqualified. Transient conditions that may cause a diagonal dimension of the robot to momentarily exceed the 60” height restriction – such as during a tip-over or when climbing onto the ALLIANCE PLATFORM – are not subject to this rule. The one exception to the height restriction is provided in rule <R13> (flag rule).

<G17> ROBOT Orientation - ROBOTS must maintain their vertical orientation with respect to their starting position throughout the match. ROBOTS may not intentionally tip over onto one of their initially vertical sides and operate with this side parallel to the ground. **“Flop-Down” robots will be disqualified.**

<G18> ROBOT Extension Size – ROBOTS may not extend beyond a 60-inch limit in either horizontal cardinal dimension as specified in <R08>. Robots that violate this rule will be disqualified.

4.3.4.4 Robot Interaction

<G19> Field Interaction - ROBOTS may push or react against any elements of the field, provided there is no damage or disruption of the field elements. ROBOTS may not grab, grasp, grapple, or attach to any field structure. If a ROBOT violates this rule, the head referee will give one warning. If the referee determines that team is disregarding the warning, the team’s ROBOT will be disabled for the remainder of the match.

<G20> Field Damage - The head referee may disable a ROBOT that has damaged the playing field, carpet, goals, etc. if the head referee feels that further damage is likely to occur. The head referee may require corrective action, such as eliminating a sharp edge, and re-inspection, before the ROBOT will be allowed to compete in subsequent matches.

<G21> ROBOT Incursion into the Corner Goal – **Robots should not enter the corner goals.** Incidental incursion into the corner goal that occurs as a result of a ROBOT pushing balls into the goal is permitted, not to exceed a distance of approximately 3 inches. **The 3 inches does not include the deflection of the goal panel or structure.** Intentional incursion, for example to use a ball gathering mechanism to drop off balls inside the goal, or extending a portion of the ROBOT through the goal opening to activate the ball counting system, will result in disqualification of the offending ROBOT. **Any incursion substantially**

beyond 3 inches, particularly if the robot extends over the lighted scoring system panel, will be considered intentional incursion.

<G22> Intentional ROBOT - 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. However, AIM HIGH is a highly interactive game, and some appropriate contact is allowed subject to the following guidelines:

- Rule <R35> in Section 5.3.4 establishes ROBOT BUMPER ZONES. Any contact within this zone is generally acceptable, with the exception of high speed long distance ramming. If two ROBOTS choose not to use bumpers, and they contact such that simultaneous contact occurs both in and out of the BUMPER ZONE, then this contact is considered within the BUMPER ZONE.
- Contact outside of the BUMPER ZONE is generally not acceptable, and the offending ROBOT will be assessed a 5-point penalty, and may be disqualified from the match if the offense is particularly egregious or if it results in substantial damage to another ROBOT. Incidental contact will not be penalized. Contact outside the BUMPER ZONE that is a result of tipping caused by contact within the BUMPER ZONE will be considered incidental contact.
- If a ROBOT extends outside of its 28 inch by 38 inch starting footprint, it is responsible for the extension's contact with other ROBOTS and 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.
- Extension to extension contact between 2 robots with appendages outside the 28-inch by 38-inch starting envelope will generally not be penalized.
- Contact with a tilted robot such that the contact is outside the bumper zone will generally be considered incidental contact.

In all cases involving robot-to-robot contact, the Head Referee may assess a 5-point penalty and the robot may be disqualified, subject to these guidelines.

<G23> Accidental Entanglement - If, due to its own loose cables, hoses, cordage, etc., a ROBOT unintentionally but routinely entangles another ROBOT as a result of normal game interaction, the head referee may at his or her discretion disqualify the offending ROBOT and require that the entangling device be repaired prior to the ROBOT's next match.

<G24> Pinning - While on the carpeted field surface, a ROBOT cannot pin (inhibit the movement of another ROBOT while in contact with a field element or border) for more than 10 seconds. This rule does not apply if either ROBOT is entirely on an ALLIANCE PLATFORM. If a ROBOT has been pinned for 10 seconds, the team with the pinning ROBOT will be told by a referee to release the pinned ROBOT and back away approximately 3 feet. Once the pinning ROBOT has backed off by 3 feet, it may again attempt to pin its opponent, and if successful, the 10 second count will start over. If a referee determines that this rule has been violated, a 5-point penalty flag will be assessed for each violation.

4.3.4.5 Match Play

<G25> Balls Out of Play - Balls that leave the playing field over the side field boundaries will be placed on the field just inside the field boundary approximately where it left the field, provided it is safe to do so. Balls that leave the field over the player station will be given to a HUMAN PLAYER closest to where the ball left the field. Every attempt will be made to return balls to the field. However, if there are no balls available to replace balls thrown out of the immediate area, then the match will continue with the balls that remain on the field.

<G26> ROBOT Off Sides - During the SECOND and THIRD PERIODS the ALLIANCE on defense can have at most two (2) operable* ROBOTS on the defensive end of the field (the near end of the field, from the ALLIANCE point of view). If the ALLIANCE has a third operable ROBOT, that ROBOT (the BACKBOT) must be positioned on the end of the field farthest from the ALLIANCE STATION.

If an ALLIANCE is determined to be "Off Sides" they will immediately receive a 5-point penalty. The ALLIANCE will receive an additional 5-point penalty every 5 seconds thereafter, until they have placed a valid BACKBOT in position at the far end of the field. In all situations if a BACKBOT is prevented by an offensive ROBOT from crossing the field centerline, then the ALLIANCE will not be penalized.

The mid-field line is included in both the defensive and offensive half of the field. Multiple ALLIANCE robots are permitted in the far half of the field. ROBOTS of the same ALLIANCE may dynamically change the designation of the BACKBOT during the defensive period as long as there is at least one BACKBOT during the entire period.

<Part A> If an alliance starts a defensive period with more than two operable* ROBOTS on the defensive side of the field, then:

- If none of the ALLIANCE ROBOTS are moving toward the far end of the field at the start of the period, then the ALLIANCE will be considered Off Sides.
- If at least one of their ROBOTS is moving toward the far side of the field, then the ALLIANCE will have a 5 second grace period in which to position a ROBOT beyond the mid-field line and make it their BACKBOT. After the conclusion of the grace period, if the ALLIANCE does not have a valid BACKBOT they will be considered Off Sides.

<Part B> During the defensive period, if an ALLIANCE BACKBOT crosses the centerline to the defensive side of the field before another ALLIANCE ROBOT has taken position as BACKBOT, then the ALLIANCE will be considered Off Sides.

<Part C> During the defensive period, if an alliance BACKBOT is pushed across the center line and into a potential off-sides violation by an opposing ROBOT, the BACKBOT will continue to be considered "On Sides" unless and until it begins to play defensively. If the BACKBOT does not begin defensive play, then it may stay in the position in which it was deposited by the opposing ROBOT, or move back across the centerline at it's own pace. If the BACKBOT does begin to play defensively, then (given that another ALLIANCE ROBOT has not moved to become the new BACKBOT) the ALLIANCE will be considered Off Sides.

* Note: a ROBOT will be considered operable unless the robot has fallen over and cannot be righted, or the ROBOT has been disabled by the field control system, or the team has pushed the "E-Stop" button to disable the ROBOT. Loss of control due to operator error, user software errors, or faulty mechanical systems are not sufficient to cause a ROBOT to be classified as "inoperable."

<G27> ROBOTS Must Throw the Balls into the Center Goal - Only a ROBOT may throw a ball into the center goal. The kinetic energy of the ball must be supplied by the ROBOT. A HUMAN PLAYER may not bounce a ball off a ROBOT and score it in the center goal. A violation of this rule will result in a 5-point penalty.

<G28> ROBOTS Can Pick Up Balls - ROBOTS are permitted to pick up balls from the field.

<G29> Detaching Mechanisms - ROBOTS may not intentionally detach parts or leave multiple mechanisms on the field. Violations will result in a 5-point penalty. If an intentionally detached component or mechanism impedes access to a ramp or a goal, the offending ROBOT will be disqualified from the match.

<G30> Field Reset, ROBOT Ball Release - ROBOTS must be designed to permit the release and removal of any balls from the ROBOT without being powered up after a match. If a ROBOT violates this rule, the head referee will warn the offending team and request that they modify the ROBOT. If the modification is not made, the head referee may not allow the ROBOT to compete in future matches.

4.3.5 Team Member Actions

<G31> Number of people in the ALLIANCE ZONE - Each team shall include a maximum of one HUMAN PLAYER, two DRIVERS, and one COACH. A team with additional personnel in the ALLIANCE ZONE will be assessed a 5-point penalty, and the additional person will be asked to immediately leave the ALLIANCE ZONE.

<G32> Travel Within the ALLIANCE ZONE - All team members may travel anywhere within the ALLIANCE ZONE.

<G33> HUMAN PLAYER Shooting Zone - The HUMAN PLAYER must remain behind the STARTING LINE and within the ALLIANCE ZONE when they are entering a ball onto the field. Each violation will result in a 5-point penalty. Human players may jump to enter a ball onto the field. However, if their momentum carries them across the starting line, even after they release the ball, a penalty will be assessed. Extreme jumping, sitting or standing on the shoulders of another human player, or any behavior that is potentially hazardous to the team members or field personnel, or damaging to the robots, will be considered a violation of Rule <S01>.

<G34> HUMAN PLAYER/COACH/DRIVER Out of ZONE - All team members must stay within their ALLIANCE ZONE during the match. Each violation will result in a 5-point penalty.

<G35> HP/COACH/DRIVER Over The STARTING LINE During AUTONOMOUS PERIOD - No team member may pass the STARTING LINE in the ALLIANCE ZONE until the conclusion of the AUTONOMOUS PERIOD (when the field timer displays zero seconds). Each violation will result in a 5-point penalty. Exceptions will be made in cases involving personal safety or the safety of the ROBOT controls.

<G36> HUMAN PLAYER Entering Balls on the Field During AUTONOMOUS PERIOD - A HUMAN PLAYER may not enter a ball onto the field during AUTONOMOUS PERIOD. A violation of this rule will result in a 5-point penalty.

<G37> Team Member Ball Handling - Any HUMAN PLAYER, DRIVER, or COACH may handle balls that are in the ALLIANCE ZONE during a match.

<G38> Entering balls onto the field - Only the HUMAN PLAYERS may enter a ball onto the field, either by attempting to throw it to a ROBOT, attempting to throw it in a corner goal, or throwing it onto the field for pickup by a ROBOT. Balls must be thrown over the top of the Alliance Station Wall, and may not be thrown around the side of the Alliance Station Wall. Violations of this rule will result in a 5-point penalty per ball entered onto the field.

<G39> Scoring interference - HUMAN PLAYERS, DRIVERS, or COACHes may not reach into a ball chute or in any way interfere with the ball counting system. Violations of this rule will result in disqualification.

<G40> COACHes Operating ROBOTS - During a match, the ROBOTS may be remotely operated solely by the DRIVERS and/or by software running in the on-board control system. Any violation of this rule, such as

a COACH touching the controls, will result in the ROBOT being disabled and disqualified from the match.

<G41> Respect and Professional Demeanor - FIRST Competitions promote respect and professional demeanor. In the event that team members who are on the playing field (DRIVERS, COACHES, or HUMAN PLAYERS) are uncivil towards competition field personnel (including referees, tech advisors, FIRST field volunteers, etc.) or other teams, the team may be disqualified from the match. This rule only applies to team field personnel while on the playing field. Teams may not receive penalties for actions off the field, however they will be held accountable.

4.3.6 Referee Interactions

<G42> Any discussions regarding rules, scores, or penalties must be between the DRIVERS or HUMAN PLAYERS (pre-college team members) and the head referee.

<G43> The Head Referee may at his or her discretion receive input from other sources, particularly Game Design Committee members that may be present at an event. However, the Head Referee's decision is final (reference Rule <T01>).

Section
5

THE ROBOT



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5 THE ROBOT

5.1 OVERVIEW

This section of the 2006 FIRST Robotics Competition Manual provides:

- NEW Rules applicable to the design and construction of the 2006 Robot.
- Descriptions of NEW mechanical and electrical systems that are based on parts provided in the 2006 Kit of Parts (KOP).

Information about the Vision system, Transmission kit, and Chassis kit, is included in this chapter and is also available from the device manuals and specification sheets.

COMPLIANCE WITH ALL RULES IS MANDATORY.

Robots will be inspected at each FIRST event to verify rules compliance before being allowed to compete.

5.1.1 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 2006 competition “Aim High.”

5.1.2 Getting Started

Please be sure to thoroughly read and understand Sections 3, 4, 5, and 8 of this manual before designing your robot. In particular, pay attention to *Section 5.3.1. General Design & Safety Rules* and *Section 5.3 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 structures, pick and place items, push / pull goals, 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 tread design?
 - Are there any particular offensive / defensive capabilities important to the robot?
2. Inspect all items provided in the Kit of Parts (see Section 5.4) and review their basic features. Note that suppliers' data sheets are referenced in the Part Kit tables for many of the components in the Kit.
3. We recommend that you carefully read the manuals and documents listed in *Section 5.1.3 Related Documents & Resources*.
4. Look over the specifications and technical notes provided for the various Kit 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

5.1.3 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:

- **Section 3: The Arena, Section 4: The Game** and **Section 8: The Tournament**
- **Section 6.5.1.1 Crate Shipping Deadlines** as listed in **Section 6: Robot Transportation**
- Innovation First, Inc. instruction manuals for the *Robot Controller*, *Spike Relay modules*, and *Victor 884 Speed Controllers* as provided by their manufacturer
- FIRST 2006 Transmission Manual
- FIRST 2006 Chassis Kit Manual – Information to assemble Chassis Kit and Drive Train available at: <http://www.ifrobotics.com/kitbot.shtml>.

Important FIRST Manuals, Drawings, available at http://www.usfirst.org/robotics/doc_updt.htm include:

- FIRST 2006 Software Quick Start Guide – A guide to software tools available for robot and vision system programming
- 2006 CMUCam2 Engineering Workbook – A guide to vision system programming using Labview8 and EasyC software applications.
- FIRST 2006 Pneumatics Manual - Valuable information about the pneumatic components and ordering processes are included.
- 2006 Robot Power Distribution Diagram

5.1.4 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, Phrases, or References appear in bold italics such as a ***Section Number*** reference. Operating keys, controls, buttons appear in bold capital letters (i.e. **OFF/ON** switch or **RESET** button).

This section includes hypertext. Clicking on the Underlined Italic text will link you to additional information related to that item or subject.

5.2 DEFINITIONS

COMPONENT – A robot part in its most basic configuration, which cannot 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 on 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.

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 has designed an arm mechanism that uses gears with a 1/2-inch face width. They order a 12-inch length of gear stock and cuts it into precise 1/2 inch slices. They have not yet bored 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 – Two 5-hour 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. The FIX-IT WINDOWS are limited to single continuous time periods with a maximum duration of 5 hours each. Part or all of the team may participate in the work conducted during this period. The FIX-IT WINDOWS may not be subdivided into multiple work sessions of lesser duration.

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.

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.

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 may 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.”

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.
- 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.
 - 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 (<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 is 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.

5.3 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 specified in this section. **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 reading these Rules, please use technical common sense (engineering thinking) rather than a lawyer's interpretation. Try to understand the reasoning behind a rule.

5.3.1 General Design & Safety Rules

<R01> Each team may enter ONE robot into the 2006 FIRST Robotics Competition. That robot must be assembled using materials from the 2006 FIRST Kit of Parts, and other allowed materials as specified in the Rules, and must fully comply with all Rules.

<R02> Energy used by FIRST Robotics Competition robots, (i.e., stored at the start of a match), may only come from the following sources:

- Electrical energy derived from the onboard 12V and 7.2V batteries
- Compressed air stored in the pneumatic system, but only supplied by the compressor included in the kit, and stored at a maximum pressure of 120 PSI in no more than two Clippard Instruments tanks.
- A change in the altitude of the robot's 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.

<R03> Protrusions from the robot must not pose hazards or be dangerous to 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) then 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, grapples, etc. may be carefully inspected for these hazards.

<R04> "Wedge" robots are not allowed. Robots must be designed so that interaction with other 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 – see Rule <R35>) that might push against another robot must be within 10 degrees of vertical. Devices deployed outside the robot's footprint should be designed to avoid wedging. If a mechanism or an appendage (a ball harvester, for example) becomes a wedge that interferes with other robots, penalties, disabling, or disqualification can occur depending on the severity of the infraction.

5.3.2 Robot Physical Rules

5.3.2.1 Robot Size

<R05> At the beginning of the match, the *maximum allowed size of the robot* is 28 inches (71.12cm) by 38 inches (96.52cm) by 60 inches (152.40cm) tall.

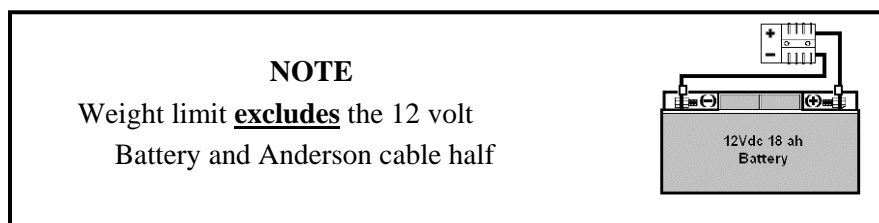
<R06> The starting configuration of a robot immediately prior to being enabled by the Arena Controller at the beginning of a match is the basis upon which a robot will be inspected for compliance with the maximum allowed size. This configuration of the robot must fit within a FIRST Sizing Device that has the following inside surface dimensions: a flat, level rectangular base 28 inches x 38 inches, and a height of 60 inches. Other than resting on the floor of the Sizing Device, no part of the robot may 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.

<R07> If a robot has been designed such that it may have more than one possible starting configuration, the largest possible configuration must be the one used during size inspection.

<R08> Once a match begins, robots may extend horizontally beyond the 28-inch x 38-inch starting size under their own power, up to a limit of 60 inches in either horizontal cardinal dimension. The robot may not exceed the 60-inch height restriction at any time during the match. In other words, after the start of the match the robot may expand up to a maximum volume of 60 inches by 60 inches by 60 inches. The one exception to the height restriction is provided in Rule <R13>. Any restraints (elastic bands, springs, etc.) that are used to maintain starting size must remain attached to the robot for the duration of the match.

5.3.2.2 Robot Weight

<R09> The maximum allowed weight of **all** robot configuration mechanisms combined, **not including an Exide battery and its associated half of the Anderson cable quick connect/disconnect pair, and any robot bumper assemblies** is 120 pounds (54.43 kg). At the time of weigh in, the basic robot structure and all elements of all additional mechanisms that might be used in different configurations of the robot must be weighed together. Included in the weight limit is the robot control system, back-up 7.2V battery, decorations, and any other attached parts, but not bumpers (see immediately below and Rule<R35>), the Exide 12VDC battery and its associated half of the Anderson connection pair (including no more than 12 inches of cable per leg, the associated cable lugs, connecting bolts, and insulating electrical tape)



- Example: A team has decided to design its robot such that, before any given match, it may quickly change the configuration of the robot based on perceived strengths or weaknesses of an opponent team's robot. The team accomplished this by constructing its robot as a basic drive train platform plus two versions of a ball catcher, each catcher being a quick attach / detach device such that either one or the other catcher (but not both) may be part of the robot at the beginning of a match. Their robot's platform weighs 107 lb, version A of the catcher weighs 6 lb, and version B weighs 8 lb. Although only one version will be on the robot during a match, both catchers (and all components of the catchers that would be used during the match) must be on the weight 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.

<R10> The weight of any bumper assemblies included on the robot that are in compliance with Rule <R35> is excluded from the robot weight limit specified in Rule <R09>, up to a maximum of 15 pounds.

5.3.2.3 Robot Visibility

<R11> Robots must 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.

<R12> The judges, referees, and announcers must be able to easily identify robots by Team Number. Teams must display their Team Number in four locations at approximately 90-degree intervals around the side 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.

<R13> Robots must use one of the two colored bicycle flags provided at the event queuing location to display their alliance color (red or blue). Each robot must include a 12 inch long, 1/2" ID PVC tube, capped at the bottom, permanently mounted on the robot such that when a 3 foot long, 1/4 inch diameter flagpole is inserted the top of the flagpole is no higher than 6 feet from the ground and the top of the flagpole is at least 12 inches higher than any other point on the robot (+/- 1/2 inch). The flagpole must be mounted such that it starts the match, and remains, approximately vertical. The flagpole receptacle must be statically mounted, and not articulated or actuated.

<R14> Robots should use the Alliance Color LED provided in the Kit of Parts to display their alliance color (red or blue). The Color LED will be used by field personnel during the matches for diagnostic purposes. It must be mounted on the robot such that their displayed color is easily visible while standing in front of the robot in its' starting position. Instructions for connecting the Color LEDs are provided in the Innovation First Controller manual. The Robot Controller directly powers and controls the Team Color LEDs. The user has no control over the Team Color LEDs and no programming is required.

5.3.3 Fabrication Schedule

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

<R15> 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 items they want. But absolutely no fabrication or assembly of any elements intended for the final robot is permitted prior to the Kick-off presentation. Any MECHANISMS assembled prior to the Kick-off presentation may be used for prototyping or educational purposes, but MAY NOT be used on the final ROBOT.

<R16> 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 2006 FIRST Robotics Competition. As the robot shipment deadline approaches, 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) must be crated and out of team hands by the robot shipment deadline.

<R17> During the “FIX-IT WINDOWS” following the shipment of the robot: During this period, all teams may utilize one or two 5-hour 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, but all work must be completed by 5:00pm on the Friday 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 the competition event is limited (as specified in Rule <R29>).

<R18> 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 software development. 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.

<R19> At the competitions: Teams are allowed to repair, modify or upgrade their competition robots 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 <R28> and <R29>). Work may 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 may not be removed from the competition site and retained overnight after the Pit area closes.

<R20> 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 one or two 5-hour 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, but 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. 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. 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 <R29>).

5.3.4 Robot Material Utilization Rules

<R21> Robots entered into the 2006 FIRST Robotics Competition must 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 this section in quantities consistent with the Cost Accounting rules.

<R22> Individual COMPONENTS from robots entered in previous FIRST competitions may be used on 2006 robots **IF** they satisfy **ALL** of the rules associated with materials/parts use for the 2006 FIRST Robotics Competition.

- <R23> Teams participating in the 2006 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 may 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.
- <R24> Individual COMPONENTS retrieved from previous robots and used on 2006 robots must have their undepreciated cost included in the 2006 robot cost accounting, and applied to the overall cost limits.
- <R25> Motors, pumps, and, robot controllers from previous robots may not be used in addition to those provided in the 2006 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 may only be used if they are identical to the part being replaced (note that 2002 and 2003 Fisher-Price motors are not the same as those in the 2006 kit, and, therefore, cannot be used).
- <R26> MECHANISMS from robots entered in previous FIRST competitions may not be used.
- <R27> Only Victor 884 Speed Controllers are permitted. Victor 883 and 885 Speed Controllers may not be used.
- <R28> 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.
- <R29> 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 must arrive at the competition venue packed in the shipping crate with the robot.
- <R30> Mechanisms or components on the robot must 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. For example, nets, loose rope or wire, voluminous sheets of fabric, etc. may be carefully inspected for these hazards. Willful entanglement actions are addressed in Rule <G23> in *Section 4.3.4 – Robot Operations* of “The Game” section.
- <R31> No devices or decorations are permitted on the robot that are intended to jam or interfere with the operation of the vision system (i.e. changing robot color to confuse opponent’s vision system).
- <R32> 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 may 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 it from being moved by another robot, cannot 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.

<R33> Adhesive backed tapes are NOT allowed except as follows:

- 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.

<R34> Lubricants may be used only to reduce friction within the robot. Lubricants shall not be allowed to contaminate the playing field components, or other robots.

<R35> The use of bumpers is strongly encouraged. Bumpers can reduce damage to robots when they contact another robot or field elements. If you choose to use the specified bumpers, you will have both a more robust robot and the traction advantage of a heavier robot. Bumper height has been specified so that robots will make contact bumper-to-bumper and so that the balls will be pushed rather than pulled under the robots. Note that robot wheel/tracks must be properly positioned relative to the bumpers to avoid trouble climbing the ramp. Obviously harvesting balls from the floor or launching balls along the floor must be done through gaps in bumpers or over bumpers. As the bumper mounts are being designed, please think about carrying the robot. The bumpers do not make good handles. Please do not “lawyer” the bumper rule - it is meant to help. If used, bumpers must satisfy the following constraints:

- Bumpers must be designed as shown in figure 5-1
- Bumpers must be removable so that they can be weighed separately from the robot
- Bumpers must weigh, in total, no more than 15 pounds including any fasteners that attach them to the robot
- Bumpers must not include sections that weigh more than 3 ounces per inch (i.e. no short bumpers with giant heavy fasteners)
- Bumpers must use a stacked pair of 2-1/2 inch “pool noodles” as the bumper material
- Bumpers must use 3/4 inch plywood backing 5 inches tall as the bumper structure to attach the bumper (“pool noodles”) to the robot
- Bumpers must be covered with a tough smooth cloth (1000 denier Cordura Plus® strongly recommended)
- At the start of the match bumpers may extend outside the horizontal starting dimensions for the robot (as specified in Rule <R05>) by up to a maximum of 3-1/2 inches per side, nothing other than pool noodles and cloth may extend more than 1 inch beyond the robot boundaries
- Bumpers must be positioned on the robot so that they remain between 2-1/2 inches and 8-1/2 inches above the floor

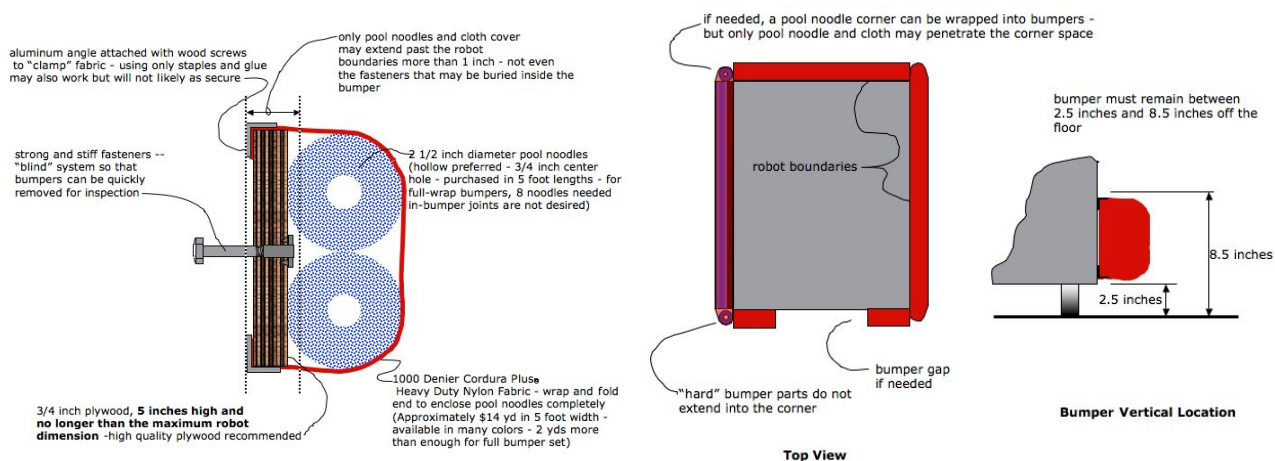


Figure 5-1

5.3.4.1 Kit of Parts Rules

<R36> So that every robot's maximum power level is the same, the motors in the kit may **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. **FIRST will not provide replacements for parts that fail due to modification.**
- 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.

<R37> Teams may replace lost or damaged Kit COMPONENTS only with identical COMPONENTS of the same material, dimensions, and treatment.

<R38> Materials in the Kit may not be changed chemically with the following exceptions:

- Rope ends may be singed to prevent loose ends or to bind them together
- Metal may be heat treated
- Metal may be plated or anodized

5.3.4.2 Additional Parts and Materials Rules

Besides items directly supplied in the 2006 Kit, teams are allowed to use Additional Parts and Materials in the construction of their robots.

<R39> The use of an Additional Part or Material shall not violate any design rule.

<R40> Additional Parts shall not be made from hazardous materials or be unsafe.

<R41> Additional Parts must 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-2006 Kit materials does not have to be available to others; however, the materials it is made from must be available to other teams.

<R42> The costs of all Additional Parts and Materials must be in compliance with the Cost Accounting Rules of Section 5.3.4.3.

<R43> Specific items allowed include:

- Additional HITEC HS-322HD Servos.
- Additional Victor 884 Speed Controllers and Spike Relays, as needed.
- Additional solenoid valves, air cylinders, and connecting fittings.
- Teams may purchase either one additional 4-slot Maxi-block circuit breaker panel and/or one 2005 FRC circuit breaker panel, and utilize it on their 2006 robot in addition to, or in replacement of, the circuit breaker panels provided in the kit of parts.

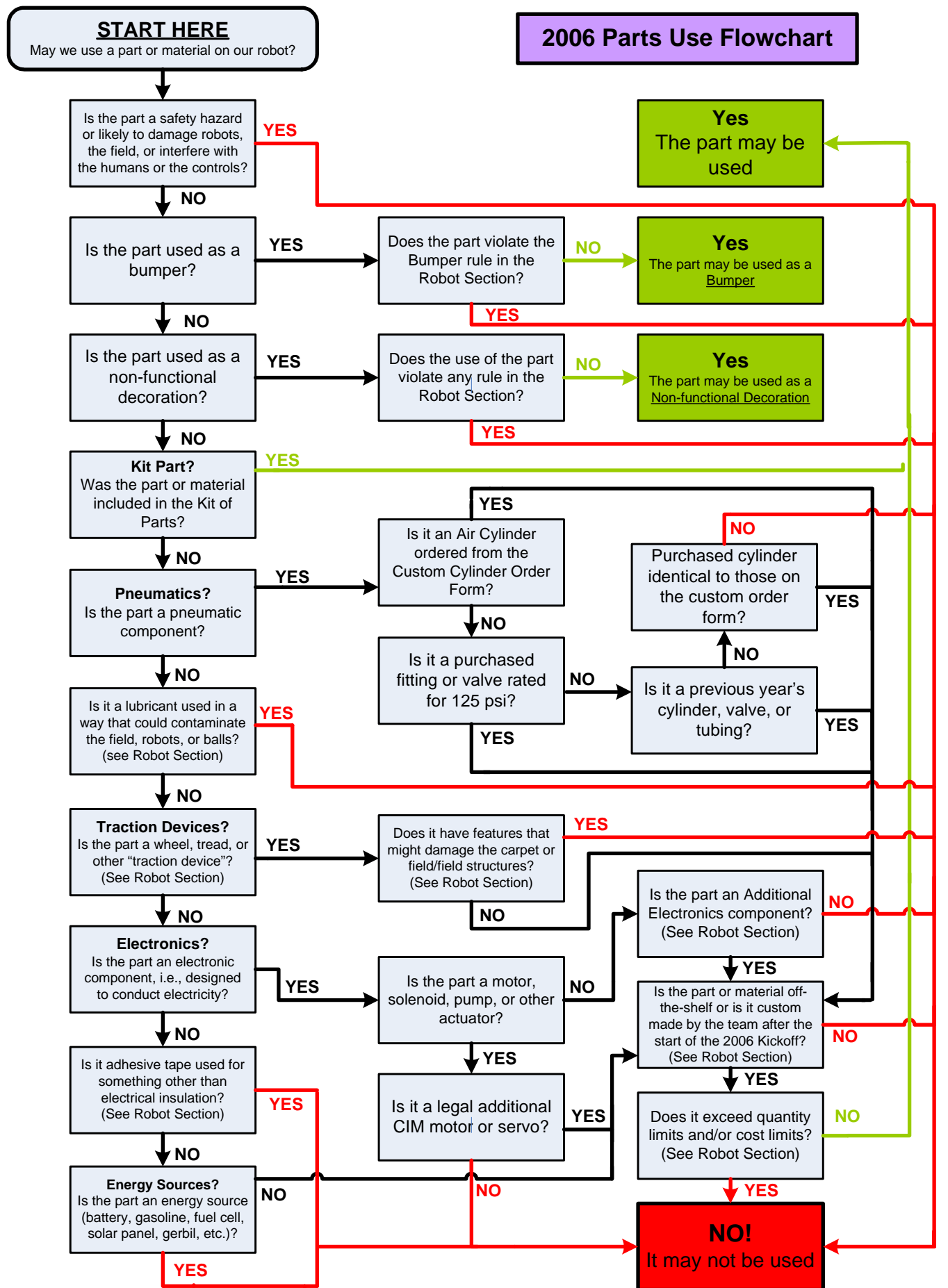
- Teams may utilize one or two additional small CIM motors (part #FR801-001) in addition to those provided in the kit of parts. This means that you may use up to four, and no more, small CIM motors on the robot.

<R44> Specific items NOT allowed include:

- Batteries different from or in addition to those provided in the Kit.
- Circuit breakers different from those provided in the Kit. Note: the Snap Action brand circuit breakers provided have unique “trip” characteristics. No substitute brands are permitted.
- Electric motors different from or in addition to those in the Kit, with the exception of those specifically permitted by Rule <R43>.
- Any air compressor, pressure relief valves, or air storage tanks other than those provided in the Kit.
- Hydraulic fluids or hydraulic components.
- Materials classified as hazardous by their MSD Sheets (teams should provide MSD Sheets for any materials they use that might be considered questionable during robot inspection).

<R45> 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 conducts electricity other than IFI relays and speed controllers, wires, connectors and solder.

<R46> Refer to the Part Use Flowchart to help determine the legality of a part.



5.3.4.3 Cost Accounting Rules

<R47> The costs of all non-2006 Kit parts and materials used in the construction of a ROBOT (as defined in 5.1.1) must be recorded (in US dollars) by the team, and a list of all such items and their costs presented at robot inspection. **An Additional Part or Material is defined as an allowed additional quantity of any part provided in the 2006 Kit, or any item that was not included in the 2006 Kit's inventory list.**

<R48> All costs are to be determined as explained in Section 5.3.4.4 - Additional Parts - Cost Determination.

<R49> The total cost of all non-Kit items may not exceed \$3,500.00 USD. No individual COTS electronic component shall have a value of over \$200.00 USD. No individual non-electronic 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. 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 part or non-Kit part) that has already been included in the cost accounting is covered by the accounting for the original part.
- The costs of additional Speed Controllers and Spike Relays obtained from Innovation First Inc. for use with Kit motors.
- All costs for the construction of devices used to control the robot from the Alliance Station (i.e. the operator interface and any associated custom equipment).

<R50> The costs of additional non-spare robot control system components obtained from Innovation First Inc. other than Speed Controllers and Spike Relays are to be included in the above \$3500 limit.

5.3.4.4 Additional Parts - Cost Determination

The "cost" of each additional 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 item would be normally offered by the supplier 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' x 1' 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 parts that were not received from FIRST are not subject to the cost limitation (i.e., should not be charged against the \$3,500 robot limit).

5.3.5 Electrical System Rules

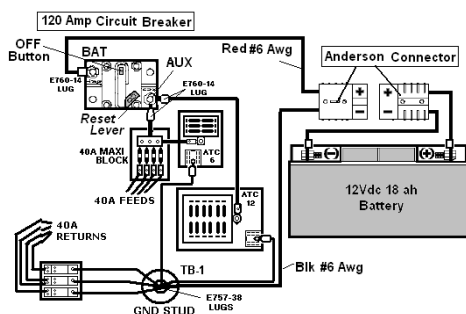
<R51> The only legal main source of electrical energy on the robot is the 12VDC non-spillable lead acid battery provided in the Kit of Parts. That 12V battery is the Exide type EX18-12. The ES18-12 battery, purchased through your local Exide supplier as a spare, is identical and may also be used. You may use other equivalent type 12V batteries, but only during the Thursday practice rounds.

The 7.2v "backup" battery is considered an integral part of the Robot Controller, and may not be used for any other purpose.

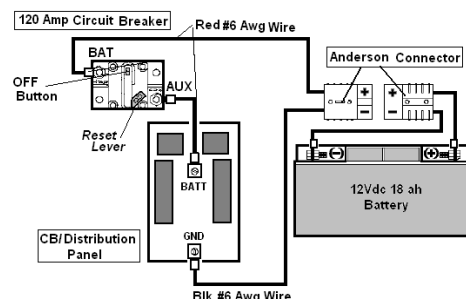
<R52> The EX18-12 or ES18-12 Battery may only be charged by a 6 Ampere rated Automatic Battery Charger between matches. When recharging the Kit batteries, you may use the charger provided by FIRST or an automatic charger with an equivalent charging current rating.

<R53> The 7.2v backup battery may be charged on or off the robot. When off the robot, the battery is to be charged with the provided 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. (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)

<R54> The 12V Battery, the Main 120 Amp Circuit Breaker, and the Circuit Breaker distribution panels must be connected as shown in the 2006 (or optionally) as in the 2005 diagrams shown below. The Battery must use the Anderson Connector. The connector must be attached with either the copper SLU-35 lugs provided in the Terminal Supply Bag or appropriate crimp-on lug connectors. The Battery terminals and the connecting lugs must be insulated with shrink tubing and/or electrical tape. You may use additional lengths of #6 red and #6 black wire to reach the panels as needed to make the above connections. The circuit breakers must be readily accessible for inspection and testing at each competition event.



2006 Main Power Connections



2005 Main Power Connections

- <R55> All wiring and electrical devices must be electrically isolated from the robot frame; the robot frame may 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).
- <R56> All 12v electric power used on the robot must be obtained from the load terminals of the Circuit Breaker distribution panels. Each branch circuit must be protected using the appropriate value circuit breaker as specified in Section 5.3.9.1 “Circuit Breaker/Fusing Rules.”

5.3.6 Custom Circuit Rules

- <R57> The use of additional electronics is intended to allow teams to construct custom circuits for their robots. The 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. In addition to the required branch power circuit breaker, smaller value fuses may be incorporated in the custom circuits for additional protection. All outputs from the custom circuits must be connected to the analog inputs, digital I/O, TTL Serial Port, or Program Port on the Robot Controller.
- <R58> Inputs to custom circuits may 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.
- <R59> Custom Circuits may **not**:
- Interfere with the operation of other robots
 - Directly alter the power pathways between the battery, fuse blocks, speed controller/relay, and motor. 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.
 - 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
 - Be used for wireless communication, such as sending or receiving a signal to and/or from the alliance station
 - Connect to the radio or tether ports on the Robot Controller

5.3.7 Control System Rules

- <R60> You must operate your robot with the wireless, programmable Innovation First 2006-Robot Control System.
- <R61> 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 may not be tampered with, modified, or adjusted in any way, (tampering includes drilling, cutting, machining, gluing, rewiring, etc.) with the following exceptions:
- The dip switches on the Operator Interface may be set as appropriate.
 - The user programmable code in the Robot Controller may be customized.

- The 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.

<R62> 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.

<R63> The Robot Controller must be positioned within the robot so that its indicator lights may be seen during inspection and during operation in a match. This will greatly facilitate analysis in case of problems.

<R64> All circuit breakers must be accessible for inspection at each FIRST Robotics Competition event.

<R65> The team number settings on the Operator Interface must be set to the team number assigned to the team by FIRST, then the Robot Controller must be tethered to the Operator Interface to transfer the Team Number setting to the Robot Controller. This must be done only once after setting the Operator Interface.

<R66> Do not connect 12Vdc power, Relay Module outputs, Speed Controller outputs, or PWM outputs to the analog or digital I/O on the Robot Controller.

<R67> You must connect all outputs from the sensors and additional electronics circuits used on the robot directly to the analog or digital I/O on the Robot Controller. ***Sensors may not be wired so that they directly control other devices.*** All loads must be controlled by PWM signals sent by the Robot Controller to relays or speed controllers. It is acceptable to wire switches used as sensors in series or parallel with each other.

<R68> The 7.2V Robot Control backup battery must be connected to the Controller as described in the Controller's manual. 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 7.2V NiCad battery pack may be used.

<R69> A remote reset and remote programming switch may be wired to the Robot Controller's RESET/PROG header. Any switch may be used. See the ***Robot Controller Reference Guide*** for wiring information.

<R70> Digital outputs of the Robot Controller may be connected directly to brake/coast headers on the speed controllers to permits 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.

<R71> Unaltered software modules developed during prior competitions may 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.

5.3.8 Operator Interface Rules

<R72> The team number settings on the Operator Interface must be set to the team number assigned to the team by FIRST.

<R73> The Operator Interface Console designed by your team must fit on the 69" wide by 12" deep shelf in the Alliance Station.

- <R74> Teams are permitted to connect a portable computing device (Laptop computer, PDAs, etc.) to the RS232 Output of the Dashboard Port of the Operator Interface for the purpose of displaying feedback from the robot while competing 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.***
- <R75> The IFI Operator Interface (OI) must be positioned within the operator console so that its indicator lights may be seen during inspection and during operation in a match. This will greatly facilitate analysis in case of problems.
- <R76> Teams may not use Innovation First Operator Interfaces from previous years' competitions.
- <R77> No external equipment may be connected to the Tether Port of the Operator Interface during a match.
- <R78> All equipment connected to the Joystick Ports of the IFI 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 may not be connected to Joystick input ports on the Operator Interface. Power-passive devices (e.g. joysticks that draw their power solely through the IFI Operator Interface joystick port) are permitted.
- <R79> The Competition Cable at the Alliance Station must connect directly to the Competition Port on the Operator Interface. No intermediate connectors, cables, or "pigtailed" are permitted.

5.3.9 Wiring Rules

- <R80> Electrical devices may only be wired in accordance with ***Section 5.3 Robot Rules***. For your convenience, please refer to the ***2006 Robot Power Distribution Diagram***.
- <R81> All wires distributing power with a constant polarity (i.e., except for Relay Module, Speed Controller, or sensor outputs) must 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.
- <R82> *You must use 12 AWG or larger* diameter wire for all circuits protected by a 40A Circuit Breaker.
- <R83> *You must use 14 AWG or larger* diameter wire for all circuits protected by a 30A Circuit Breaker.
- <R84> *You must use 18 AWG or larger* diameter wire for all circuits protected by a 20A Circuit Breaker.
- <R85> *You must use 24 AWG or larger* diameter wire for connecting sensors such as: switches, potentiometers, accelerometers, and other sensors. *You must use 24 AWG or larger* diameter wire for connecting a Vision System to Robot Controller inputs, and for extending the PWM cables, for the small muffin fans, or for wiring LEDs. It is acceptable to use ribbon cable smaller than 24 AWG to connect to the 9 pin ports on the Robot Controller.
- <R86> No more than one motor may be connected to each Speed Controller.

<R87> CIM motors and Fisher-Price motors must be connected to Speed Controllers. They may not be connected to Relay Modules.

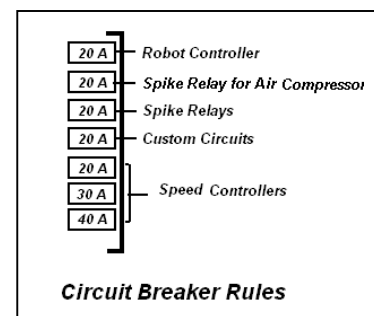
5.3.9.1 Circuit Breaker / Fusing Rules

<R88> You must use the auto resetting Snap Action circuit breakers provided in the Kit Of Parts to protect all the active Circuit Breaker/ Power Distribution Panel branch circuits from overload.

<R89> You must protect the Robot Controller power feed with a 20A Circuit Breaker. You may **not** connect any other electrical load to this breaker.

<R90> You must protect the Air Compressor spike relay power feed with a 20A Circuit Breaker. You may **not** connect any other electrical load to this breaker.

<R91> You must protect the power feed to Custom Circuits and Additional Electronics with a 20A Circuit Breaker.



<R92> Speed Controllers may be protected by 20A, 30A, or 40A Circuit Breakers. Speed Controllers may power motors or devices of any size.

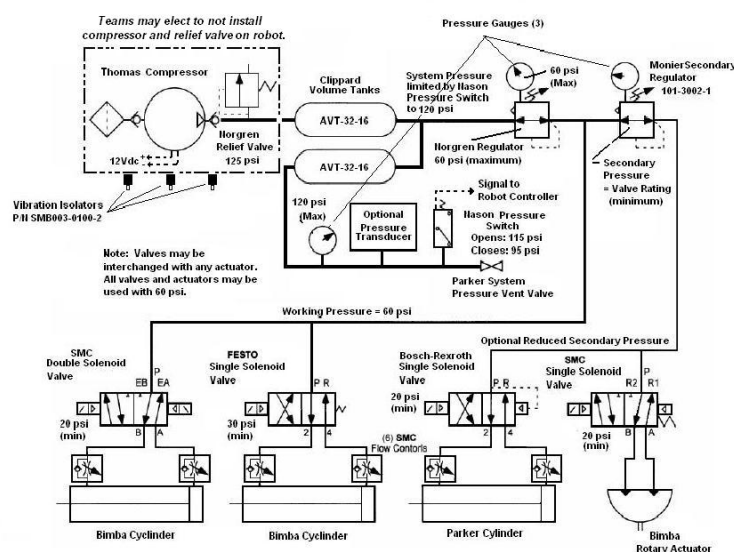
<R93> SPIKE Relay Modules must be protected with a 20A Circuit Breaker. Multiple devices may be connected to Relay Modules if desired (but only one motor may be connected to each Relay Module).

5.3.10 Pneumatic System Rules

Please refer to the *Pneumatics Manual* for additional information about using pneumatics on your robot.

<R94> Pneumatic components supplied in the Kit compressor, regulators, pressure switches, cylinders, valves, fittings, tubing, etc.) may 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 rest of 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.



<R95> The compressor may be mounted on the robot, or if teams prefer, they may leave it off their robot, and pre-charge and store compressed air in the storage tanks prior to bringing their robot onto the playing field. If you elect to use pneumatics on your robot, your pneumatic system must contain as a minimum the following components, connected in accordance with this section.

- Pressure gauges to display the “working” and “stored” air pressure.
- An accessible pressure vent valve to manually relieve the stored pressure

<R96> **Teams are not allowed to remove or adjust the 125-psi set relief valve attached to the compressor.**

You may only use the Thomas Industries compressor and Clippard Instruments air storage tanks provided in the Kit to compress and store air on the robot. You may not use extraneous lengths of pneumatic tubing to increase the storage capacity of the air storage system.

<R97> The Nason pressure switch must be connected to the output end of one of the Clippard tanks to sense the tank’s pressure. 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 spike relay that powers the compressor. The Parker Pressure Vent valve must be connected to a Clippard tank such that, when manually operated, it will vent to the atmosphere to relieve any stored pressure. The valve must be placed on the robot so that it is visible and accessible.

<R98> “Working” air pressure on the robot must be no greater than 60psi. All working air must come from 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.

<R99> There is no limit to the number of solenoid valves, air cylinders, pressure regulators, and connecting fittings you may use on your robot. They must, however, be “off the shelf” pneumatic devices rated by their manufacturers for pressure of at least 125psi. Besides the “free” pneumatic components listed on the Pneumatic Components Order form, you may purchase additional air cylinders or rotary actuators, however, they must be identical to those listed on the Pneumatic Components Order form (i.e. same part numbers), and obtained from a Bimba or Parker Hannifan distributor.

<R100> The following pneumatics items may be added to your robot:

- You may use the 2005 Kit pneumatic cylinders, solenoid valves, and pneumatic tubing in addition to those items in the 2006 Kit, but you must account for their costs as explained in the Cost Limits and Accounting section.
- You may use a pressure transducer as long as it is rated to the operating air pressure at its mounting point in the pneumatic system.
- 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 one of the Kit-of-Parts 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.

5.3.11 Non-Functional Decoration Rules

Teams may add “Non-functional” decorations to robots under the following conditions:

<R101> Decorations must be on the robot at the time of final inspection, and must not cause the robot weight or size to exceed the Rule requirements.

<R102> Decorations must not affect the outcome of the match, and must be in the spirit of “Gracious Professionalism.”

<R103> Any decorations that involve broadcasting a signal to/from the robot, such as remote cameras, must be cleared with FIRST Engineering prior to use. Teams may **not** use *900 MHz camera systems*.

<R104> Decorations may draw power from the 12v electrical system as long as they are powered via a dedicated 20A or 30A circuit breaker and do not affect the operation of other control system components.

5.3.12 Robot Inspection Rules

FIRST will post a copy of the Official Robot Inspection Sheet in approximately the first week of February. Use this sheet as a guide to pre-inspect your robot before it ships. Note that robot inspectors will be looking for sharp corners and edges that could cause injury. Please try to mitigate all sharp corners.

<R105> All robots must pass inspection for compliance with the Rules herein before being allowed to compete in the Qualification Rounds. At the time of inspection, teams must present a list of all Non-Kit part items and costs used in the construction of their robot to the inspector.

<R106> At Inspection, noncompliance with any robot construction Rule may result in disqualification of the machine at a FIRST competition event. The team must bring the robot into compliance before they will be allowed to compete in the Qualification Rounds. At the discretion of the lead Inspector, the robot may be allowed to participate in practice rounds before passing inspection.

<R107> If a team makes a modification to improve performance or reliability after its robot has passed inspection, that team must have the robot re-inspected. If you observe 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.

<R108> At the time of robot inspection, you must present ***all*** mechanisms (including ***all*** components of each mechanism) ***and configurations*** that you will use 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.

<R109> If a robot is rejected because of a safety issue or concern related to the team’s method of storing energy, the concerned mechanisms must be disabled or removed from the robot before it may 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.

<R110> FIRST Officials may randomly re-inspect robots participating in competition rounds to assure compliance with the Rules

5.4 KIT OF PARTS

FIRST provides a Kit of Parts to each team. Only the exact parts provided in the Kit (or their exact replacement) are considered as Kit Parts. Some Kit Parts may legally be used in additional quantities. Additional quantities of these parts are considered to be “Additional Parts” and not “Kit Parts”.

5.4.1 2006 Kit Changes

Some of the exciting and important changes found in the 2006 Kit Items include:

- Labview8 and Easy C software supplied for vision system software development and programming.
- Removed two of the CIM motors and replaced them with two larger CIM “mini-bike” motors.
- 3 New Sensors for 2006 - Gear Tooth Sensor, Dual Axis Accelerometer, and Angular (Yaw) Rate Gyro. Each provides critical positioning and attitude sensing data for precision robot control.
- Enhanced CMUcam2 Vision System with new servo driven Pan/Tilt Brackets adds the capability for vision-based tracking of illuminated targets - essential to achieving competitive performance skills in this year’s game.
- New igus Linear Bearing and Guide System kit provides robust lightweight components useful for designing efficient mechanical control systems.
- New Allen-Bradley Infrared Transmitted Beam Sensor for any applications where broken beam detection is a useful and important requirement.
- Returned the MAXI and the ATC fuse panels to the kit in place of the single Circuit Breaker/Power Distribution panel.
- Spiraled Pneumatic tubing from Freelin-Wade.

5.4.2 Kit Of Parts Contents

The *FIRST* 2006 Kit of Parts is provided in multiple containers. They consist of; 2 Large plastic Totes (blue and red) of robot parts and construction materials shipped from *FIRST*, cartons containing 1-KitBot box, 1 Electronics Kit, 1 Drive Kit, and 1 Motor Kit shipped from Innovation First, Inc and 2 items.

Use the tables below to inventory your Kit of Parts. The inventory may take about 45 minutes, but should be completed within 48 hours of receiving the kit in order to determine that all items are present. Any irregularities must be reported by 11:59 pm (EST) on Wednesday, January 11, 2006.

The CHECK column should be marked when the item and quantities are correct. All bags are labeled. If you are not sure what a particular part should look like, match the Pix Number to the numbered photograph for clarification. (N/A = picture not available). Kit photos are attached to the checklist supplied with the kits and may be downloaded from the FIRST web site at http://www.usfirst.org/robotics/doc_updt.htm

5.4.2.1 The following part items will be found inside the Blue container

BLUE CONTAINER ITEM 1

BATTERY BOX		EXIDE	Contains 2 ea.	
✓ Pix	Part Name	Description	Part Number	Qty
K11	Battery, Exide	12V, 18AH, Deep Cycle	EX18-12	2

BLUE CONTAINER ITEM 2

<i>COUPLER BAG</i>			MMH		
✓	Pix	Part Name	Description	Part Number	Qty
	K21	Wheel Hub, Plastic	Hub for Skyway wheels	DEKA	4
	K22	Coupler, Nippon-Denso Motor	Injection molded	DEKA Denso_6	2

BLUE CONTAINER ITEM 3

<i>ELECTRICAL BAG</i>			MMH		
✓	Pix	Part Name	Description	Part Number	Qty
	K31	Connector, Quick Disconnect	#6 Wire Pair, 12"	6331G1	4
	K32	Battery Connector Safety Plug	White (45) small plastic	AndyMark, Inc.	8
	K33	Fan, Muffin (Tiny)	12 Vdc	412	6
	K34	Fan, Muffin, (Large)	12 Vdc	4212/19H-490 or 4112N/12GL	2
	K35	Latex Tubing	¼" ID, 3/8" OD, 5 feet	5234k44	2

BLUE CONTAINER ITEM 4

<i>FREELIN WADE</i>					
✓	Pix	Part Name	Description	Part Number	Qty
	K41	Spiral Tubing	Coil	2MC-151-5P-FW	1
	K42	Tubing, ¼"	100 Ft length	1J-151-07P-FW	1
	K43	Catalog, Freelin-Wade		FWRGSI	1

BLUE CONTAINER ITEM 5

<i>LOOSE MATERIALS</i>					
✓	Pix	Part Name	Description	Part Number	Qty
	K51	Coil, Wire, Black	10' , # 6 AWG, Black	Delphi Conn. Systems	1
	K51	Coil, Wire, Red	10' , # 6 AWG, Red	Delphi Conn. Systems	1
	K52	Battery Charger, Automatic	6 Amp, Midtronics	CXC-2005	1
	K54	Ball, 7" Foam Basketball	Sport balls	Poof-slinky.com	1
	K55	Motor, Fisher-Price, w/19T #7 Gearbox	12 Vdc	00968-9003 or 00968-9012 supplied	2
	K56	Wheel, wheelchair, 8"	Precision Hub w/o brg.	WHL70C	4

BLUE CONTAINER ITEM 6

<i>MAGAZINE BAG</i>			May be loose in Tote		
✓	Pix	Part Name	Description	Part Number	Qty
	N/A	Magazine, Nuts and Volts			1
	N/A	Magazine, Servo			1

BLUE CONTAINER ITEM 7


TARGET BAG					
↳ Pix	Part Name	Description	Part Number	Qty	
K71	Cold Cathode Dual Kit	12" green (2 bulbs/box)	Oznum	4	
K72	Transformer		Oznum	4	
K73	Target Lens, HDPE Panel	16" x 8"(nom) x 1/8"	Plastic Supply	1	

BLUE CONTAINER ITEM 8

TERMINAL SUPPLY BAG					
↳ Pix	Part Name	Description	Part Number	Qty	
	K81	Circuit Breaker, 120A, Buss	120A, Automotive style	CB3-SM-120 185-120-F01-1(old)	1
	K82	Nylon Ring Terminal	AWG 22-18	A-532-06	10
	K83	Nylon Ring Terminal	AWG 16-14	B-523-06	6
	K84	Maxi Style Fuse Block, 4 Position	Gold plated	JEF-531D	1
	K85	Terminal Lug, SLU-35	6-14ga solderless lug	SLU-35	8
	K86	ATC Fuse Panel,	12 Position	15600-12-21	1
	K87	ATC Fuse Panel,	6 Position	15600-06-21	1
	K88	Nylon Ring Terminal	#6ga- ¼” stud	E760-14	4
	K89	Nylon Ring Terminal	#6ga- #10 stud	E760-10	6
	K810	Nylon Ring Terminal	#6ga- 3/8” stud	E757-38	6
	K811	Female Quick Disconnect, Nylon	12-10ga, .250d	C-572	56
	K812	Nylon Ring Terminal	12-10ga Ring Lugs	C-536-06	20
	K813	Fem Quick Disconnect, Nylon	22-18ga, .250d	AA-8140	8
	K814	Fem Quick Disconnect, Nylon	10-12ga, .250d	C-850	14
	K815	Male Quick Disconnect, Nylon	16-14ga, .250d	MCT-850	14
	K816	Fem Quick Disconnect, insulated	16-14ga, .250d	B-850	4
	K817	Stud w/ Nut	3/8” stud terminal block	TB-1	1
	K818	Male Quick Disconnect, Nylon	12-10ga, .250d	MCT-C-850	14


5.4.2.2 The following part items will be found inside the Red container

RED CONTAINER ITEM 1


IGUS BAG					
	Pix	Part Name	Description	Part Number	Qty
	KR11	Igubal Pillow Block- 5/8"	2 in separate bag in Tote	KSTI-10	4
	KR12	Iglide Flange Bearing-5/8"		JFI-1012-12	4
		IGUS Product Guide			1
	KR14	Plastic Linear Bearing	5/8"	RJI-01-10	2
	KR15	5/8" Aluminum Shafting	18" Hard Anodized	AWI-10	1
	KR15	3/8" Aluminum Shafting	18" Hard Anodized	AWI-06	1
	KR17	Iglide Sleeve Bearing-5/8"		JSI-1012-12	4
	KR18	2-Hole Flange Bearing- 3/8"		EFOI-06	2
	KR19	Clevis Joint w/pin & Clip	3/8"	GERIK-06	2

	KR110	5/8" Rod end Bearing		EBRI-10R	2
	KR111	3/8" Rod end Bearing		EBRI-06R	2
	KR112	EZ Chain	18" Long	Z06-16-018-0	1
	KR113	Mounting Bracket – EZ Chain	1 Set/ 2 Pieces	060-16-12PZ	1
	KR114	Low Profile Linear Guide 27mm wide	2 pieces, 18" Long, 4 carriages	NK01-27-2-457	2

RED CONTAINER ITEM 2


<i>LOOSE MATERIALS</i>					
	Pix	Part Name	Description	Part Number	Qty
	KR21	Motor, Globe, w/drive assy	12 Vdc	409A587	2
	KR22	Volume Tank, Clippard	2" bore by 6" long	AVT-32-16	2
	KR23	Motor, CIM	Keyed output shaft	FR801-001	2
	KR24	Motor, Nippon-Denso Window, RH		262100-3030/ RH	1
	KR25	Motor, Nippon-Denso Window, LH		262100-3040/ LH	1
	KR26	Motor, Sliding Door, Van	Bosch	16636815	1
	KR27	Joystick, Analog	AVB Top Shot Analog	GC-1000FR	2
	KR28	Rod Clevis Kit		LO7130 0400	1
	KR29	Pivot Bracket Set (R/L)		LO7131 0300	1
	KR210	Lead Screw w/ Nut		BZ6050 x 12"	1
	KR211	Motor, Mabuchi		RS-545SH-2485	1
	KR212	Cylinder	1.5" bore x 8" stroke; rear pivot	1.5DPSR8.00	1
	KR213	Compressor, Thomas		405ADC38/12	1
	KR214	US Patent + Trademark Office	DVD		1
	KR215	80/20 CD			1
	KR71	MSC Catalogue – CDROM	& Starrett table		1
	KR216	FedEx Envelope			1

RED CONTAINER ITEM 3

<i>KR30</i>	<i>PNEUMATICS – SMC</i>		<i>Note: 24V solenoid</i>	<i>is an extra item</i>	
	Pix	Part Name	Description	Part Number	Qty
	KR31	Flow Control		NAS2201F-N01-07S	6
	KR32	Fitting, Straight	¼" tube, straight	KQH07-34S	10
	KR33	Fitting, 90 Elbow	¼" tube, 90° elbow	KQ2L07-34S	5
	KR34	Solenoid Valve, Double w/ Lead Wire Assy, Pilot Valve & gaskets	12VDC pilot valves hardwired to assy.	SY3240-6HZ-X70	2
	KR314	Solenoid Valve, Double w/ Pilot valves 24VDC	24VDC, no lead wires	SY3240-5LOZ (Spare for solenoid)	1
	KR37	Sub Base,	1/8" ports	SY3000-27-1T	2
	KR38	Fitting, 90 Elbow	90° Elbow ¼" tube	KQLO7-35S	10
	KR39	Fitting, Tee-Union	Tee union –1/4" tube	KQTO7-00	5


	KR312	Fitting, 90 Elbow	Male, 90° Elbow, 5/32" tube- 1/8 NPT	KQ2L03-34S	1
	KR313	Fitting, Straight	Male Conn. 5/32" tube -1/8 NPT	KQ2H03-34S	1

RED CONTAINER ITEM 4


<i>PNEUMATICS BAG #1</i>					
	Pix	Part Name	Description	Part Number	Qty
	KR41	Teflon Tape	1/4" x 520'		1
	KR42	Pressure Gauges, Wika	1/8" NPT, 0-160 psi	9690242	2
	KR43	Solenoid, Festo, Single valve kit	Single solenoid valve	VPLE18-M5H-4/2-1/4	2
	KR44	Vibration isolators, Lord		SMB003-0100-2	3
	KR45	Secondary Regulator & Bracket, Monnier	Regulator & Mtg Kit	101-3002-1	1
	KR46	Pressure Switch, Nason	Open; 115, Close; 95psi	SM-2B-115R	1
**	KR47	Main Regulator, Norgren, 60psi	60 psi Max output	R07-153-RNEAJ060	1
	KR48	Regulator Mounting Kit	Bracket & Nut	18-025-003	1
	KR49	Relief Valve, Norgren, 120 psi	120 psi Relief Valve	16-004-074	1
	KR410	Gauge, Norgren	Gauge, 0-160 psi	18-013-212	1
	KR411	Parker Brass Bag			1

** Verify part number is R07-153-RNEAJ060

RED CONTAINER ITEM 5


<i>PNEUMATICS #2 BAG</i>					
	Pix	Part Name	Description	Part Number	Qty
	KR51	Valve, BoschRexroth	Valve, 12V	5728400410	1
	KR52	Connector kit, BoschRexroth	Connector, & hdwre	H894101-02202	1
	KR53	Nut, BoschRexroth	Gray Nut – 1/4" tubing	H893071-4904	3

RED CONTAINER ITEM 6

<i>SENSOR BAG</i>					
	Pix	Part Name	Description	Part Number	Qty
	KR61	Receiver	Combine Rx & Source	42SMR-7100	1
	KR62	Source	Rockwell Automation	42SML-7100	1
	KR63	Power Distribution Block	Rockwell Automation	1492-PDM 3141	1
	KR64	Micro switch	Sager Electronics	V7-2B17D8-048	2


5.4.2.3 The following part items are shipped from Innovation First

INNOVATION FIRST, INC. ITEM 1


<i>FIRST-2006 ELECTRONICS KIT</i>				E-KIT-2006	
	Pix	Part Name	Description	Part Number	Qty
	IF16	Robot Controller Unit	ROBOT-RC	FR-2006-RC	1
	IF17	Operator Interface Unit	ROBOT-OI	FR-2006-OI	1
	IF13	Radio Modem – Robot Controller	RS-422, 9 pin, M, w/ Rubber Antenna	ROBOT-RADIO-RC	1
	IF14	Radio Modem – Op. Interface	RS-422, 9 pin, M, Metal Antenna	ROBOT-RADIO-OI	1
	IF110	Speed Controller, Victor 884	VICTOR-884-12-12	FR-VIC884	4
	IF18	Cable, PWM/Relay	Hitec/JR –36”	CABLE-PWM-36	8
	IF19	Cable, PWM/Relay – Y	Hitec/JR –24”	CABLE-PWM-Y	2
	IF119	Adapter, 7.2V Battery Charger	Old Connector to Spade-Lock	ADAPT-BATTERY- 7.2	1
	IF11	Cable, 9 pin, M/F, Blk, 6”	DB9 M/F 6’, Shielded	CABLE-DB9-6FT-MF	3
	IF111	Cable, 9-Pin, 6’, Tether	DB9 Female/Female	CABLE-DB9-6FT-FF	1
	IF117	Battery, 7.2V, NiCad, Backup	7.2V NiCad	BATTERY-BACK-7.2	1
	IF124	Wall Adapter – OI	AC/DC Adapter 9VDC	AC-ADAPTOR-OI	1
	IF12	Servo	42 oz/in peak torque 0.19	SERVO-HS-322HD	2
	IF120	Circuit Breaker Bag	20Ax4, 30Ax2, 40Ax4	CB-20A, CB-30A, CB- 40A	1
	IF123	MPLAB CBOT Compiler	MicroChip Software	C-BOT-COMPILER	1
	IF128	LabView Software	Student Edition	National Instruments	1
	IF15	Spike Relay	12v, 20A	SPIKE-RELAY-H	4
	IF115	Camera Pan/Tilt Bracket Kit	3 Brackets plus h/w	FRC-PANTILT-01	1
	IF122	LED Cluster	Robot LED, Red/Blue	ROBOT-LED-RB	1
	IF112	Camera Lens	Camera Lens	CAMERA-CMU-2	1
	IF113	CMU CAM Printed Circuit Board	CMU-CAM-2 PCB	CAMERA-CMU-2	1
	IF114	TTL-232	TTL–RS232 Converter	CAMERA-CMU-2	1
**	IF125	Sensor Strip	DAA, YRG, GTSx2	SENSOR-STRIP-01	1
	N/A	Gear-Tooth Sensor Hardware	Not Used	See Motor kit item 3	1
	IF127	Picasa Software Ver 2.0 on CD	for Google Camera		1

** Note: See <http://www.ifirobotics.com/> BEFORE wiring the YRG sensor.


INNOVATION FIRST, INC. ITEM 2

<i>FIRST 2005 KITBOT</i>				FRC-KITBOT-001	
	Pix	Part Name	Description	Part Number	Qty
	IF31	Transmission Support Frame	Metal plate, 30” x 5”	KITBOT-TRAN-TOP	1
	IF32	Bumper, C-Channel	Metal C- channel, 37”	KITBOT-BUMPER	2
	IF33	Main Chassis Rail	Rail	KIT-BOT- RAIL	4
	IF34	End Cap	U-shaped C-channel	KITBOT-ENDCAP	4
	IF35	Mount Plate, Transmission	Plate, 9’ x 2.75”	KITBOT-TRAN-MNT	2
	IF36	Chassis Stiffener	Angle Bracket, 6”	KITBOT-STIFFENER	4
	IF37	Hardware Kit	Misc Hardware	KITBOT-2005-HDWR	1

INNOVATION FIRST, INC. ITEM 3


MOTOR KIT				FRC-KIT-MOTOR-001	
	Pix	Part Name	Description	Part Number	Qty
	IF41	Motor (Large)	Motor	FP801-005	2
	IF21	Bearing, Timken	Skyway Wheel Bearing	S3KDD	8
	N/A	Screw Kit (contains 4 each - 8/32" flat head screws)	Hardware for mounting Gear tooth sensor.	JSU-229	1

INNOVATION FIRST, INC. ITEM 4 BOX UPC: 356

DRIVE KIT				FRC-KIT-DRIVE-001	
	Pix	Part Name	Description	Part Number *	Qty
	IF66	Output Sprocket	Output Sprocket	FRC-2005-112-009	2
	IF65	Wheel Sprocket	Wheel Sprocket	FRC-2005-120-01	2
	IF614	Hardware Pack	Hardware Pack	Hardware-TranPk-01	1
	N/A	Hardware Pack	Hardware Pack	Hardware-TranPk-02	1
	IF64	Cover	Cover	FRC-2005-112-002	2
	IF613	Hex Cluster Shaft	Hex Cluster Shaft	FRC-2005-112-003	2
	IF612	Hex Output Shaft	Hex Output Shaft	FRC-2005-112-004	2
	IF69	Hex Shaft Cluster Gear	Hex Shaft Cluster Gear	FRC-2005-112-005	2
	IF610	Small Hex shaft Gear	Small Hex shaft Gear	FRC-2005-112-006	2
	IF68	CIM Motor Input Gear	CIM Motor Input Gear	FRC-2005-111-007	4
	IF611	Large Hex Shaft Output Gear	Large Hex Shaft Output Gear	FRC-2005-112-008	2
	IF64	Transmission Housing	Transmission Housing	FRC-2005-112-001	2
	IF63	Master Link, Chain	# 35 Link	ROBOT-MLINK-35	1
	IF62	Chain, 10'	Browning # 35	ROBOT-CHAIN-35-10	1
	IF22	Bearing, Transmission- 39KDD		39KDD	6
	IF23	Bearing, Transmission-9103KDD		9103KDD	2

- - Reference: 2005 FIRST Robotics Competition Kit Transmission Manual

5.4.2.4 Kickoff Supplied Materials

KICKOFF MATERIALS					
	Pix	Part Name	Description	Part Number	Qty
	N/A	Google Digital Camera	Shipped to Kick-off site		1
	IF118	Battery Charger for 7.2V Battery	7.2V NiCad Charger	CHARGER-7.2	1

5.4.3 Replacement Parts Requests

After receiving your Kit of Parts (KOP), *FIRST* will be using a similar system as implemented last year for teams to submit a "Replacement Parts Request" within a short period of time after the kickoff. Any parts requested will be sent to teams via this online request system only. The Replacement Parts Request link will be posted on the Team Information Management System (TIMS) at http://www.usfirst.org/robotics/res_art2.htm after the Kickoff event.

To begin the process of submitting a Replacement Parts Request (after the kickoff), teams will:

- 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

****IMPORTANT****

Please remember there is a **"one time only"** chance for submitting your Replacement Parts Request. Please be very careful to make sure your request is both accurate and complete prior to pressing the "Submit Request" button. Once the request is submitted there can be no 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.

Replacement Parts Requests will be processed daily and items will be shipped to teams during the next open shipping window. Please remember that all requests must be placed by **11:59 pm (Eastern Time) on Wednesday, January 11, 2006.**

5.4.4 Innovation First Kit of Parts:

To submit a Replacement Parts Request for your IFI supplied kit items or for product support (to obtain a Return Merchandise Authorization Number (RMA#) prior to the return of warranted IFI parts, please contact Innovation First at 903-453-0802. Do **not** contact *FIRST* for replacements or repairs of these items.

5.4.5 Obtaining Replacement or Spare Parts:

We will have a listing of the LIMITED set of parts that will be available at events posted on the *FIRST* web site no later than January 17, 2006. If your robot is using parts not included on this list, and there is a reasonable possibility the part could be damaged or broken during competition, it is ***STRONGLY RECOMMENDED*** that you obtain and bring the appropriate SPARE PARTS to events.

Innovation First Inc is also hosting the FIRST Store on behalf of FIRST on the Innovation First web site. Its purpose is to assist teams with the ability to procure excess Kit of Parts items from FIRST. Only FIRST teams will be authorized to purchase the listed parts. FIRST will establish pricing for all parts, which will be inclusive of handling charges, but will be exclusive of shipping charges.

Additional parts and spare Innovation First parts are available and may be purchased by visiting the [IFI Store](http://www.ifirobotics.com/) at <http://www.ifirobotics.com/>. The Innovation First, Inc. contact for FIRST Store matters is Tom Watson at 903-453-0800 : extension 204.

5.4.6 FIRST Loan policy for Control System Components:

Teams are responsible for all Innovation First products required at events. If at any event a team needs to borrow any part of a Control System, the team must provide a Credit Card number to ensure proper return of the items immediately upon completion of the event.

If the part is not returned at the end of the event, *FIRST* retains the right to bill the provided credit card number for the borrowed items.

All "loan" items will be available on a first-come, first-served basis.

ROBOT TRANSPORTATION



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6 ROBOT TRANSPORTATION

6.1 OVERVIEW

This section provides information regarding crate specs, shipping, the FedEx® Freight shipping donation, and the drayage companies. Please make sure those persons responsible for building and shipping your team's robot crate understand and follow the guidelines for the processes.

Read the section below that describes the specific, federally regulated battery packaging method.

Also, read about the new regulations for wood packaging coming into the U.S.

6.2 BATTERY PACKAGING

When the 12VDC Batteries will be shipped in the crate together 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).

Each time you ship your robot:

1. You must ship the 12VDC batteries inside their original box or carton packaging
2. You must use the Styrofoam covering with protective caps covering the battery terminals.
3. Secure the boxed batteries inside the "inner battery box" section of the robot crate in an upright position. The photograph below is a sample of an inner battery box built to comply with regulations.



5. **ABSOLUTELY NO** batteries are to remain mounted (connected or disconnected) on the robot!
6. The crate **MUST** be marked "**NONSPILLABLE BATTERY**" in 1" or larger letters on all four sides. The inner battery box **MUST** be marked "**NONSPILLABLE BATTERY**" in 1" or larger letters on 2 sides of the battery box.

6.3 CRATE INFORMATION

Build your crate so it is sturdy and falls within height specifications and weight specifications when packed for shipment. The Drayage Company determines if a crate meets the size and weight criteria and passes the information to *FIRST*.

If a crate exceeds specifications, 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 website for EVENTS <http://www.usfirst.org/robotics/2006/rgevents.htm> and choose your event, then “Site Info.”

6.3.1 NEW: 2006 Building Restrictions/Laws Regarding Wood Materials

New Federal Rules apply to the crating and pallets you will use to ship robots across U.S. Borders to FRC events. Please read the sections below.

6.3.1.1 Crate/Robot 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.***

The U.S. Dept. of Agriculture has adopted new international guidelines to decrease the potential for the introduction of certain plant pests that may accompany wood materials arriving from other countries. These guidelines call for wood packing materials used in the construction of crates and pallets to be either heat treated or fumigated with methyl bromide in accordance with applicable rules. ***These wood materials must be marked with an approved international mark certifying that treatment.*** The final rule became effective in September 2005, and affects all persons using wood packaging material in connection with importing goods into the United States.

6.3.1.2 Exemptions

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

- 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)
- Processed wood packing materials that have received more than primary processing, e.g., plywood, corrugated board, fiberboard, veneer, whiskey and wine barrels, strand board, etc.

6.3.1.3 Rules Information

FIRST recommends that all international teams, or U.S. teams shipping out of the U.S. and then back into the Country do the following:

- Use only plywood or other exempted wood materials when construct their shipping crates
- If using **raw** wood materials such as 2”x4”s, 1x 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 to facilitate forklift use.**
- If you must use a pallet to ship your crate, make sure the pallet is either non-wood or a compliant wood pallet. Compliant pallets are available from commercial pallet distributors.
- Canadian teams should obtain an appropriate importer’s statement as indicated.
- Contact your local FedEx office for additional information and assistance. You can also find information at: <http://fedex.com/us/promo/woodpackaging.html>

6.3.2 Crate Specifications

When you build your crate, 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 3/4" product? Build it with more than one shipment and/or season in mind.

All Crates must:

- **NEW:** Comply with the Wood Materials Regulations above if the crate ships into the U.S.
- Weigh 400 pounds or less in order to avoid drayage overage charges
- Be sturdily built to prevent damage to your equipment
- Have plywood construction to ensure stacking capability during transport
- "Sit" on 2 pieces of 4" by 4" lumber, spaced at least 28" apart so it can be moved by a forklift.
- 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.
- Be capable of being moved by a forklift

6.3.3 Crate Limit

FIRST asks that each team ship only one crate. Each team has equal pit station space, and the Pit gets crowded when teams are loading and unloading their crates. ***Teams cannot have more than two crates at any competition site.*** This keeps team costs down and keeps Pit aisles, entrances, and egresses clear and safe.

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

6.3.4 Crate Labeling

- Go to the website, *Regional Event* <http://www.usfirst.org/robotics/2006/rgevents.htm> or to the Championship Event web area, and obtain the printable, mandatory drayage address label for your event.
- Fill in your team number on the address label; make three copies and attach one to each side of the crate. Repeat this for each event you attend. This label helps the shipper. It also helps the drayage company easily locate your crate at the warehouse and competition sites.
- Print the battery label, make copies, and tape one to each side of the crate
- Place a clear airbill sleeve on your crate and insert the shipping label.
- Bring your outbound labels to the event for crate shipment.
- Bring extra airbill sleeves in case yours get damaged during shipment

6.3.5 Required Crate Contents

Teams must include the robot and may include the two batteries. When shipping the batteries in the crate, carefully and completely follow all instructions listed above in the "Battery Packaging" Section 6.2.

(Non-North American teams cannot ship batteries with their robots. They must make arrangements with *FIRST* to pick up a battery for competition at their initial event.)

FIRST will allow you to keep **all** of your robot controls (Operator Interface, OI power supply, joysticks, etc.) and not ship them with your robot on Tuesday, 2/21/2006. This will allow you to continue to work on your programming. If you decide not to ship controls with your robot, please remember to bring your controls to your initial competition. *FIRST* does not have replacement controls.

NOTE: Do not pack all of the team's safety glasses in your crate. You will need some when you uncrate!

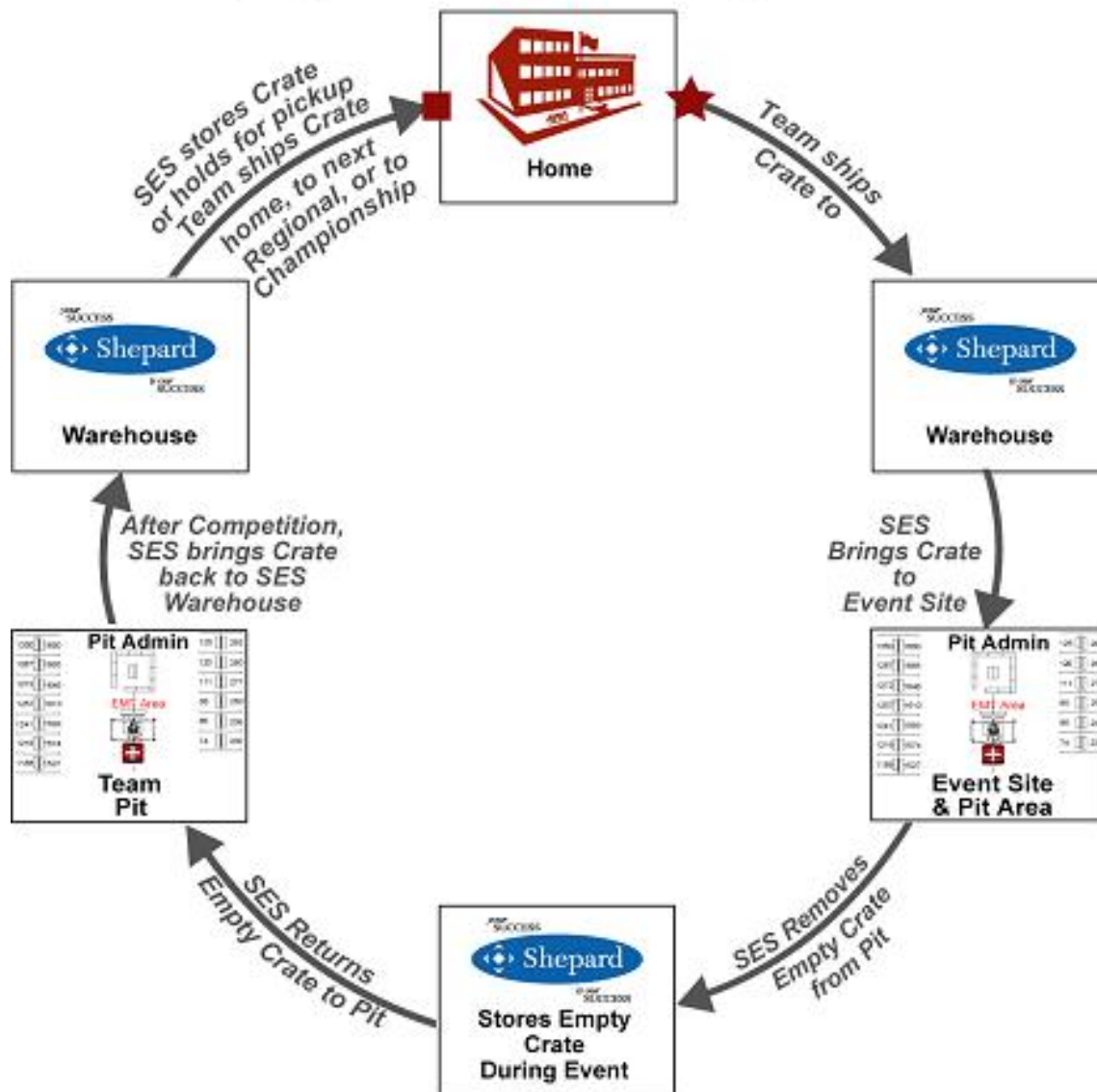
6.3.6 Visual Depiction of Shipping and Drayage Process

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

Shepard Exposition Services (SES)

FIRST Drayage Contractor

Understanding Drayage and Robot Transportation



* *Shepard Exposition is not responsible for Drayage service for Long Island Regional Diagram and service applies for all other Regionals*

6.4 SHIPPING AND DRAYAGE DEFINITIONS

Shipping	<p>In this case, the term "shipping" refers to the transportation of your crate:</p> <ol style="list-style-type: none"> To the Drayage (material handling) Company From the Drayage Warehouse to the next event's Drayage Warehouse Home after your last event
-----------------	---

Bill of Lading (Material Handling Form)	This is a receipt your carrier issues, promising delivery of the merchandise / items listed.
Ship Deadline	The robot crate must leave the team's possession, by delivering or shipping to the drayage facility. This helps ensure teams have equal robot work time.
At Drayage Deadline	Latest date and time you can have your robot delivered to drayage warehouse. Note: This deadline ensures machines arrive at drayage in time for competition site delivery.
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 Wednesday before the event.

6.5 INTERNATIONAL SHIPMENTS AND CUSTOMS

- Teams shipping to the Canadian Regional and international teams shipping into the U.S. and back should research Customs requirements well in advance.
- *FIRST* strongly recommends using a Customs Broker so your team knows exactly what paperwork it needs to import and export your crate.
- Comply with the 2006 Building Restrictions/Laws Regarding Wood Materials listed above.

6.6 SHIPPING YOUR ROBOT

Event sites do not accept or store team robots, crates, or toolboxes. So all teams must ship to a drayage warehouse facility, which stores the robots and then transports them to the event site and back to the warehouse.

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

Teams have two shipping carrier options from event to event:

1. Refer to the FedEx® section below for specific information about free, donated shipping to ONE Regional and the Championship.
2. If you do not ship with FedEx, you must ship with the drayage carrier, Yellow Freight. Refer to the “Yellow Freight System & Discount” section below for specifics.

6.6.1 Shipping to Your Initial Event

- Locate drayage information for your event(s) on the usfirst.org website, *Event* section and choose your event.
- Print, read, and save all sections relating to your events, especially the drayage sections.
- Make shipping arrangements well before the ship deadline. You may choose any carrier or drive your crate to the drayage warehouse for you initial event only. *Read the stipulations below regarding the delivery vehicle.*
- Obtain the best shipping rate from Yellow Freight to the drayage warehouse for your first event, if you are not using the complimentary FedEx® ship. **Note:** You will need the total weight and dimensions of your crate and its contents for an accurate estimate.
- **NEW:** Tell your chosen-shipping carrier if your crate pickup area does not have a loading dock so it can send a truck with a lift gate.
- Obtain a Bill of Lading from your carrier.

6.6.1.1 Crate Shipment Deadline and Requirement

ALL team crates must leave the team's hands or be delivered to the team's initial event's drayage warehouse by midnight local time February 21, 2006. This date applies whether you ship your crate(s) or drive it to the drayage facility. Teams are responsible to work within the business hours of the shipper or drayage facility.

- 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 about the "Mandatory Shipment Verification Process."
- b. If you drive your robot to the Drayage Facility, ask for written proof that shows the date you delivered your crate(s). Read below for rules about the "Mandatory Shipment Verification Process."

6.6.1.2 Delivery Stipulations for Drayage Site and Delivery Vehicle

If your team decides to deliver its crate(s) to its initial event's drayage warehouse, the vehicle must be tall enough for a commercial loading dock. Drayage personnel will not unload personal vehicles.

YOUR DELIVERY TRUCK MUST HAVE A FORTY-EIGHT INCH (48) BED HEIGHT.

You will be turned away at the warehouse if the vehicle requirement is not met!

NO EXCEPTIONS!

6.6.2 Mandatory Robot Shipment Verification Process

FIRST requires every team to document the shipment of its crate(s), initial event only. All crates must ship from event to event thereafter. *Teams will disqualify themselves* from competition for failure to observe and verify adherence to the rules and deadlines. *Please follow the instructions below for your chosen method.*

6.6.2.1 If You Use the FedEx PassKey System

1. The PassKey System will provide *FIRST* with tracking numbers and crate pickup dates.
2. Save a copy of the airbill for tracking purposes and your records.

6.6.2.2 If You Use an Alternate Shipper

- a. Ensure that your receipt clearly shows the date and time the crate(s) left your team's hands.
- b. Write your team number on the bill of lading/receipt.
- c. Make a copy and retain for your records.
- d. **International teams** will receive an e-mail instruction on how to get the shipping verification to *FIRST*.
- e. **U.S. teams:** Send it to *FIRST* right away, to arrive within 4 days. Address the envelope as below, using all capital letters.

6.6.2.3 If You Drive Your Robot to the Drayage Facility

Refer above to the "Drayage Site Delivery Vehicle Stipulation" section. *Your vehicle must have a 48" bed height, no exceptions.*

1. Have the drayage warehouse personnel put the time and date of drop off on an official receipt.
2. Write your team number on the receipt.
3. Make a copy and retain for your records.
4. Send it to *FIRST* so it arrives in 4 days. Address the envelope as below, using all capital letters.

6.6.2.4 Verification Mailing Address

YOUR TEAM #, YOUR INITIAL EVENT'S NAME

TEAM SUPPORT

FIRST ROBOTICS

200 BEDFORD STREET

MANCHESTER, NH 03101

6.6.3 Robots Must Ship from Event to Event

Teams cannot take their robots home between events. Robots must ship from event to event, either:

- a. Through Shepard Exposition Service (SES) and its designated carrier, Yellow Freight.

OR

- b. Through the FedEx complimentary shipping. *Bring the airbill with you on Saturday.*

Remember to print/ bring shipping address labels to each event in which you compete.

Crates will return to the drayage facility and ship from its warehouse on Monday.

6.6.4 Back-to-Back Events

Contact the Drayage Company(s) well before both competitions to see if it can/will extend the crate arrival deadline for your team. You *must* use the Shepard Exposition Services' designated shipper. You cannot use FedEx in this case, because FedEx does not pick up at events on Saturdays and your robot will not make the competition on time. You must make all arrangements early to have your robot ship and arrive on time.

6.6.5 Delivery Deadlines

Each event has an "at drayage" deadline. Refer above to "Definitions." Make sure your shipper is aware of the deadline so you will meet it. Find the crate arrival deadline for each event by referring to the website *Events* section.

6.7 FEDEX® FREIGHT SYSTEM (DONATED SHIPPING)

FedEx has again graciously agreed to partner with **FIRST** and donate some robot crate shipping, via the FedEx Freight System. Remember, this is a generous donation. Be grateful.

NEW: The teams in the U.S. contiguous states will use the on-line FedEx PassKey System to generate airbills.

6.7.1 The Benefit/Donation

Please familiarize yourself with the benefit options below. You cannot substitute. Use the airbills for the following *only*:

1. FedEx Freight System will ship **ONE** crate to:

- a. **ONE** Regional of your team's choice
- b. The Championship

2. FedEx will also ship **ONE** crate back home:

- a. After your final Regional if you are not competing in the Championship

OR

- b. After the Championship if you compete in that event. If you need your robot soon after the Championship, you may want to use the Shepard Exposition Services (SES) shipper. *Because of the crate volume of these donated shipments, it could take a month or so until you receive your crate.*

6.7.1.1 **NEW: PassKey Process - Teams in the 48 Contiguous U.S. States**

As a part of the Kit of Parts, teams will receive instructions for printing on-line airbills. You will find the directions in a large FedEx envelope. If you are registered for the Championship, your return airbill will be in the registration envelope at the event.

6.7.1.2 **Process - Teams in HI, AK, PR**

FIRST will send a FedEx envelope with two (2) pre-printed airbills to your team's Shipping Contact. This will most likely be in early February.

If you are registered for the Championship, your return airbill will be in the registration envelope at the event

6.7.1.3 **Process – International Teams Competing in the U.S.**

FIRST will send a FedEx envelope with two (2) pre-printed airbills to your team's Shipping Contact. This will most likely be in early February. Make sure you have all Customs papers in order for the shipment to and from the U.S.

If you are registered for the Championship, your return airbill will be in the registration envelope at the event.

6.7.2 Weigh the Donation Value

Which event will give your team the most value for this donation?

- **Back-to-Back Events:** FedEx does not pick up on Saturday, so you cannot use the donation for back-to-back events. There is not enough time to make it from one event to the next Drayage warehouse.
- **Initial Event is Close to Home:** If you have the proper vehicle/bed height, is it wise to drive your crate to the local event and save the donation for a more costly shipment?
- Complimentary shipments *do not* get high priority, so make sure there is enough time for this method of shipping, *especially after the Championship*.

6.7.3 FedEx Important Notes

FIRST cannot and will not replace lost airbills.

- **You cannot use airbills with hand-written account numbers for these donated shipments.**
- You cannot use FedEx when shipping to back-to-back events.
- FedEx will pay for one Regional ship only. You cannot substitute a second Regional shipment for the Championship shipping benefit or for the ship home.
- **Call for pickup.** If your robot ships back to drayage for FedEx shipment, remember that you must call FedEx for pick up. This does not happen automatically.

Refer below for International shipments and shipments from Hawaii, Alaska, Puerto Rico.

6.7.4 FedEx Weight Limit

Crates *cannot* exceed 600 pounds.

REMEMBER: *FIRST* pays drayage costs for *one* crate up to 400 pounds *only*. Teams pay the drayage cost in excess of 400 pounds, rounded *up* to the next hundredweight.

6.7.5 Shipment Insurance

FedEx does *not* insure complimentary shipments. If you want to insure your crate and its contents, obtain insurance through a third party.

6.7.6 International / Unusual Shipments

Read *NEW*: 2006 Building Restrictions/Laws Regarding Wood Materials before building your crate. This deals with regulations regarding required treated wood materials. Teams in the following locations may receive e-mails as the season approaches. Remember, the “return from the Championship” airbill will be enclosed in your Championship registration envelope.

Canada	Because FedEx Freight service is not offered within Canada, FedEx is not able to provide the donation of shipments within Canada. FedEx does donate shipments that cross the Canadian/U.S. border or those shipments within the U.S. Teams must use a FedEx International Airbill to ship across the Canadian/U.S. borders. <i>FIRST</i> will mail them to your Shipping Contact in a FedEx packet in February. Remember to fill out required Customs papers. If you will be shipping to the Championship, we will provide a domestic airbill.
Other International	Teams must use FedEx Freight International airbills to ship to the U.S. and from the U.S. back home. These forms will be sent in a FedEx packet to your Shipping Contact in February. If you will be shipping to the Championship, we will provide a domestic airbill. Fill out required Customs papers.
Alaska Hawaii Puerto Rico	FedEx Freight is not available in these areas. These shipments require 2 nd Day Air. Teams will receive airbills with the "Second Day Air" box checked.. Use the provided airbills for shipments within the continental U.S.

6.7.7 NEW: The PassKey System

This is an on-line ship manager process that allows registered teams in the contiguous 48 U.S. states to print their own airbills for one Regional event. Teams registered for the Championship may also print an airbill for that event. Find the instructions in the FedEx envelope/packet in your Kit of Parts.

- The Shipping Contact should become familiar with the instructions and retain this packet in a safe place.
- *FIRST* will send an invitation to the Shipping Contact, via e-mail, to register for the PassKey system. The Shipping Contact will have five (5) days to register.
- Once the registration is complete, he/she will be able to enter the system, choose the event, fill in a limited amount of information and print out an airbill.
- She/he should register within 3 days of requested pickup date.

The airbill for the return from the Championship will be in the team's Championship registration

6.7.8 NEW: What to Do

AirBills:

- Print out or fill out your airbill and place it in a plastic sleeve and attach it on your crate. Make sure you follow all crate labeling instructions. Refer above to "Crate Labeling" section.
- Keep a copy of the airbill for tracking purposes, and put it in a safe place.
- *There will be NO airbill replacements.* Airbills with a handwritten account number will not be accepted for these free shipments.

Arrange Pickup: Call 24-48 hours in advance to schedule by calling

United States	Canada
Call FedEx Freight Services 800-332-0807	Use the Canadian Call Center: 866 744 7493
International teams, go to fedex.com , choose your country, and locate the appropriate phone number.	

- You will need the account number from the airbill.
- Ask for Freight Services. Emphasize that it is a heavy weight shipment and provide the type of shipment for the area you will be shipping to/from. See table below.
-

Area	Shipment Type
Contiguous 48 states	F3
Alaska	F2
Hawaii	F2
Puerto Rico	F2
International	International Priority Freight

- If your pick-up/return site does not have a loading dock, be sure to tell the representative that you need a truck with a lift gate. (This may apply to your initial shipment from your home base)
- Provide your crate's dimensions and total weight.
- Allow 3-5 days for shipment movements.

6.8 YELLOW FREIGHT SYSTEM & DISCOUNT

If you do not ship with FedEx, you *must* ship from event to event with the Shepard Exposition Services Carrier, Yellow Freight.

- **Quote:** To obtain a freight quote for shipping crates to a drayage site, please contact Yellow Transportation at (800) 610-6500.
- **Yes Discount:**
 1. **Teams must ask for the “YES DISCOUNT” in order to receive a discounted rate.**
 2. **Bill of Lading (BOL):** The “*Yes Discount*” wording must also appear on the Bill of lading to receive the appropriate rate.
- If your pick-up/return site does not have a loading dock, be sure to mention that you need a truck with a lift gate. (This may apply to your initial shipment from and return to your home base).

6.9 TRACK YOUR CRATE

Track your crate to ensure on-time crate delivery to the event. Please do *not* call Shepard Exposition Services (SES) to track your crate if you shipped FedEx.

FedEx Shipment Tracking	SES Yellow Freight Shipment Tracking
Use the FedEx Customer Service Center at www.fedex.com , or call (800) 463-3339. (800 Go FedEx) Have your twelve-digit tracking number available.	Call (800) 610-6500 Follow the telephone prompts for tracking Have your pro number available. If you need assistance, call SES.

6.10 DRAYAGE (MATERIAL HANDLING)

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.*

Yellow Transportation c/o Shepard Exposition Services (SES) is the designated Drayage Company for all events except the SBPLI Long Island Regional. Festo Corporation handles drayage for the Long Island event.

1. Label your crate properly. If it doesn't meet required specifications, the Yellow Transportation terminal may refuse it.
2. Well ahead of shipping time, find drayage information and the Shepard Exposition Services rates for overweight (overage) costs for all events in which your team will compete. Go to <http://www.usfirst.org/robotics/2006/rgevents.htm> and click on your event.
3. Refer to all related sections below.

6.10.1 The Drayage Companies: Functions and Services

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

1. To provide **FIRST** with a system to monitor on-time crate arrival
2. To provide robot storage prior to the event
3. To ensure on-time crate delivery to team Pit stations at the competition sites
4. To Provide storage for empty crates at the venue
5. To provide a staging location for outbound shipments and protect staff and teams from crowded load-in and load-out situations
6. To comply with venue contracts which prohibit the acceptance of shipments on site.

6.10.2 Drayage Company Regulations

Teams cannot take their robots home from any event. They must ship through SES (Yellow Freight) or use the donated FedEx shipment. The material handlers 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.
- **Freight Overage Payments:** All teams must pay for drayage overage in advance, prior to the competition. If a team refuses to pay for freight overages, the drayage companies will refuse delivery of the team's crate until payment is reconciled at the drayage service desk. Upon payment receipt, it will deliver the crate(s).
- **Accepted Payment Forms:** SES will accept credit card payment for drayage overages. (MasterCard, Visa, or American Express) If paying by school check, the check must arrive at the drayage company *before* the team participates in the event.
- **Use Designated Shippers:** Teams must use FedEx *or* the designated SES shipper (Yellow Freight Transportation) for crates shipping from event to event.
 - * **FedEx:** Consider using your final FedEx Freight airbill to ship home from your last event if you do not need your robot right away. Remember, these are donated shipments and the final return can take a month or more, especially after the Championship.
 - * **Shepard Exposition Services Carrier (Yellow Freight):** When not using FedEx, teams must make on-site arrangements through the SES desk and the Yellow Freight representative. Teams shipping from the Long Island event must also use Yellow Freight or 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 Yellow Freight Terminal or drayage warehouse requires that drivers submit a *certified weight receipt*. The company 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:
 1. Number of items, weight, and description of merchandise
 2. All Items labeled per Regional/Championship event specifications
- **Damage:** The Yellow Transportation terminal or drayage warehouses will not be responsible for damage to uncrated materials, improperly packed materials, any concealed damages, loss, or theft of materials after crates have been picked up for loading out of the competition site.
- **Weigh In:** The Yellow Freight Terminal or drayage warehouse 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 fees. *If a team wants to dispute the weight of its crate, a forklift with weight scales will be on site at each event for reweigh.*

6.10.3 Immediate On-site Crate Weight Complaint Resolution

When the team members arrive at the Pit Station:

1. Refer to and read the label Shepard Exposition Services (SES) placed on your crate.
2. If you have any question as to the accuracy of the weight or information on the label, *immediately* find An SES representative and resolve the problem. Please see the Pit Administration Supervisor if you cannot find a representative.
3. *Do not open the crate until you resolve the problem.*

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

6.10.4 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 website, click on your event and Site Information for material handling rates.
<http://www.usfirst.org/robotics/2006/rgevents.htm>

6.10.5 Drayage Costs - *FIRST*

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

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

6.10.6 Drayage Costs - Teams

The following will cost teams money:

1. Crate exceeding measurement or weight specifications
2. 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.

6.10.7 Outbound Shipments from the Drayage Warehouse

SES will bring crates back to its warehouse or a Yellow freight terminal 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, will ship at FedEx convenience.

- Teams must ship their robots. *They cannot take robots or crates with them from an event.*
- Make sure your crate is still fit for travel.
- Teams must pre-pay for all outbound shipping charges.
- Fill out a Material Handling Form (Bill of Lading) for each event. These are available on Saturday of each event. A SES representative will pass out an Outbound Bill of lading to each team at the event.
- At the event, remove the old shipping label. Attach the shipping address and battery labels for the next event, to all sides of the crate...at a readable level.
- Make arrangements for the outbound shipment.
- Attach your shipping label if you are using a FedEx. If you are using Yellow Freight, please turn in your Outbound Bill of Lading to the Yellow Freight representative.
- At SES events, the Yellow Freight Representative will review your information and will give you a copy of the BOL with a Pro number assigned. Please retain this copy to track your shipment with Yellow Freight.

6.10.8 Empty Crates

Teams that have a crate they no longer wish to keep/ship should notify the drayage representative about it before it is time to deliver crates back to the pit stations on Saturday.

6.11 EARLY UNCRATING PROCEDURE AT EVENTS

For the 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, and nobody can work on the robot at that time. If any of the three team members exits the Pit area, they will not be re-admitted until general Pit opening.

Regionals: Will be allowed to enter on Thursday, 7:45a.m.

The Championship: 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.

The Drayage Manager will be on hand to help during this limited opening. Teams should:

- Look for the SES label on your crate. This label will show if there are weight or crate damage questions regarding your crate. Contact the Drayage Manager *before opening the crate. Once the team opens a crate, it cannot protest a weight issue.*
- Notify the SES Manager as soon as you have uncrate so SES can remove the empty crate(s). This will help to ensure safety and by clearing the aisles.

6.12 NEW: WE QUALIFIED FOR THE CHAMPIONSHIP. WHAT DO WE DO?

6.12.1 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* 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.

6.12.2 Undecided? Temporary Crate Shipment “Hold, Then Ship” Process

If you are not sure your team can attend the Championship, read below for the “hold” process.

- Make sure you talk with the SES/Yellow Freight representative at the event (or the Festo Corporation representative if at the Long Island event). Explain your situation and make temporary arrangements. Follow directions below in “Shipping Arrangements.”
- Put an 8 ½” by 11” sign on your crate, near your shipping airbill. It should say:

**Team will call.
Hold until Tuesday.**

- Fill in your donated FedEx airbill with the team’s home shipping address OR the address for the Championship drayage warehouse. (If shipping to the Championship, also place the drayage warehouse address on each side of the crate.)
- Consider shipping your tools also
- Place the airbill on your crate.
- **You must inform SES of your shipping intentions by Tuesday.**
- If you find that you are not shipping to the address on your airbill, you must ship through the SES carrier. Provide the new shipping address and prepay the shipment.
- Track your shipment.

Because of possible liability, the drayage company will not fill out a FedEx airbill for your team

AT THE EVENTS



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7 AT THE EVENTS

7.1 OVERVIEW

This section provides a general summary regarding a *FIRST* credo, mascots/uniforms, recommended items and equipment for teams to bring, Pit rules, event schedules, registration, practice rules/time slots, and robot inspections. Please read the following to get a "feel" for competition schedules, registration procedures, practice times, and matches. Please familiarize your team with this overview so all team members understand the routine and rules.

Please notice and carefully read the “NEW” items in all sections of the Manual.

7.2 FIRST EVENT INFORMATION

To ensure that your team has the proper Regional information for its event(s), download Regional sections from the *FIRST* website for the specific events they will attend. These sections are only available on the *FIRST* website, and contain critical event-specific information. <http://www.usfirst.org/robotics/2006/rgevents.htm>

7.3 SAFETY

Participants and team mentors should review *FIRST* safety policies and procedures prior to participating in events. *FIRST* will provide materials on the *FIRST* website and at the events. Use the above link and go over the “Site Restrictions” in “Site Info” for your event. Please ensure that your team knows and follows safety measures such as the following:

7.3.1 Safe Travel

Travel in pairs or larger groups at all times going to, coming from, and during each event. Include at least one adult during transportation.

7.3.2 Staff/Volunteer Badges

At events, staff and volunteers will wear distinguishing badges. Advise your team members as to this system and whom to approach with questions and problems.

7.3.3 Safety Captains

Each team shall 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 event and will help to maintain a safe environment for their team at each event.

7.3.4 Mandatory Safety Glasses - They are not forehead protectors

FIRST requires all teams to bring and supply safety glasses for its members and guests for each competition. Students and adult team members and guests must wear them to protect their eyes:

- While uncrating the robot
- NEW: At all times while in team Pit Stations
- Working on the robot
- When observing any robot building/repair work
- While competing

Operators, players, and coaches will not be allowed on the competition field without them. Regular glasses do not qualify as safety glasses. *You must use safety goggles over them.*

Goggles are not required to be worn over regular glasses **if** the regular glasses are made of polycarbonate / plastic material similar to that in safety glasses **and** safety side shields are attached.

7.3.5 NEW: Other Safety Recommendations

At events the pure anticipation and excitement of being at the competition can sometimes overshadow common sense and safety fundamentals. One safety area that team members sometimes overlook is the particular need to wear appropriate and proper clothing when hanging around the robots. In addition to the Safety glasses required for eye protection, *FIRST* also highly recommends that team members:

- Do not wear loose or baggy clothing near the robots,
- Do wear proper shoes to protect feet and toes,
- Do wear gloves when carrying the robot or manhandling the robot crates to protect hands and fingers.

7.3.6 NEW: Robot Carts

To protect team members from muscle strains and other injuries as they transport the heavy robot from the Pit to the competition area, it is recommended that teams use some type of cart. Carts must remain in the team pit area when not in use for robot transportation. And importantly, all carts should fit through a standard 30-inch door. Cart wheels must not damage site flooring.

7.4 SAMPLE COMPETITION AGENDAS

For event-specific agendas, go to the website and download the agenda for each event you will be attending. Print it and bring it with you so your team will have the schedule(s).

<http://www.usfirst.org/robotics/2006/rgevents.htm>

7.4.1 Regional Competitions

- | | |
|-----------------|--|
| Thursday | Limited pit opening-7:45 a.m. (3 persons per team to uncrate team robot)
Team arrival. Pit usually opens about 8:30 a.m.
Release form collection.
Registration - before noon
Practice rounds
Official weigh-in and inspection
Pit closes, usually at 8 p.m. |
| Friday | Pit opens, usually about 8 a.m.
Team lineup begins about 8:30 a.m.
Opening ceremony, about 9 a.m.
Seeding (qualifying) matches
Awards ceremony
Pit closes 6 p.m.
Team Social, if applicable |
| Saturday | Pit opens, usually about 8 a.m.
Opening ceremony, usually about 9 a.m.
Continued seeding (qualifying) matches
Elimination matches, usually about 1 p.m.
Awards ceremony
Pick up bronze medallions at the Pit Administration station
Receive returned Chairman's Award submissions
Pit closes- Robots packed and shipped |

7.4.2 Championship Agenda

- | | |
|-----------------|--|
| Thursday | <i>Limited Pit opening on Wednesday night from 6 to 9 p.m. (3 persons per team to uncrate team robot and charge batteries only. This is not a work session)</i>
Team arrival. Pit usually opens about 8:30 a.m.
Registration upon arrival and before noon
Practice rounds |
|-----------------|--|

Official weigh-in and inspection
Pit closes, usually around 8 p.m.

- Friday** Pit opens, usually about 8 a.m.
Team lineup begins at 8:30.
Opening ceremony about 9 a.m.
Seeding (qualifying) matches
Pit closes
- Saturday** Opening ceremony
Continued seeding (qualifying) matches
Elimination matches, about 1 p.m.
Awards ceremony
Teams receive returned Chairman's Award submissions before Pit closes
FIRST Finale
Pit closes- Robots packed and shipped

7.5 COMPETITION OVERVIEW

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

7.5.1 Practice Rounds

Your registration envelope will contain a list of Thursday practice times and indicate on which field you will practice. *Teams cannot switch practice times.*

7.5.1.1 Time Slots

All teams will receive a list of all the 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, send in the human player only or forfeit the practice slot entirely. Your team members may want to scout other teams and their strategies.

7.5.1.2 Courtesy

In order to make the most of practice time, there will be a specified number of 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.

7.5.2 Official Robot Inspection

To ensure all robots are safely constructed and fall within the *FIRST* parameters, there is an official robot inspection. Please read below for criteria:

- To ensure safety and readiness, pre-inspect your robot before you ship it. This will make your official inspection go more smoothly.
- Inspectors will use an Official Inspection sheet for checking robots; a draft copy of the inspection checklist will be available to teams during the season.
- Inspectors will ask the team members questions. Make sure they are familiar with the robot operation and can respond correctly to the inspector's questions.
- Teams may practice on Thursday 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 eliminated.
- Robots must pass inspection before competing on Friday.
- Have your robot re-inspected after you make alterations.
- Inspectors may re-inspect randomly before or after matches.

7.5.2.1 When Does Inspection Take Place?

FIRST staff and volunteers will be on site all day Thursday, until the Pit closes, to inspect machines. It is not necessary to wait until you are totally ready to begin the inspection process. It is to your advantage to start the process early. Go to the weigh/sizing station to document height/weight specifications. Inspectors can sometimes help find problems and/or provide suggestions during an early inspection.

7.5.2.2 Procedure

Bring your robot to the Inspection Station when you are ready to begin. Partial inspections, such as height and weight, help prevent an inspection clog at the end of the day. Don't wait till the last moment to begin.

- Team members must accompany the robot and be prepared to answer Inspectors' questions.
- Inspectors check off items on an Inspection Sheet as the team passes those portions of the process.
- Return with corrected items until your robot passes inspection.
- Each time you modify your robot, you must request and pass a re-inspection.

7.5.3 Competition Matches

Match List: Once a team passes robot inspection, it is eligible to compete. Before the Pit opens on Friday morning, the Pit Administration Supervisor will place copies of the Match List on each team's Pit table. This list includes both Friday and Saturday matches and provides information as to when teams will participate, with whom, and against whom.

Scouting: Teams often use the list for scouting other teams and their strategies. This may be especially helpful when choosing alliances for the final rounds.

Early Matches: Make sure your team is on time in case you have an early match on Friday or Saturday. *If your team is in any of the first four matches on Friday or Saturday, volunteers will ask you to line up before the Opening Ceremony.* Matches begin right after its conclusion.

Maintaining Schedule: The Pit Announcer and Queue Team will work together throughout the days to line up teams for competition matches and maintain the schedules.

Pay attention to the practice/match schedule and listen for announcements throughout the day. You will need to know when you will compete, find out the number of the ending match before lunch and which match designates the end of the competition day.

7.6 TEAM REGISTRATION

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

Prior to attending your event(s), please download the General Information Sheet and the Agenda. You can find agendas on the 2006 FIRST Robotics Competition Regional Events page.

<http://www.usfirst.org/robotics/2006/rgevents.htm>

Please read the following information carefully.

7.6.1 Consent / Release Forms - A Requirement for Registration

Web location for form: http://www.usfirst.org/robotics/2006/consent_release_form.pdf

Teams cannot register without a completed form for each team member attending the event(s), including adults traveling with the team. Persons under 18 years of age must have a parent or legal guardian's signature.

7.6.1.1 Prepare and Collect the 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 will not accept school permission forms.*

7.6.1.2 Bring Required Forms to Registration

Do not forget these forms. We may not have extras. By choosing to attend or participate in the 2006 FIRST Robotics Competition events, each person grants FIRST permission to use all photographs and/or video

footage. Use our consent forms only for this purpose. Treat the Robotics Competition like any other school activity requiring parent/ legal guardian consent.

Read below for instructions and requirements:

Team's Initial Regional Event	Later Regionals & the Championship
<ol style="list-style-type: none"> 1.Download the <i>FIRST</i> Consent and Release form from the <i>FIRST</i> website. 2.Fill in your team number on the line in the lower right hand corner 3.Make enough copies for all team attendees, students and adults. 4.Have each team member fill one out and sign it. <i>Team members under eighteen must have a parent or legal guardian sign their forms.</i> 5.Collect the forms, clip them together, and bring them to the event. 6.Give them to the registration personnel at the Pit Administration Station at your first Regional of the season. 	<p>Supply a form for anyone who has not provided a form at an FRC event during this competition season.</p>

7.6.2 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 Times: Designates practice times for all teams.

Safety Badge This safety badge is in the team's initial event registration envelope.

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

4 Team Operator Badges: These are for the 2 operators, 1 human player, and 1 coach/mentor. The badge with the dot is the mentor's. The mentor can be an adult or student. *He or she cannot score points or operate the robot.*

7.7 THE PIT

Teams spend a lot of time in the Pit working on their robots. It also houses the Replacement Parts area and the inspection station. It is important to use thoughtful manners and true team spirit here since quarters are equal, but are often cramped.

Get to know other teams, help each other when you can, and keep the aisles clear. Time is short, and help may be right "next door" in the adjacent Pit station.

7.7.1 Be Safe, Be Kind

- Use common sense regarding safety and courtesy.
- Read and follow the "Courtesies and Rules List" section. Print and provide these to all team members.
- NEW: Wear required safety glasses in the Pit Stations *at all times*.
- Wear required safety glasses when working on or watching work done a robot. Wear them on the playing field.
- Choose a student or adult Safety Captain during the build season. This person will monitor team safety at the event also.
- Take advice from Safety Captains

7.7.2 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. 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.
- Get answers to most questions.
- Ask about lost and found articles.
- Report an illness or injury.

7.7.3 Pit Map

You will receive a Pit map when you register. It shows team location, robot traffic flow, First Aid Station, Replacement Parts Area, Inspection Area, and the Pit Administration Station.

7.7.4 NEW: Team Stations

These designated spaces help organize team placement and help team members, judges, and visitors find teams easily. Please keep your numbers visible and aligned. They are set up to be as equal as possible.

Each team's pit station will have a table and power outlet.

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 pit space. No structures should be higher than 10 feet above the floor and must safely support any signs or displays mounted to the structure. FIRST will require the removal of any pit structure that is deemed unsafe by event management personnel and local committee members.

7.7.4.1 Station Numbering/Signage

You will see team numbers on poles aligned for easy team station identification. These signs are reused at other events, so please do not remove them. *This will be considered stealing.*

7.7.4.2 Space Regulations

Each team is allotted the same amount of workspace. The size may vary from site to site. Please keep your equipment and team members within this area and do not allow spillage into the aisle or undesignated space. It is not gracious to expand your space. If your team is too large for the allotted space, encourage your team members to leave the area and take turns scouting other teams and/or watching the matches.

Do not add to your space by setting up in another area of the Pit or by adding additional height.

7.7.5 Aisles

It is extremely important to keep aisles clear for safety, judging accessibility, robot mobility, courtesy, and maintaining competition schedules. Please advise team members not working on the robot to watch the practice rounds or competitions. Keep chairs and equipment out of the aisles. Please sit in the audience, not on the floor or in the aisles.

7.7.6 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. Please do not add music to your cart.

7.7.7 Replacement Kit Parts Availability at Events

As *FIRST* grows, the issue of replacement kit parts grows also.

FIRST asks that teams bring any unused parts from their kits to events to assist and support each other. You can expand your *FIRST* Network as you exchange parts.

The *FIRST* Replacement parts area is located in the Pit. The number of parts is limited.

The following are the ONLY items that will be available at any event.

Battery Quick Disconnects
Muffin Fans – Large and Small
120 Amp Main Breakers
Wheel Hub Adapters
Globe Motors

CIM Motors
Nippon Denso Window Motors and Couplers
Fisher-Price Motors/Gearboxes
Various Pneumatic Fittings – but no cylinders,
tanks, compressors or valves

Batteries & chargers will NOT be available at any time at any event unless you have made prior arrangements with FIRST.

7.7.8 Control Systems

Teams are responsible for all Innovation First, Inc. products required at events. If a team has a problem with the 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, FIRST will bill the credit for the borrowed item(s).

- 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)

7.7.9 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. Grinding and tools that cause sparks are not allowed in the Pit, so teams must use the machine shop when repairs and fabrication may produce sparks.

The staff and volunteers in the Pit Administration Station will be able to tell you how the system works. 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."*

7.7.10 Announcer

Each event has a Pit announcer to coordinate the queuing (lining up) of teams to the practice or competition lineups. Please do not ask the announcer to make frivolous announcements.

7.7.11 Robot Traffic Flow

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

7.7.12 Queuing

The Pit announcer and volunteers must maintain the practice and match schedules. Your team should designate team members to be your queue specialists and carefully watch the schedule and alert the team when its turn is near. They 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 Thursday and your competition match times on your Match List for Friday/Saturday.

- Listen carefully for the queuing announcements.
- Line up your four (4) competing team members and robot when your team number is announced.
- *Check the Saturday schedule to see if your team is in the first matches of the day, in which case lineup is prior to the Opening Ceremony.*

7.7.13 Property Security

There have been occasions when items such as cameras and laptops have "disappeared." Use common sense and do not leave such valuable items unattended. Neither the site nor **FIRST** is responsible for theft.

Designate a representative to remain in the Pit during team absences, or take your valued items with you.

7.7.14 Lost and Found

If you find an article or lose one, please 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 during events and after the season.

7.7.15 First Aid

There will be an EMT or Nurse in the Pit area to assist with injury and illness. Refer to the Pit Map for the First Aid Station location. *Please notify the Pit Administration Supervisor of any injuries or illness.*

7.8 OPENING AND AWARDS CEREMONIES

There are both Opening and Awards Ceremonies on Friday and Saturday at Regional events. These ceremonies allow us to show honor and respect for our country, sponsors, teams, volunteers, and award winners and to provide the opportunity to applaud the successes of team members. They give teams a chance to "meet" the Judges, Referees, and important persons and sponsors involved with their event.

FIRST presents trophies and medallions to award-winning teams. We expect all teams to attend on time.

7.8.1 All Teams Should Attend

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

7.8.2 Pit Manners/Rules During the Ceremonies

- 1.) Team members will not be allowed to use power tools, hammers, and 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 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.

7.9 TEAM SOCIAL

The team social is a great part of the competition celebration. If your event has a Team Social, it will probably be after the Awards Ceremony on Friday evening and include food, fun, and an opportunity for teams to unwind and get to know each other in a relaxed environment. These events are informal and entertaining!

7.9.1 Requirements

In order to plan for the socials, please ensure the following:

Head Count: Prior to the deadline, the team Main/Alternate Contact must enter the team's attendance number in TIMS. (If the team will be attending more than one event, please enter a number that reflects the average attendance.)

Chaperones: Each attending team must have 1 responsible, adult chaperone for each 10 students.

Team Conduct: All team members must conduct themselves with gracious professionalism.

7.9.2 Deadline for Attendance Count

Provide the event attendee information, on line in TIMS, no later than three weeks prior to your event. If you are attending more than one event, average the count for a good approximation.

7.9.3 Regional Socials

Check the Regional Events section, "Site Info," on the website for dates and location for this activity at <http://www.usfirst.org/robotics/2006/rgevents.htm> There 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. We expect the best from our teams, because they are the best!

7.9.4 Championship *FIRST* Finale

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

7.10 PARTICIPATION MEDALLIONS

FIRST provides ONE box of twenty-five (25) bronze medallions to each team that has *not* won medals as a:

- A Regional Chairman's Award winner
- An Engineering Inspiration Award winner
- A 2006 Regional Champion or Regional Finalist

7.10.1 One-Time Pickup at Team's Initial Event

We will hand out the medallions at each team's initial event only. Pick them up and sign for them at the Pit Station on Saturday once it is clear that your team will not receive one of the three awards listed above.

If your team has been to another event, you will **not** receive a second box of medallions.

7.10.2 After Your Initial Event

If teams forget to pick up their medallions, you should act quickly and request that *FIRST* ship the team medallions.

- *The team will pay for the medallion shipment cost via their the shipping account number in TIMS*
- The medallions will not ship until after our trucks return from the Championship and materials are unloaded and categorized. The estimated ship time would be mid or end of May.
- We will accept check, credit card, or money order. We will *not* accept purchase orders.

7.11 TEAM SPIRIT

Competing as a team is fun as well as rewarding. Part of the pleasure and reward of being a team member is the way the team stylizes itself with team T-shirts, trading buttons, hats, cheers, cheerleaders, and costumes.

7.11.1 Team Styl'n

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. Refer to the "Communications" Manual section, "Using the *FIRST* Logo" for logo use clarification.

7.11.2 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 are comfortable and cool enough to prevent fainting and dehydration.

7.11.3 Banners and Flags Rules

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:

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

7.12 SITE RESTRICTIONS

Please read the following restrictions and adhere to them in order to promote an orderly, safe, pleasant, and exciting competition. As a group, we all should honor agreements with the venue and help promote the spirit of good partnership. *Please:*

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 save seats. It is not fair to other teams or the public we hope to interest as team sponsors/volunteers.

Do not deliver or ship robots directly to the site. All shipments go through the drayage company.

Do not arrange for Internet access 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 remove any *FIRST* or Team number signs. *This is stealing!* We use signs for multi-event and multi-year applications.

Do not bring helium tanks or use walkie-talkies.

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.

Do not run in the venue.

Do not wear open-toed shoes.

7.13 COURTESIES AND RULES

The behind-the-scenes action is in the Pit. That 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 request that your team follow courtesy rules while in the Pit, on the playing field, and in the audience.

We are trying to encourage support from our audience members 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 rules below so everyone can work and compete in a safe, sportsmanlike, friendly, and orderly environment.

7.13.1 Pit and Competition Safety

SAFETY CAPTAIN Each team appoints a Safety Captain who will help maintain safety at events, especially in the Pit. He or she should monitor your team's general safety practices as well as Pit and Pit Station safety.

Battery Safety: Charge 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 SAL battery in an inverted position.
(Sealed Acid Lead) Should your battery leak, ask the Pit Administration Supervisor for baking soda to absorb the acid.

Brazing/Welding/Soldering: Prohibited at the pit stations. Use the machine shop.

Fire Extinguishers: Located at the Pit Administration Station and near the Playing Field.

Grinding/Painting: No grinding or painting in the Pit. Designated grinding and painting areas are available to teams

Open Flames: No open flames are allowed in the buildings

Pit Station Crowding: 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.

Robot Loading in/out: For safety and accountability, only the drayage company handles loading in and out of robots.

Robot Operation: Operate robots on tether only in Pit area.

Running: No running in the venue

Safety Glasses: All team members and onlookers must wear safety glasses when working on a robot or observing same. They are required on the playing field. If you wear glasses, you must wear safety goggles over them." Teams are required to bring enough safety glasses/goggles for team members and their guests

Two-way radios: Not allowed in the Pit or near the playing field since they may interfere with robot operation and cause accidents.

7.13.2 Courtesy and Site Regulations

Bands or Drum Units: No live bands in the audience or Pit.

Food: You cannot bring food on site at all. Not even as a promotion. Do not provide teams with candy, water, fruit, soft drinks, etc. This is to promote good will and the spirit of partnership with the venues

Music/Noise: No loud music, audio systems, whistles, banging sticks, blow horns, etc. They interfere with announcements. They prevent teams from hearing important announcements, can be annoying, and can cause hearing loss. Power may be shut off and/or radio/cd player, noise makers confiscated.

Phone lines: No free phone lines for internet access.....at all.

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 you receive in your Registration envelope. The Pit Administration staff will advise you of corrected hours.

Selling items at the event: Because of site regulations/contracts, *FIRST* cannot allow teams or individuals to sell items, such as T-shirts, pins, etc., at any events.

7.14 CONSIDERATIONS

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

7.14.1 Donated Software Use/Restrictions

Software companies donate software to **FIRST** teams, and we consider it as part of the Kit of Parts. They provide it with the understanding that the teams will read the licensing agreement and comply with their rules. *The donated software is for team use and is not donated for use by the school.* Think about which computer will be the most convenient and appropriate for team use.

Be sure to check the number of allowed installations for each application. It is illegal to install software on more than the stipulated installation number.

7.14.2 Saving Seats Not Allowed

Sitting together in a group during competition rounds 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, so teams are not allowed to save seating space.

With this in mind, it is not gracious or fair 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 rounds.

7.14.3 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.

7.14.4 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.
- Do not tape or affix items or papers to walls, bleachers, floors, or other site areas.

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

7.15 LOCAL STORES - WEBSITES

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 website in the Events Sections, "Site Info."

Note for Canada: Please note that the website 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	http://www.acehardware.com/
Lowe's	http://www.lowes.com/
Menard's	http://www.menards.com/nindex.jsp
The Home Depot	http://www.homedepot.com/home.html
The Home Depot Canada	www.homedepot.ca
True Value Hardware	http://www.truevalue.com/
OFFICE SUPPLIES	
Kinko's	http://www.fedex.com/us/officeprint/main/index.html/
Office Depot	http://www.officedepot.com/
Office Max	http://www.officemax.com/
Staples	http://www.staples.com/about/store/find/
Staples Business Depot	www.staples.ca
VARIETY STORES	
Kmart	http://www.bluelight.com/home/index.jsp
Target	http://target.com/target_group/stores_services/index.jhtml
Wal*Mart	http://www.walmart.com/cservice/ca_storefinder.gsp?NavMode=7
ELECTRONICS	
Best Buy:	http://www.bestbuy.com/
Circuit City:	http://www.circuitcity.com/
Future Shop	www.futureshop.ca
Radio Shack®:	http://www.radioshack.com/
DRUG STORES	
CVS Pharmacy	http://www.cvs.com/CVSApp/cvs/gateway/cvsmain
Eckerd	http://www2.eckerd.com/Default.asp
Rite Aid	http://www.riteaid.com/stores/locator/
Sav-On	http://www.savon.com/default2.asp
Shoppers Drug Mart	www.shoppersdrugmart.ca
Walgreens	http://www.walgreens.com/

7.16 TEAM CHECKLIST

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

<u>SAFETY GLASSES are REQUIRED!</u> Bring enough for all team members/your visitors.	Bring required completed CONSENT/ RELEASE FORMS for all team members!
<p style="text-align: center;"><u>TOOL BOX ITEMS</u></p> <ul style="list-style-type: none"> -- Adjustable crescent wrench -- Allen wrenches -- Ball driver set / Nut driver set -- Batteries and Charger -- Box cutter -- C-Clamp, large, medium, small -- Cutters -- De-burring tool -- Dremel tool/accessories -- Drill bit set -- Drill - cordless w/charger -- Duct tape -- Electrical tape -- Flashlight -- Flat and Phillips Screwdriver assortment -- Hacksaw and blades -- Hammer (ball peen & brass) -- Heat gun -- "Leatherman" tool -- Level, small -- Lithium grease, spray can -- Lock tight -- Magnet on a stick -- Needle nose pliers - medium, small -- Open end and boxed end wrenches -- Paint brush -- Pliers, - large, small -- Power Outlet Strip / Extension cord (2) -- Power Screwdriver -- Saber Saw/wood & metal blades -- Sandpaper - various grits -- Screws - nuts - washers -- Shrink tubing -- Socket set - 1/4", 3/8" drive -- Soldering iron, solder, solder wick, flux -- Spare parts -- Super glue / stick glue -- Square - small, medium -- Tap & die set/assorted taps -- Tape: Clear / masking / duct -- Tape measure / ruler -- Tie Wraps / Connectors -- 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 -- X-Acto knife and blades 	<p style="text-align: center;"><u>ADDITIONAL ITEMS</u></p> <ul style="list-style-type: none"> -- Banners - Corporate signs & flags for Pit Station -- Cart for robot -- Clock -- Dirt Devil - vacuum -- Disposable camera / extra film -- Drop light -- Epoxy -- File folder box for paperwork -- Hand truck -- Laptop / software / cables / floppies -- 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 -- Pit station monitor / clean up schedule -- Portable printer -- Registration Papers - completed release forms -- Rubber bands -- Schedule to set up and break down pit station -- Small broom -- Small foldable seats for Pit Station -- Small trash can, trash bags -- Spray cleaner -- Stapler / staples -- Storage box - trinkets & trash (buttons) -- Team roster -- Upright storage bins -- Water cooler / cups or water bottles -- Ziploc bags <u>ESSENTIALS/PERSONALS</u> -- 1st Aid Kit -- Advil / Aspirin / Tylenol -- Alcohol Prep Pads / 3M First Aid tape -- Band-Aids / Blister kit / Ice Bag -- Cough drops / sore throat medicine -- Extra - toothbrushes / hairbrushes / combs -- Extra - travel size deodorant/razors -- 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 -- Small Sewing Kit -- Sunscreen / Sunburn Spray / Aloe Vera

Section
8

THE TOURNAMENT



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8 THE TOURNAMENT

8.1 OVERVIEW

Each Regional Competition and the Championship will be played in a Tournament format. Each Tournament will consist of three sets of rounds called Practice Rounds, Qualifying Rounds and Elimination Rounds. The purpose of the Practice Rounds is to allow 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 Rounds is to allow each Team to earn a Ranking that may qualify them for participation in the Elimination Rounds. The purpose of the Elimination Rounds is to determine the event Champions.

In the Qualification Rounds, teams can be individually disqualified in a match. In the Elimination Rounds, a team disqualification will result in the disqualification of the entire alliance for that match.

For the Championship Event, teams will be split into four Divisions. Each Division will play exactly like a Regional Event and produce a Division Champion Alliance. Those four Alliances will then proceed to the Championship Rounds to determine the Grand Champion Alliance.

8.2 PRACTICE ROUNDS

8.2.1 Schedule

The Practice Rounds will be played all day Thursday. The Practice Rounds schedule will be available on Thursday morning. Practice Rounds will be randomly assigned. Each team will be assigned an equal number of Practice Rounds. At some events, additional rounds may be available on a standby basis. Each Practice Round will consist of a ten-minute period in which teams may operate their robot on the field. The first five minutes of each Practice Round will start with a 10-second autonomous period, and followed by a “free-form” session, in which the robots may be exercised to evaluate operational characteristics, gain driver experience, determine system robustness, etc. The second five minutes of each Practice Round will be conducted as a “match” with approximately two minutes for set up, two minutes and fifteen seconds of regular game play (including autonomous operations), and one minute to clear the field.

8.3 QUALIFICATION ROUNDS

8.3.1 Schedule

The Qualification Rounds will be played all day Friday and finish Saturday morning at approximately noon. The Qualifying Rounds will consist of a series of Matches, with an Arena Reset between each Match. The Qualification Rounds schedule will be available Friday morning.

8.3.2 Match Assignment

The Scoring System will randomly assign each team two Alliance Partners for each Qualifying Match played. All teams will play the same number of Qualifying Matches **except** if the number of teams in attendance is not divisible by six, the Scoring System will randomly select some teams to play an extra Match. For purposes of scoring, those teams will be called Surrogates for the extra Match. The qualification match schedule with the timing of the surrogate matches will be available Friday morning.

8.3.3 Match Qualification Points and Ranking Points

The combination of Qualification Points and Ranking Points enable the Scoring System to determine the seeding of teams at any point in time.

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 Qualifying Points. Each team on the losing Alliance will receive zero Qualifying Points. In the event of a tie Match Score, all six teams will receive one Qualifying Point.

The winning alliance teams will receive a number of Ranking Points equal to the un-penalized score (the score without any assessed penalties) of the winning or losing alliance, whichever un-penalized score is lower.

The losing alliance teams will receive a number of Ranking Points equal to their final score (with any assessed penalties).

In the case of a tie, all six alliance teams will receive a number of Ranking Points equal to their alliance score (with any assessed penalties).

A Surrogate team will receive zero qualifying Points and will not receive any Ranking Points.

A team is declared a no-show, and will be disqualified, if **no** member of the team is in the alliance station at the start of the match. Teams that do not show up for a scheduled qualification match will receive zero (0) Qualifying Points (QP's) and zero (0) Ranking Points.

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 (DQ'd), all three teams on the winning Alliance would get their own score as their Ranking Points for that match.

8.3.4 Qualifying Score

The total number of Qualifying Points earned by a team throughout their Qualification Rounds summed together will be their Qualifying Score.

8.3.5 Ranking Score

The total number of Ranking Points earned by a team throughout their Qualification Rounds, divided by the number of Matches played, then truncated to two decimal places, will be their Ranking Score.

8.3.6 Highest Match Score

The Scoring System will keep track of the Highest Match Score earned by each team during the Qualification Rounds but this score will not be displayed.

8.3.7 Qualification Ranking

All teams in attendance will be ranked during the Qualification Rounds. If the number of teams in attendance is 'n', they will be ranked '1' through 'n', with '1' being the highest ranked team and 'n' being the lowest ranked team.

The Scoring System will use the following Ranking 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.
- Within each Tier, teams will be sorted by their Ranking Score. *Note: Because your Ranking Score is derived directly from the Match Scores of the losing alliances in the matches you play, it is in*

your best interest to support your opponents and win by helping each alliance score as many points as possible.

- If any teams within a Tier have the same Ranking Score, they will then be sorted 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 sort those teams based on a random electronic coin toss.

8.4 ELIMINATION ROUNDS

At the end of the Qualification Rounds, the top eight ranked teams will become the Alliance Leads. The top ranked Alliances will be designated, in order, Alliance One, Alliance Two, etc., down to Alliance Eight. Alliances One through Eight may invite any team below them in the rankings that has not already declined any invitation to join an alliance. The Alliance Selection Process will consist of two rounds so that each of the eight-playoff alliances consists of three teams.

8.4.1 Alliance Selection Process

Each of the Alliance Leads will designate a student to be the Alliance Captain. Each remaining team will choose a student to act as Team Representative. Each Alliance Captain and Team Representative will proceed to the Playing Field at the designated time to represent her or his team. In descending order, each Alliance Captain will invite to join them, a team ranked below them in the standings, which has not already accepted or declined an invitation, to join an Alliance. 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 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 team to another top eight alliance team is accepted, the team currently ranked ninth will move up to become the number eight alliance. If an invitation from a top eight alliance team to another top eight alliance team 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. The same method is used for each Alliance Captain's second choice except the selection order is reversed, with the eighth seeded alliance picking first. This process will lead to eight alliances of three teams.

Backup Teams – Regional Events

Of the remaining eligible teams, the highest seeded teams (up to eight) shall remain on standby and be ready to play. If a robot from one team in a three-team alliance becomes inoperable, at the discretion of the Alliance Captain, the highest seed of the standby teams shall join that 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 cannot play, even if their robot is repaired.

The original three-team alliance shall only have one opportunity to draw from the teams on standby. If a second robot from the alliance becomes inoperable, then the alliance must play the following matches with only two (or even one) teams. It is in the best interests of all teams to construct their robots to be as robust as possible to prevent this situation.

Backup Teams – Championship Events

For the purposes of illustration, assume that the three teams on any alliance going into **Divisional Playoffs** are A, B, C. The Highest Seeded team in that division NOT on one of the 8 alliances is Team D.

If at any point during the **Divisional Playoffs**, one of alliance teams A, B or C can't go on and the alliance captain decides to bring up Team D to replace said robot (for this example, we'll use team C), Team C (the replaced robot) may not play in any subsequent **Divisional Playoff** matches.

Championship Einstein Playoffs

If the above alliance wins their division and moves on to the **Einstein Playoffs**, at that point the alliance can move Team C back into play in place of Team D, making Team D the backup again.

In this case, if this alliance wins the **Einstein Playoffs**, the Grand Champions would be teams A, B, C, and D.

If Team C is not able to be repaired and teams A, B, and D play and win the **Einstein Playoffs**, the Grand Champions would be teams A, B, C, and D.

If Team C is not able to get repaired and if one of team A, B or D gets damaged in the **Einstein Playoffs**, thus creating a need for a third robot, then the alliance may bring up Team E (the highest remaining seeded team from their division, which did not participate in the **Divisional Playoffs**) to replace the damaged robot.

In this case, if the alliance with Team E wins the **Einstein Playoffs**, the Grand Champions will be teams A, B, C, D, and E.

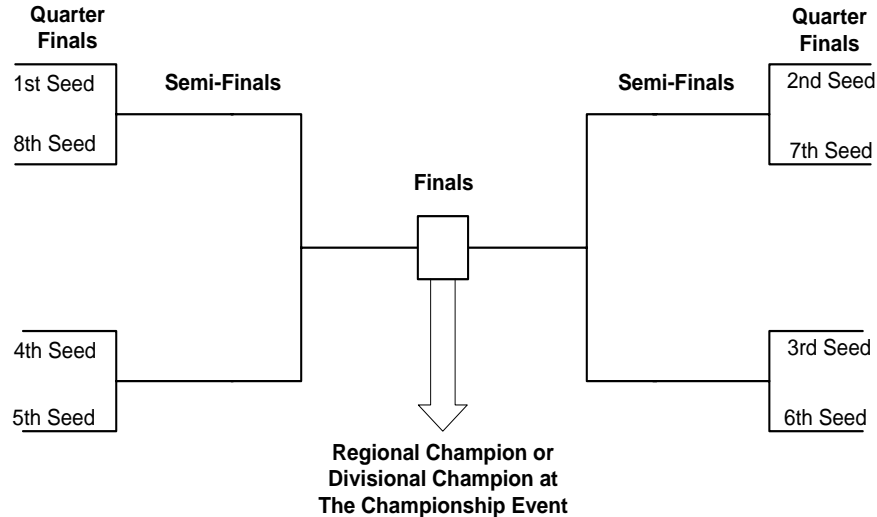
In any case, once a replacement robot is used in the **Einstein Playoffs**, none of the teams who sat out a match can come back into play.

8.4.2 Schedule

The Elimination Rounds take place on Saturday afternoon and will consist of a series of Matches, with an Arena Reset between each Match.

8.4.3 Match Ladder

The Elimination Rounds will play in a ladder format as follows:



Note: 1st Seed = 1st Seeded Alliance, etc.

8.4.3.1 Order of Match Play

The order of play is as follows:

- 1st match from 1 v 8
- 1st match from 4 v 5
- 2nd match from 1 v 8
- 2nd match from 4 v 5
- Etc. until 8.4.4 is satisfied

Similarly the order of play then continues as follows:

- 1st match 2 v 7
- 1st match 3 v 6
- 2nd match 2 v 7
- 2nd match 3 v 6
- Etc. until 8.4.4 is satisfied

8.4.4 Elimination Scoring

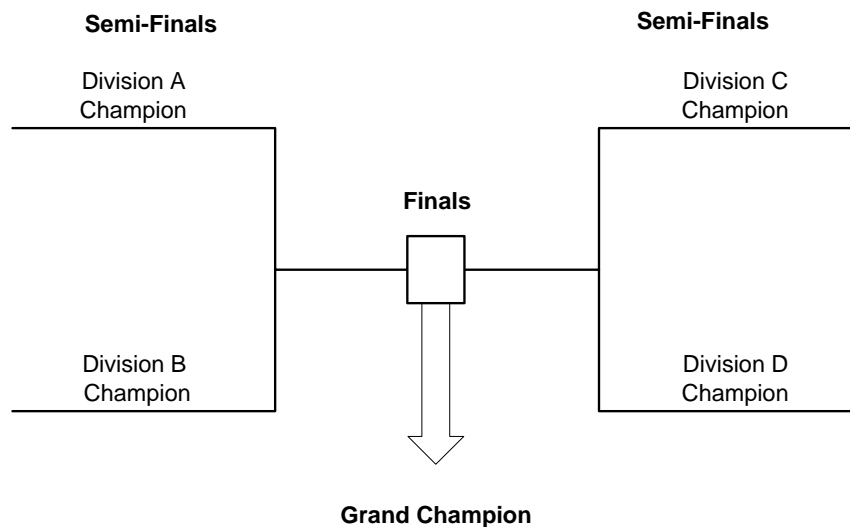
In the Elimination Rounds, teams do not get “points (2, 1, 0)”; they get a win, loss or tie.

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.
- Any tied matches will be replayed until an Alliance has two wins.

8.5 CHAMPIONSHIP EVENT – FINAL ROUNDS

8.5.1 Match Ladder



The Championship Rounds will play exactly like the Semi-Finals and Finals of the Elimination Rounds.

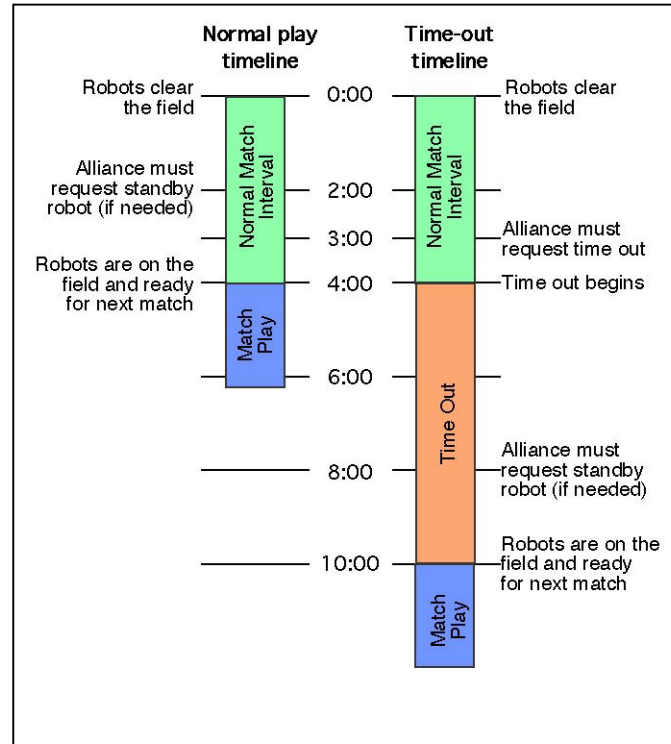
8.6 TOURNAMENT RULES

<T01> Referees have ultimate authority during the competition. THEIR RULINGS ARE FINAL! The referees will not review recorded replays.

<T02> During the elimination rounds, alliances will have at least four minutes between scheduled matches.

<T03> There are **no time outs** in the Qualifying Rounds. If a robot cannot report for a match, the queuing manager shall be informed and at least one member of the team should report to the field for the match.

<T04> In the elimination rounds, each alliance will be allotted one time out for no more than 6 minutes. This six minute period is in addition to the four minutes allowed between matches. If an alliance wishes to call time out, the alliance captain must inform the head referee or his or her designee (typically the field manager) within approximately three minutes after their robot has left the field. After approximately four minutes of the time out (eight minutes after the robots have left the field), if an alliance wishes to insert a standby robot, the alliance captain must inform the head referee or his or her designee.



<T05> In the elimination rounds, if an alliance wishes to draw from the standby robots without calling a time out, the alliance captain must inform the head referee or his or her designee (typically the field manager) within two minutes after the robots have left the field.

<T06> Robot Field power will **not** be re-enabled after a match. Robots must be designed to permit removal of balls without requiring activation of the robot power system. Teams should design mechanisms that allow easy access to ball storage and handling systems. 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.

<T07> Robots that become entangled in the field barriers, field elements or other robots will not be freed until after the match has finished unless the entanglement represents a safety hazard. Any entangled robot may be disabled if the head referee deems it necessary.

<T08> The qualification match schedule will indicate alliance partners and match pairings. It will also tell the alliance its color, RED or BLUE, for each match. The color is used to determine the placement of each team's robot, drivers, human players, and coach around the playing field.

<T09> Prior to each match, teams shall indicate to the queuing manager their choice of available starting positions for that alliance. Once starting locations are selected, teams must place their robot in the selected location. Robots may not be repositioned in response to robot positions of the opposing alliance. During elimination rounds, teams may orient their robots within the selected locations once the robots are placed on the field. The higher seeded alliance will have the last opportunity to orient their robots within the selected locations.

<T10> Special clothing and/or equipment will only be allowed on the playing field for those who demonstrate a need based on a physical disability.

- <T11> If, in the judgment of the head referee, a “field fault” occurs that affects either the play of the game 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.

8.7 TOURNAMENT SAFETY RULES

- <T12> Teams are responsible for providing their own safety glasses at each event. All team members, including coaches, must wear safety glasses while in the Pit or alliance stations during matches. Safety glasses must also be worn during the building of the Robot.
- <T13> All team members must wear sneakers or appropriate footwear while in the Pit area or competing on the field. **No bare feet, sandals or open-toed footwear are allowed.**
- <T14> Wireless / radio control mode of robot operation is not permitted in any of the Pit areas. Robots may only be operated via the tether when not competing on the field.

THE AWARDS



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9 THE AWARDS

9.1 REGIONAL AWARDS

Please read below for a description of Regional Awards. Note an asterisk designates a new or “changed” award in “Regional Competition Awards” listing. The “Industrial Safety” Award was previously known as the “Safety” Award.

9.1.1 Chairman’s Award - Regional

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. Refer to the *Chairman’s Award* section for specifics.

The winning entries of the Regional Chairman’s Awards will travel to the Championship for the continuing process of consideration for the most prestigious 2006 Chairman’s Award.

9.1.2 Regional Competition Awards

FIRST will hold an Awards Celebration at each Regional Competition to present the following awards:

9.1.2.1 Autodesk Visualization Award

Presented by Autodesk, Inc., this award recognizes excellence in student animation that clearly and creatively illustrates the spirit of the *FIRST* Robotics Competition. Autodesk will award excellence in content, creativity, and mastery of multimedia. *Please refer to the Autodesk Visualization section for specifics.*

9.1.2.2 DaimlerChrysler - Team Spirit

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

9.1.2.3 Delphi - “Driving Tomorrow’s Technology”TM

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.

9.1.2.4 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. This is the second highest team award *FIRST* bestows.

9.1.2.5 General Motors - Industrial Design

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

9.1.2.6 Highest Rookie Seed

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

9.1.2.7 Imagery

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

9.1.2.8 Johnson & Johnson - Sportsmanship

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

9.1.2.9 Judges' Awards

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

9.1.2.10 Kleiner Perkins Caufield & Byers - Entrepreneurship

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.

9.1.2.11 Motorola - Quality

This award celebrates machine robustness in concept and fabrication.

9.1.2.12 RadioShack® Innovation in Control

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

9.1.2.13 Regional Finalist

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

9.1.2.14 Regional Champion

This award celebrates the team or alliance that wins the competition.

9.1.2.15 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.

NOTE: We encourage, but do not require, rookie teams to enter a Chairman's Award submission relative to this award.

9.1.2.16 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. It is the 2nd highest honor *FIRST* bestows to a rookie team.

9.1.2.17 *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.

9.1.2.18 Website Award

This award recognizes excellence in student-designed, built, and managed *FIRST* team websites. We have revised the process for this award for 2006. Please refer to the website section for specifics.

9.1.2.19 Woodie Flowers Finalist Award

Small Parts, Inc. presents the Woodie Flowers Award to an outstanding engineer or teacher participating in each of the robotics Regional Competitions. Students choose and write about a person on their team who best demonstrates excellence in teaching science, math, and creative design. These Regional winners will receive consideration for the Championship Woodie Flowers Award. **NOTE:** For 2006, teams may add an update essay to the submission for the 2004 & 2005 Regional Woodie Flowers Award winners, and those individuals will also be considered as finalists for the 2006 award.

9.1.2.20 Xerox - Creativity

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

9.2 THE CHAIRMAN'S AWARD 2006

The *FIRST* Robotics Competition is about much more than the mechanics of building a robot or winning a competitive event. It is about the impact *FIRST* has on those who participate in the program and the impact of

FIRST on the community at large. The *FIRST* mission is to change the way America's young people regard science and technology and to inspire an appreciation for the real-life rewards and career opportunities in these fields.

9.2.1 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 best represents a model for other teams to emulate and which embodies the goals and purpose of *FIRST*. It remains the most prestigious team award *FIRST* presents.

FIRST will present a Regional Chairman's Award at each regional competition. There are thirty-three (33) regional competitions scheduled for the 2006 season, therefore, there will be thirty-three Regional Chairman's Award winners. Only the winners of the Regional Chairman's Award will be eligible for consideration in the selection of The Chairman's Award presented at The Championship.

Prior winners of the Chairman's Award at the Championship are ineligible to submit for the Regional Chairman's Award. All submissions by Championship Chairman's Award-winning teams will be electronically routed to a folder judging as part of the Hall of Fame.

9.2.2 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. We encourage rookies, however, to develop a Chairman's Award submission to use as a criterion to judge 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.

Rookie Teams: If you submit a Regional Chairman's Award, print a copy to give the Judges when they visit you at your Pit Station.

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

9.2.3 Submission Information

The criteria for the 2006 Chairman's Award are essentially identical to those in 2005, with the exception that the submission will need to be signed by the Team Captain/Student Representative and a team mentor to certify that all the contained information is complete and accurate. 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.

9.2.3.1 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?
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*?
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? (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.

9.2.3.2 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.

9.2.3.3 Submission Process

The URL for the Chairman's Award Submission is <http://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, 2006 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 23, 2006 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 (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 (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 (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 and 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 listed and the judges will review the submissions. Teams should 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 <http://www.my.usfirst.org>. Refer to *Communications* for more details about the *Yearbook Page*.

9.2.3.4 Submission Deadline

Chairman's Award submissions are due no later than **Thursday, February 23, 2006. 11:59 p.m. EST.**

9.2.4 Judging Process

The Regional Award Process: By 10 a.m. on Friday mornings of each Regional Competition a list of interview times 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) student team members to best represent them. 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 interview.

NOTE 1: If the presentation requires special equipment, the team is responsible for bringing it to the interview.

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.

The Championship Award Process: At The Championship, a panel of judges will review the winning thirty (30) 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.

9.2.5 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.

9.2.6 Hall of Fame

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." Hall of Fame Chairman's Award submissions will not be included in the Regional Chairman's Award judging process.

9.2.6.1 NEW: DVD Submission

FIRST encourages teams to enhance each submission by creating a DVD, which should be mailed to *FIRST* headquarters, attention Sue Robinson, postmarked no later than April 19, 2006. 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 thirty-three (33) Regional Chairman's Award winners will vie for the one spot reserved for the 2006 winner.

9.2.6.2 Display Specifications

These stellar teams should also create a display booth that meets the standards associated with the Chairman's Award. It should showcase the teams' achievements and support for *FIRST* and highlight how the team continues to promote *FIRST*, while showing what it means to be a Chairman's Award recipient.

Each team will have a ten-foot space (10), which includes a skyline wall and display drum on which teams can display graphic panels and awards. These walls are made of fabric and only Velcro can be attached to them. We ask teams not to assemble any large structure over forty-eight inches (48) tall or one that extends out from the skyline panel and impedes persons from viewing all of the Hall of Fame teams at one time.

9.2.6.3 Hall of Fame Teams

THE <i>FIRST</i> HALL OF FAME		
Year	Team #	Official Team Name
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. & Bellarmine College Preparatory San Jose, CA USA
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 International & 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

9.3 THE FOUNDER'S AWARD

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

9.4 THE WOODIE FLOWERS AWARDS

The Woodie Flowers Award celebrates effective communication in the art and science of engineering and design. Dr. William Murphy and Small Parts, Inc. began 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 thirty-three (33) Regional Competitions as a Woodie Flowers Finalist Award (WFFA) winner. Of these talented mentors, combined with the WFFA winners from 2004 and 2005, one will receive the Woodie Flowers Award at the 2006 Championship in Atlanta.

9.4.1 Award is Students' Choice

Students on a *FIRST* Robotics team will choose one adult team member as their 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 2006 Finalists and Championships winner based on student essays.

9.4.2 Spirit of the Award

Two aspects of this award are important. Of course, the accomplishments in communication by the mentor are essential. Also very important is the student's ability to communicate clearly and concisely.

Communication in both directions is an integral part of learning. 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. Also, 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.

9.4.3 Judging Criteria

Each team may nominate one candidate to be a WFFA winner. Students may also re-nominate their team's past WFFA winners by submitting a new essay for this past Finalist to be eligible for the Championship WFA. Nominees must be adult mentors who truly inspire the team. These individuals demonstrate excellence in engineering instruction by explaining complex ideas to students in an inspiring way. Judging criteria is based on the team's description of how the teacher or engineer 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 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.

9.4.4 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.

9.4.5 Submission Deadline

The Woodie Flowers Award entries are due on Thursday, February 23rd at 11:59 p.m. EST.

9.4.6 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 13, 2006 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 essays for their team's past WFFA winners in order to make them eligible for the Championship WFA. As the student nominator fills out the required information, he/she must choose only one regional, where the team will be competing, to submit its candidate.

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 23rd 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

Student Advocate's information: (Student recommending candidate)

First Name, Last Name
Phone Number
E-mail Address
Position on Team

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 submissions.

9.4.7 Prior Regional Woodie Flowers Award Winners

A team may refresh the submission of 2004 & 2005 winners of the Regional Woodie Flowers Award as well as submit another mentor for 2006. You will not be able to edit the original submission but can refresh it by adding a new 600-word essay to make the submission current. These prior winners will be considered as finalists at the Championship along with the regional winners from the current year

9.5 THE AUTODESK INVENTOR AWARD 2006

9.5.1 Purpose of Award:

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

9.5.2 Competition Period:

Monday, December 25, 2005, to Monday, March 13, 2006. Autodesk Award updates (if any) may be found on Autodesk Streamline site created for the *FIRST* Robotics teams (see below). Please note the rules for 2006 have changed slightly from past years.

9.5.3 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 honor those who bring their ideas to reality.

9.5.4 Award Description

The Autodesk Inventor Award honors the team that best uses Autodesk Inventor software to design their 2006 *FIRST* Robotics Competition robot. Entrants are required to post various drawings and photographs of their robot onto a website, as well as post their Autodesk Inventor files onto Autodesk Streamline.

9.5.5 Award Criteria

Please post your files to:

<https://projectpoint.buzzsaw.com/client/first>

User Name: “(public)”, no password (the parenthesis are needed).

It is important to Zip your files, with a filename of your 4-digit numbered team name, such as “team_0123_phase1.zip.” Please also title your Inventor Project file in the format “team_0123.ipj.”

The competition has three required phases:

9.5.5.1 Phase One: The Design

The deliverables are as follows:

- A DWF export of the main robot design; this is new for 2006, and required for entry. Please name the file distinctly with your team number in 4 digits, such as “team_0123.dwf,” and place it in the main directory of your entry.
- A set of drawings (.idw or .dwf) which document the basic dimensions of the design
- The assembly data for your robot (.iam and .ipt) --- parts and assembly

Please note: Designs must be created entirely within Autodesk Inventor. Importing geometry from other CAD packages will significantly impact the team score.

9.5.5.2 Phase Two: The Photograph

- A series of pictures (screen shots, image exports, or Studio renderings) which emphasize the advantages of your design.
- Digital photographs of your completed robot entered into the 2006 *FIRST* Robotics Competition. Photographs should clearly show the front, rear and side views of your robot.

9.5.5.3 Phase Three: Post designs and photo to web.

- Please post your entry to a website. Please title each document clearly and concisely so the judges will know what they are viewing. Please make sure your website is active by the entry date. (Note: please test it from various computers.)

9.5.5.4 Phase Four: Bonus (not required):

- Animation of one mechanism using driven assembly constraints (.avi, .mov, or other common format). The animation should be captured using Autodesk Inventor’s record functionality in the Drive Constraint dialog box, or with Inventor Studio.

9.5.6 Judging Criteria:

Judges will review all entries. A select number will advance to the second phase of judging. A list of entries that advanced to the second round of judging will be posted onto Autodesk Streamline after the submission deadline.

In scoring your entry, judges will address specific criteria:

Robot Design	50 points
---------------------	-----------

Technical Expertise	30 points
Presentation of final design	20 points
TOTAL POINTS:	100 points

Bonus Animation	10 points
TOTAL POSSIBLE POINTS:	110 points

9.5.7 The Judging Process

The judging panel is made up of volunteers from business, industry and education. Some of the judges are Autodesk employees; others are Autodesk Inventor customers or educators. Judges are familiar with the *FIRST* Robotics Competition, with previous Autodesk Award competitions, and with the application of Autodesk products and other technologies in engineering, design and education.

Judges will select:

- One Grand Prize Winner
- One Honorable Mention Winner
- One Rookie Winner

Winners will be announced during The 2006 *FIRST* Competition Championship Awards Ceremony. Representatives from the winning team will be acknowledged on the main stage. A link to the winning teams' website will be posted on Autodesk's website (www.autodesk.com/first) after the Championship event.

9.5.8 Entry Deadline:

There are two deadlines. Please break up Zip files as needed to make uploading manageable (250 Mb is a recommended maximum size).

- Entry Form and Consent Form (2 forms!) must be posted onto Autodesk Streamline **no later** than Monday, March 6, 2006, by 5:00 p.m. PST.
- Entry must be posted onto Autodesk Streamline no later than Monday, March 13, 2006, by 5:00 p.m. PST. Your website must also be active and ready for viewing by Autodesk Judges on March 13, 2006.

9.5.9 Entry Requirements:

- Entrant must be a fully registered team participating in the 2006 *FIRST* Robotics Competition.
- Limit one (1) Entry per team.
- A completed and clearly legible "Entry Form" and an "Archive Consent and Release Authorization Form" must be submitted to Autodesk via Autodesk Streamline.
- Forms must be legible. Illegible forms may cause your entry to be disqualified.
- Forms should be posted on Autodesk Streamline by the deadline, under "Student Upload Area 2006/Deposit Inventor Entry Forms Here" folder.
- Entry must be posted on Autodesk Streamline by the deadline, in the "Deposit Inventor Award Entries Here" folder.

Autodesk is not responsible for any technical malfunctions; lost/delayed data transmission; omission; interruption; deletion; line failures of any telephone network, computer equipment or software; the inability to access any website or online service. Autodesk is not responsible for late, lost, stolen, misdirected, incomplete, or illegible entries; postage due mail; internet downtimes or malfunctions; or other errors.

Please try to upload early to avoid last minute deadline concerns.

Note: Hard copies of entry forms and/or Autodesk Archive Consent and Release Authorization Forms will not be accepted this year. All forms must be posted onto Autodesk Streamline.

9.5.10 Prizes and Prize Rules:

Detailed information on the prizes and prize rules will be announced on Autodesk Streamline before the regional events.

9.5.11 Scores

Scores will be provided to teams whose entry advanced to the second round of judging. Scores will be emailed to the team and/or teacher contact listed on the entry form.

Autodesk, the Autodesk logo, Autodesk Inventor and Autodesk Streamline are either registered trademarks or trademarks of Autodesk, Inc., in the U.S.A. and/or other countries. All other brand names, product names, or trademarks belong to their respective holders.

9.5.12 Autodesk Inventor Award 2006 Entry Form

The following is required:

1. Complete this Entry Form as its contents are required for judging. It must be legible, and you must include it with your Entry submittal. Please read the Entry Requirements carefully, before completing this Entry Form. Information on the form must be complete.
2. Complete and include the Autodesk Consent and Release Authorization agreement with your entry. It is required for judging.

Do not forget to post both forms ("Entry" and "Consent") along with your Autodesk Inventor files (please Zip files) onto Autodesk Streamline no later than the deadline. The site can be found at:

<https://projectpoint.buzzsaw.com/client/first>

Username: (public)

Password: none required

Please make sure that the URL of your website is active prior to the entry deadline. **(If Autodesk judges cannot access your website it will not be judged.)**

Entry Deadline:

There are two deadlines:

1. Entry Form and Consent Form (2 forms!) must be posted onto Autodesk Streamline no later than **Monday, March 6, 2006, by 5:00 p.m. PST.**
2. Entry must be posted onto Autodesk Streamline no later than **Monday, March 13, 2006, by 5:00 p.m. PST.** Your website must also be active and ready for viewing by Autodesk Judges on March 13, 2006.

Entrant Information: (Please print or type)

FIRST Team Number:

FIRST Team Name:

Autodesk Inventor Award Entry URL (must be working by entry deadline):

School Name(s):

School Address:

School Phone Number:

School Contact (Teacher) and email:

Corporate sponsor's name and telephone number:

Team Contact, email and phone number:

Note: It is important that we have accurate contact information in case our judges need to contact you with any questions or concerns regarding your entry.

Individual Student Designers:

Your team can select up to 15 individual student designers as potential Award recipients. List the following information for each student on Attachment "A":

Student Name

Mailing Address (no P.O. boxes)

Telephone Number

Email address

Individual Team Champion:

In past competitions for the Autodesk Awards we have heard impressive stories of outstanding individuals on some competing teams. Please tell us who your “Team Champion” is this year and about his/her contributions to the team and your Entry. Your champion may be a student, teacher, engineer, community member or other individual contributor.

Software Use:

Describe which Autodesk products you used and how. Also, name and describe other design, visualization, or animation software products you used in your entry. Please remember that the Autodesk Inventor award is for your team to showcase the use of Autodesk Inventor in the design of your team’s robot.

Autodesk Products:

Non-Autodesk Products:

Attachment “A”
Autodesk Inventor Award 2006

Student Designers:

Include the name, mailing address, phone number and email address for each student listed.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

9.5.13 Inventor Archive Consent/Release Authorization

Use this form for the Autodesk Inventor Award at the 2006 FIRST Competition

Dear Contributor,

We appreciate your interest in submitting material to Autodesk, Inc. The following allows us to legally use your work.

By signing and returning this consent form, the individual named below and/or if applicable the individual's employer, middle or high school(s), or corporate or college/university sponsor(s) and individual student, faculty and corporate contributors (hereinafter referred to collectively as the "Entrant") understand that the Entrant is agreeing to the following terms which will govern use of the images, animation, sounds, files and other material (the "Material") described below:

- Entrant grants a nonexclusive, irrevocable, perpetual, worldwide license to Autodesk, Inc. to use the images, animation, sounds and other material contained in the "Material" in any manner it deems appropriate. "Nonexclusive" means that Entrant can allow others to use the Material and that the Entrant retains all rights to the Material other than those specifically granted to Autodesk.
- Autodesk may change, reproduce, distribute, and sublicense the Material to its subsidiaries, affiliates, customers and to third parties granting them the same rights which Autodesk has received.
- Autodesk will try to include the credit line shown below when the Material is used and will also try to require others to whom it grants sublicense to do the same. However, Autodesk and its sublicensees may not always be able to include the credit line or otherwise acknowledge the source of the Material. The compensation the Entrant will receive for agreeing to license the Material will be limited to the exposure the Entrant receives by Autodesk's use and sublicensing of it. No other compensation will be paid. The Entrant agrees that the Entrant will not at any time make any claim for compensation for the rights granted to Autodesk.

The Entrant represents and warrants that the Material is owned by the Entrant free and clear of any liens or claims of any third party; that the Entrant has a legal right to grant the permission given in the Entry Form and in this Agreement. The Entrant indemnifies and holds Autodesk, its subsidiaries, associated companies, successors, assigns, agents, and employees harmless against liability should any third party claim that the use of the Material or any part thereof by Autodesk violates any right of such third party. The Material does not include any proprietary information, logos, or trademarks of any third party. NOTE: Use of the FIRST Foundation logo is permitted without permission, as long as that logo is not at all altered.

The authorized signatory for the Entrant is over 18 years old and **either** owns the copyright to the material in these files, **or** has the right to grant this consent on behalf of the owner, **or** knows that the material in these files is in the public domain. This consent does not conflict with any others the Entrant has granted or any other rights to the files.

FIRST TEAM SPONSOR OR SCHOOL (where applicable)

FIRST Team Name and Number: _____

Inventor Award Entry URL: _____

Name, email and Telephone # of Entry Contact: _____

Address, City, State, ZIP _____

School Name & Address: _____

School Telephone # _____

Teacher Name & Email _____

Authorized Signatory (print) _____

Authorized Signature (sign) _____

The above release shall be void if amended in any manner. Autodesk shall not be responsible for the return of any materials submitted.

9.6 THE AUTODESK VISUALIZATION AWARD 2006

Purpose of Award

Honor excellence in student animation.

Entry Deadline

There are two separate deadlines this year!

- **Paperwork Due:** Monday, February 6, 2006
- **Animation and Storyboard due:** Monday, February 13, 2006 no later than 8:00 a.m. (PST)

9.6.1 Award Updates:

Award updates (if any) will be found on the Autodesk Streamline site created for the *FIRST* Robotics teams:

<https://projectpoint.buzzsaw.com/client/FIRST>

User name: (public).

[NOTE: Be sure to include the parentheses!]

Once you type in “(public)” the password field will become grey as no password is required.

9.6.2 Award Overview

All *FIRST* teams are invited to create a submission for the Autodesk Visualization Award (AVA) using Autodesk **3ds Max**® software.

The animation cannot exceed 30 seconds in length and must be submitted in QuickTime format, via Autodesk Streamline.

The theme for this year is “Ideas Realized.”

There are two ways to advance to the FINAL ROUND of professional judging:

Win during the **Peer Judging**, and/or

Advance during **Round One of Professional Judging** conducted by Autodesk’s professional judges

Only animations that advance to the **Final Round of Professional Judging** may be selected as a winner. Three animations will be selected as winners in 2006. The categories are:

- Championship Winner
- Honorable Mention Winner
- “Rising Star” (Rookie) Winner

Winners will be announced at the *FIRST* Robotics Competition Championship Event.

Note: Winning a Regional AVA does NOT earn a spot at the *FIRST* Robotics Competition 2006 Championship.

9.6.3 About Autodesk 3ds Max animation software

Autodesk 3ds Max software has a global install base in the 3D industry and is the standardized 3D software in the core production environment for game development giants including: Ubisoft, Rockstar Games and Electronic Arts. 3ds Max software is used by the top architectural design visualization businesses including, HOK, Ellerbe Becket, Skidmore, Owings and Merrill—and visual effects studios including Blur Studios, Frantic Films, Digital Dimension.

Autodesk 3ds Max software was used to generate a majority of PC, Xbox, and Playstation console games including Halo and Halo 2 (Bungie), *Spider-Man* and *Spider-Man 2 The Game* (Treyarch); *Star Wars: Knights of the Old Republic* and *Jade Empire* (BioWare); *Tom Clancy’s Splinter Cell Chaos Theory* and *Prince of Persia Warrior Within* (Ubisoft); *Need for Speed Underground 2* (Electronic Arts / Black Box) *Warhammer 40,000: Dawn of War* (Relic Entertainment), *Fable* (Lionhead Studios, Microsoft); *Deus Ex* from Ion Storm/Eidos *Grand Theft Auto* series (Rockstar); and *Harry Potter and the Sorcerer’s Stone* (Electronic Arts).

3D visual effects in motion pictures made with 3ds Max software include *Sky Captain and The World of Tomorrow* (The Orphanage), *The Day After Tomorrow* (Dreamscape Imagery/ Uncharted Territory), *Exorcist: The Beginning*, *Cellular*, *The Last Samurai*, and *Elf* (Digital Dimension), *X2:X-Men United*, *The Italian Job* (Frantic Films).

9.6.3.1 Award Description

The Award recognizes 30-seconds of student animation, created using Autodesk 3ds Max. Each animation must:

- Illustrate the concept of “Ideas Realized” – the process of visualizing what you want to achieve from being part of *FIRST*.
- Meet all entry requirements
- Must have been created using Autodesk 3ds Max software, any version. **NOTE:** Maya is not allowed in the 2006 season.

Entries will be scored on the criteria for the three key areas outlined below.

9.6.3.2 Scoring Criteria

9.6.3.2.1 Concept (Maximum: 35 points)

Distinction in the use of design and animation to illustrate and communicate a clearly defined message of “Ideas Realized”.

Measured in terms of how well your team:

- identifies and executes on a concept
- organizes the content for your 30-second animation
- how well your animation follows your storyboard.

9.6.3.2.2 Creativity (Maximum: 35 points)

Distinction in the use of design and animation to make your entry visually exciting, arresting, striking and memorable.

Measured in terms of how your team:

creates a compelling, creative and distinctive animation – one that stands out from the rest.

9.6.3.2.3 Technical Execution (Maximum: 30 points)

Distinction in the application of Autodesk software.

Measured in terms of:

how skillfully your team uses **3ds max** and other Autodesk products to create a technically impressive animation.

Some examples of technical applications are modeling, materials application, lighting, camera motion and angles, sound effects, texture mapping, color, special FX, character animation, editing technique. In addition to using the features of **3ds max**, judges will review how well you have incorporated elements such as voice-over, music, photography, or live video into the animation.

NOTE: Animations *that use copyrighted music without written permission from the legal copyright owner will be disqualified. For more information on the use of music in your animation, please see document entitled “Copyright Music Information” which is posted on Autodesk Streamline, see link below.*

9.6.3.3 Submittal Process and Entry Requirements

- Entrant must be a fully registered team participating in the 2006 *FIRST* Robotics Competition.
- Limit one (1) Entry per school. If a team includes multiple schools, each school may submit an Entry. Please identify each school entry with the team number, and then a letter starting with “a”. Example: “Team 123a Smith High School” “Team 123b Jones High School.”
- A completed and clearly legible “Entry Form”

- A completed and clearly legible “Autodesk Archive Consent and Release Authorization Form. Forms can be found on Autodesk Streamline <http://projectpoint.buzzsaw.com/client/FIRST>. Ensure that forms are legible or your entry may be disqualified.
- Please place forms into the file folder named “Student Upload Area” – “Awards” “AVA – Forms”
- **Paperwork Due: Monday, February 6, 2006**
- Storyboard (no size or length requirements). Electronic storyboards are acceptable. They should be uploaded to your specific team’s folder on Streamline. If a hard copy of the storyboard is submitted, please use #3 pencil or softer. Color may be used on the original but is not required.
- Storyboard must be clearly labeled with Team Number, Team Name, School(s) Name and Sponsor(s) name. Without this information entry will not be judged. Hard copy storyboards should be mailed to: Autodesk, Attn: *FIRST* Robotics Competition, 210 Main Street, Venice, CA 90291.
- **Storyboard Due Date: Monday, February 13, 2006.**

9.6.3.4 Animation Entry Requirements:

Your entry must include: 5-second slate followed by one second of black, followed by the animation, followed by one second of black. Slate must include:

- Team number (example: R1234 or 1234)
- Team Name
- School
- Title
- Duration (not including slate and black)
- Audio (stereo, mono, none) peak not to exceed -6db or fall under -18db
- Credits may follow that still frame, but will not be included as part of the timing, judging or scoring process, nor will they be included in the compilation reels distributed by Autodesk, Inc.

9.6.3.4.1 Required file format:

- Export your finished animation out of 3ds Max ONLY in QuickTime (.MOV) (see **Acceptable Codec** below)
- NOTE: The QuickTime export function is included on the 3ds Max 8 CD.
- NOT acceptable: .wmv .mpg .asp .wmx
- Audio (stereo, mono, none) peak not to exceed -6db or fall under -18db

Title safe guidelines: (NOTE: Computer screens are NOT the same as TV screens)

All files should be 720 x 480. All *text* and *motion* animation within the 720 x 480 window should be 15% away from the edge (especially text) to ensure that your content will fit a TV screen when viewed for judging from a DVD format. Solid or textured backgrounds are OK to run to the edge. Anything on top of the background must follow the Title Safe guidelines.

9.6.3.4.2 Acceptable Codec:

- DV-NTSC ONLY
- Cinepak is NOT acceptable
- Do not use DiVX or any other non-standard Codec
- Frame Rate: 29.97 frames per second ONLY
- Frame Size: 720 x 480 ONLY: 640 x 480 & 320 x 240 are NOT acceptable.
- Maximum File Size: Please keep your entry under 250MB

9.6.3.4.3 File naming convention:

You must name your animation in the following format:

- “[insert your team number]_AVA2006.MOV”
- Examples: 1234_AVA2006.MOV or R4321_AVA2006.MOV

ROOKIE ENTRIES: If your team is making a *FIRST* entry for the Autodesk Visualization Award, you will be considered a rookie entry. As such, you must place an “R” in front of your team number on all components of your entry (entry form, archive and consent form, slate (on the animation), etc.).

Example: “R-1234” Without this “R” your entry will not be judged as a rookie entry.

Note: For the purposes of this award, Autodesk defines rookie as a team that has never submitted for the Autodesk Visualization Award before. This means that both veteran and first year teams who have never submitted an AVA are eligible to submit as rookies.

Autodesk is not responsible for Entries not posted onto Autodesk Streamline by the deadline, or for any lost, late, misdirected, illegible, incomplete, or damaged Entries. Entries will remain the property of Autodesk, Inc. No materials will be returned.

Post Entry to:

<http://projectpoint.buzzsaw.com/client/FIRST>

User name: (public). [Note: Be sure to use the parentheses.]

Once you type in “(public)” the password field will become grey as no password is required.

9.6.4 The Judging Process

There are two ways to advance to the FINAL ROUND of professional judging:

Win during the **Peer Judging**, and/or

Advance during **Round One of Professional Judging** conducted by Autodesk’s professional judges

9.6.4.1 Peer Judging

Note: Winning a Regional AVA does NOT earn a spot at the *FIRST* 2006 Championship.

- Animations will be judged by your peers via Autodesk Streamline. (**Exact judging procedure to be provided to each team that submits an animation prior to first regional event.**)
- One winner will be selected per regional event.
- Only teams that are registered for a regional event may win at that regional event.
- In the event that an animation has already won a previous regional event, the second highest scoring animation will advance to the Final Round of Professional Judging.
- Regional winners will be announced by *FIRST* during the closing ceremony on Friday.
- Winners will advance to the Final Round of Professional Judging.

Notes on the Regional Judging process:

- Only teams that have submitted an animation will be eligible to participate in judging at the regional level. These teams will be eligible to designate one student from their team to be a student judge. The student selected must have been involved in some way with the development of his/her team’s own submittal.
- Student judges will not be allowed to score the animation submitted by their own team.

9.6.4.2 Round One of Professional Judging:

- All animation entries will be reviewed by a professional panel of judges.
- A select number of Entries will be advanced for judging to the **Final Round of Professional Judging**.
- All rookie entries will be considered for the “Rising Star” award by the professional judges. Please see “Rising Star” information below.
- A list of Entries that advance to the Final Round of Professional Judging will be posted onto Autodesk Streamline by March 13, 2006.

9.6.4.3 Final Round of Professional Judging:

Professional judges will review:

- Winners of the Peer judging (regional animation winners)
- Animations that advanced from Round One Professional Judging

Professional Judges will select the following winners:

- Championship Winner
- Honorable Mention Winner
- “Rising Star” (Rookie) Winner

Winners will be announced at the *FIRST* Robotics Competition Championship Event.

A professional panel of judges made up of volunteers from business, industry and education will conduct judging. Judges are professional animators, artists, engineers and educators. Some of the judges are Autodesk employees, others are 3ds Max customers or trainers. Judges are familiar with the *FIRST* Robotics Competition, with previous Autodesk Award competitions, and with the application of Autodesk products and other technologies in engineering, design and education.

9.6.4.4 “Rising Star” (Rookie) winner:

The “Rising Star” award will not be awarded on a regional level. For the purposes of this award, the “Rookie” designation is given to any school which has not submitted for the Autodesk Visualization Award previously. Teams submitting with a “Rookie” designation (R plus team number) will also be part of the Autodesk Visualization Awards being judged at the regional level if they have met all the qualifications. Schools, which have submitted previously but have been disqualified, do not qualify as “Rookie” teams under these Guidelines. Should a “Rookie” team be selected as the Championship Winner, a Rising Star winner will not be selected.

Prizes:

Prizes will be announced at a later date.

9.6.5 Autodesk Visualization Award 2006 Submittal Checklist

Item	Deadline (No Later than)	Completed
Entry Form and Autodesk Archive Consent and Release Authorization Form. (Post on Autodesk Streamline* site or mail**)	Monday February 6, 2006	<input type="checkbox"/>
Written permission note to use music from the legal copyright owner, <i>if</i> your animation contains copyrighted music. (Post on Autodesk Streamline* site or mail**)	Monday February 6, 2006	<input type="checkbox"/>
Storyboard (Upload to Autodesk Streamline* site or mail*)	Tuesday February 13, 2006 8am (PST)	<input type="checkbox"/>
Animation (Posted onto Autodesk Streamline* under the file folder with your team number)	Tuesday February 13, 2006 8am (PST)	<input type="checkbox"/>

Send email to: first.entries@autodesk.com to announce your animation has been posted. Subject header should say: "Notice of AVA posting, team number XXX"	Tuesday February 13, 2006 8am (PST)	<input type="checkbox"/>
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*Autodesk Streamline site:

<https://projectpoint.buzzsaw.com/client/FIRST>

username: "(public)"

**Mailing address:

Autodesk Inc.

Attention: *FIRST* Robotics Competition

111 McInnis Parkway

San Rafael, CA 94903

9.6.6 AUTODESK VISUALIZATION AWARD 2006 Entry Form

The following is required:

- A. Complete this Entry Form as its contents are required for judging. It must be legible. Please read the Entry Requirements carefully, before completing this Entry Form. Information on this Form must be complete.
- B. Complete and include the *Autodesk Archive Consent and Release Authorization* agreement with your entry. It is required for judging.

Entry Deadline:

There are two separate entry deadlines:

- **Paperwork Due:** Monday, February 6, 2006
- **Animation and Storyboard due:** Monday, February 13, 2006 no later than 8:00 a.m. (PST)

Note: If you do not have the ability to create an electronic storyboard, hard copies will be accepted via mail but it must be received at the Autodesk offices no later than Monday, February 13, 2006. Mailing address is: Autodesk, Attn: *FIRST* Robotics Competition, 210 Main Street, Venice, CA 90291.

Autodesk Streamline site:

<https://projectpoint.buzzsaw.com/client/FIRST>

Username: (public)

Entrant information:

FIRST Team Number _____ Autodesk Award Entry Title _____

Team Name: _____

School Name(s) _____

School Contact (Teacher) _____ Telephone Number _____

Teacher Email _____

Sponsor Company Name(s) _____

Sponsor Contact _____ Telephone Number _____

Sponsor Email _____

Rookie Entry? Yes _____ No _____

Does your animation contain audio? Yes _____ No _____ If so, is it music? Yes _____ No _____

If yes, what is the title of song(s), and the author(s) name, and name of band or artist:

Is it original music created specifically for your animation? Yes _____ No _____

If no, do you have written consent from the legal copyright owner to use this music in your animation?

Yes _____ No _____ (If yes, attach written consent with entry form. If no, your animation will be disqualified.)

Individual student animator(s)

Your team can select up to 15 individual student animators as potential Award recipients. List the following information for each student on Attachment “A”

Student Name**Current Address****Telephone Number****E-mail Address****Individual Team Champion**

In past competitions for the Autodesk Award, we have heard impressive stories of outstanding individuals on some competing teams. Please tell us who your “Team Champion” is this year and about his/her contribution to the team and your Entry. Your champion may be a student, teacher, engineer, community member, or other individual contributor.

Software Use—Describe which Autodesk products you used...and how. Also, name and describe other design, visualization, or animation software products you used in your entry. Please remember that this award is designed to showcase your team’s use of **3ds max**.

Attachment “A”

Autodesk Visualization Award 2006

Student Animators:

Include name, address, phone number and e-mail address for each student listed.

1.

2.

3.

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9.6.7 ARCHIVE CONSENT AND RELEASE AUTHORIZATION

Use this form for the Autodesk Visualization Award, FIRST Robotics Competition 2006

Dear Contributor,

We appreciate your interest in submitting material to Autodesk, Inc. The following allows us to legally use your work.

By signing and returning this consent form, the individual named below and/or if applicable the individual's employer, middle or high school(s), or corporate or college/university sponsor(s) and individual student, faculty and corporate contributors (hereinafter referred to collectively as the "Entrant") understand that the Entrant is agreeing to the following terms which will govern use of the images, animation, sounds, files and other material (the "Material") described below:

- Entrant grants a nonexclusive, irrevocable, perpetual, worldwide license to Autodesk, Inc. to use the images, animation, sounds and other material contained in the "Material" in any manner it deems appropriate. "Nonexclusive" means that Entrant can allow others to use the Material and that the Entrant retains all rights to the Material other than those specifically granted to Autodesk.
- Autodesk may change, reproduce, distribute, and sublicense the Material to its subsidiaries, affiliates, customers and to third parties granting them the same rights which Autodesk has received.
- Autodesk will try to include the credit line shown below when the Material is used and will also try to require others to whom it grants sublicense to do the same. However, Autodesk and its sublicensees may not always be able to include the credit line or otherwise acknowledge the source of the Material. The compensation the Entrant will receive for agreeing to license the Material will be limited to the exposure the Entrant receives by Autodesk's use and sublicensing of it. No other compensation will be paid. The Entrant agrees that the Entrant will not at any time make any claim for compensation for the rights granted to Autodesk.

The Entrant represents and warrants that the Material is owned by the Entrant free and clear of any liens or claims of any third party; that the Entrant has a legal right to grant the permission given in the Entry Form and in this Agreement. The Entrant indemnifies and hold Autodesk, its subsidiaries, associated companies, successors, assigns, agents, and employees harmless against liability should any third party claim that the use of the Material or any part thereof by Autodesk violates any right of such third party. The Material does not include any proprietary information, logos, or trademarks of any third party. NOTE: Use of the *FIRST* Foundation logo is permitted without permission, as long as that logo is not at all altered.

The authorized signatory for the Entrant is over 18 years old and **either** owns the copyright to the material in these files, **or** has the right to grant this consent on behalf of the owner, **or** knows that the material in these files is in the public domain. This consent does not conflict with any others the Entrant has granted or any other rights to the files.

FIRST TEAM SPONSOR OR SCHOOL (where applicable)

FIRST Team Name and Number: _____

Animation Entry Title: _____

Name, Email and Telephone # of Entry Contact: _____

Address, City, State, ZIP _____

School Name & Address: _____

School Telephone # _____

Teacher Name & Email _____

Does your animation contain audio? Yes _____ No _____ If so, is it music? Yes _____ No _____

If yes, what is the title of song(s), and the author(s) name, and/or name of band or artist:

Is it original music created specifically for your animation? Yes_____ No_____

If no, do you have written consent from the legal copyright owner to use this music in your animation?

Yes_____ No_____ (If yes, written consent must accompany your entry form. If no, your animation will be disqualified.)

Authorized Signatory (print)

Authorized Signature (sign)

The above release shall be void if amended in any manner. Autodesk shall not be responsible for the return of any materials submitted.

9.7 WEBSITE AWARDS

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

- 1) “Website Excellence”
- 2) “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.

9.7.1 Submission and Deadline Information

Only team websites that are entered into Firstawards.org by **11:59 p.m. EST on February 23, 2006** will be judged. 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 judged. 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 judges, will be disqualified at that particular event.

Any website, which in the judge’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.

9.7.2 Scoring Criteria

The following criteria will be used to judge the Website Design Awards:

9.7.2.1 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.

9.7.2.2 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.

9.7.2.3 Content (25 points)

Does the website:

- Clearly tell the team story and articulate its mission?
- Include recognition of sponsors and volunteers?
- Explain *FIRST* and promote its vision?
- Include helpful resources for other *FIRST* teams?
- Contain interesting non-text content such as music, sound, animation, or video?

9.7.2.4 Structure and Navigation (25 points)

- How easy is it, in general, to navigate throughout the site?
- Does it have HTML links that provide easy access to external content?
- Do links open new, separate browser windows?
- Is important information easily accessible?
- Is there a prominent link to the *FIRST* website on the home page?

9.7.2.5 Visual Design (25 points)

- Is the site engaging, and does it encourage exploration?
- Does the website:
- Communicate a visual experience reflective of the team identity?
- Use color and iconography in a consistent way?
- Use the official *FIRST* logo?
- Include photos of the team participants, volunteers, and sponsors?

9.7.2.6 Functionality and Interactivity. (25 points)

- Does the website work well?
- Does the home page load quickly?
- Do the links work throughout the site?
- Does it take into consideration those with diverse user requirements including file sizes, file formats, special access needs, (i.e. alt tags for images) and download speeds?
- Are there effective opportunities for a visitor to interact with the website?

9.7.3 Judging Process

- Each website submitted for consideration will be reviewed by a panel of judges prior to each competition.
- There will be no on-site interviews. If the judges 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.

9.7.4 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.

9.7.5 2006 Website Award Scoring Sheet

Event: _____

Team Numbers	#	#	#	#	#
Content (25 points)					
Does the website clearly tell the team story and articulate their mission?					
Does the website include recognition of sponsors and volunteers?					
How well does the site explain <i>FIRST</i> and promote its vision?					
Does the website include helpful resources for other <i>FIRST</i> teams?					
Does the website contain interesting non-text content such as music, sound, animation, or video?					
Structure and Navigation (25 points)					
Is it easy to navigate through the site?					
Does it have HTML links that provide easy access to external content?					
Is important information easily accessible?					
Is there a prominent link to the <i>FIRST</i> website?					
Do links open new, separate browser windows?					
Visual Design (25 points)					
Does the website communicate a visual experience reflective of the team identity?					
Is the site engaging and does it encourage exploration?					
Does the site use color and iconography in a consistent way?					
Does the website homepage use the official <i>FIRST</i> logo?					
Does the website include photos of the team participants, volunteers, and sponsors?					
Functionality and Interactivity (25 points)					
Does the site work well?					
Does the homepage load quickly?					
Do the links work throughout the site?					
Does it take into consideration those with diverse user requirements including file sizes, file formats, special access needs, (i.e., alt tags for images), and download speeds?					
Are there effective opportunities for a visitor to interact with the website?					
Total Scores. (0-100 points)					

9.8 THE CHAMPIONSHIP AWARDS

FIRST will hold a Championship Awards Celebration where a special judging panel will present the following awards.

9.8.1 Champion

This award celebrates the team or alliance that wins the Championship.

9.8.2 Championship Finalist

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

9.8.3 Division Finalist

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

9.8.4 Division Champion

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

9.8.5 Autodesk Visualization Award

Presented by Autodesk, Inc., this award recognizes excellence in student animation that clearly and creatively illustrates the spirit of the *FIRST* Robotics Competition. This year, Autodesk will award excellence in content, creativity, and mastery of multimedia.

9.8.6 Autodesk Inventor Award

Presented by Autodesk, Inc., this award recognizes the team that best understands, communicates, and documents the distinct phases of the design process from concept to completion. Autodesk will reward excellence in documenting the design process, technical competence using Autodesk software, and web page design.

9.8.7 Chairman's Award

The Chairman's Award represents the spirit of *FIRST*; it honors the team that best represents a model for other teams to emulate and which embodies the goals and purpose of *FIRST*. It remains the most prestigious team award *FIRST* presents. Please refer to the "Chairman's Award" Section for more about the award.

9.8.8 DaimlerChrysler - Team Spirit

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

9.8.9 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 verbally describe, as well as demonstrate, this chosen machine feature.

9.8.10 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. This is the second highest *FIRST* award a team can garner.

9.8.11 Founder's Award

The Founder's Award is presented each year, by *FIRST* Founder Dean Kamen, to one organization or individual for exceptional service in advancing the ideals and mission of *FIRST*. Past winners of this award include: Motorola, Inc. (1993), Honeywell (1994), Walt Disney World's Epcot (1995), The City of Manchester, NH (1996), Francois Castaing of Chrysler Corporation (1997), Johnson & Johnson (1998), NASA (1999), Dr. William Murphy, Founder of Cordis Corporation & Small Parts, Inc. (2000), Autodesk, Inc. (2001), John Doerr, partner, Kleiner Perkins Caufield & Byers (2002), Innovation First (2003), FedEx Corporation (2004), and The LEGO Group (2005).

9.8.12 General Motors - Industrial Design

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

9.8.13 Highest Rookie Seed

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

9.8.14 Imagery

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

9.8.15 Johnson & Johnson - Sportsmanship

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

9.8.16 Judges' Awards

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

9.8.17 Kleiner Perkins Caufield & Byers - Entrepreneurship

The Kleiner Perkins Caufield & Byers Entrepreneurship 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.

9.8.18 RadioShack® Innovation in Control

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

9.8.19 Motorola - Quality

This award celebrates machine robustness in concept and fabrication.

9.8.20 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.

9.8.21 Rookie Inspiration

This award celebrates a rookie team for outstanding effort as a *FIRST* team in community outreach and recruiting students to engineering. This team models gracious professionalism on and off the field and is a true inspiration to others.

9.8.22 *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 in the heat of competition.

9.8.23 Website Award

This award recognizes excellence in student-designed, built, and managed *FIRST* team websites. We have revised the process for this award for 2006. Please refer to the website section for specifics.

9.8.24 Woodie Flowers Award

Small Parts, Inc. presents The Woodie Flowers Award to an outstanding engineer or teacher participating in the robotics competition. This person best demonstrates excellence in teaching science, math, and creative design and is chosen from among the Regional winners for this award. This award was presented in 1996 to its inaugural recipient, Dr. Woodie Flowers, Pappalardo Professor of Mechanical Engineering at MIT and National Advisor for *FIRST*.

Past winners of this award also include: Elizabeth Calef, Teacher, Bridgewater-Raynham Regional High School (1997); Michael Bastoni, Teacher, Plymouth North High School (1998); Ken Patton, Engineer, GM Powertrain (1999); Ms. Kyle Hughes, Teacher, OSMTech Academy (2000); and William Beatty, Beatty Machine & Manufacturing Company (2001); David Verbrugge, Engineer, GM Proving Ground (2002); Andy Baker, Engineer, Delphi Automotive Systems (2003); David Kelso, Teacher, Central High School (2004), and Paul Copioli, Staff Engineer, FANUC Robotics America (2005).

9.8.25 Xerox - Creativity

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

Section

10



GET PUBLISHED

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Content of the Book

How it all Works

Submission Requirements

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ROBOTS

Behind the Design



Get Published!

Rockport Publishers will be publishing a book featuring 30 award-winning robots from the 2006 FRC competition that demonstrate engineering and design excellence. Each of the robots featured will be documented over several pages outlining the design and the design processes used through information and process images that the FRC teams supply. This book, the only one of its kind, will offer technology enthusiasts, including FRC members interested in learning how creative processes are applied to develop sophisticated robots, with an intimate understanding of what it took to design and build these winning robots. The book will be published and available through major bookstore chains such as Amazon, Borders, and B&N, as well as around the globe and possibly in multiple languages, in the fall of 2007.

About the Publisher



Rockport Publishers specializes in books for design professionals—their publishing program includes product design, graphic design, interior design, and architecture. Their worldwide book distribution offers designers the opportunity to show their work in an international forum. Please visit their website at www.rockpub.com.

The Content of the Book

The book will feature approximately 30 robot designs that demonstrate exceptional performance in the following award categories at the regional events and championships. Only winners of at least one of these awards at the regional or championship level will be eligible for consideration.

- Delphi Driving Tomorrow's Technology Award
- General Motors Industrial Design Award
- Motorola Quality Award
- RadioShack Innovation in Control Award
- Xerox Creativity Award

How It all Works

The book will be written based on information provided by teams participating in the 2006 competition. Only FRC 2006 teams who have won one of the above mentioned awards are invited to submit documentation of their design efforts for consideration as a featured profile/case-study that will be included in the book. The submitted information will form the raw material the book is created from so please provide visuals of all kinds and from all points during the development process. This is extremely important because if you do not submit enough written information or visuals, you will not be eligible for consideration.

Teams that want to be considered for inclusion in this book must document their design process and submit that documentation to FIRST no later than exactly one month from the day the award was won. FIRST will forward your submission to the book judges. The judges will select designs to be included in the book from those submitted by teams winning one of the above awards. Winning an award is not a guarantee to be published, BUT the quality of your submitted material will be a very important factor in determining which robots will be chosen for inclusion.

Submission Requirements

If you are submitting for more than one award, please provide a separate and complete package for each, clearly labeled with the team number and the award you are submitting for. You must provide the following materials in order to be eligible for consideration:

- A fully filled out questionnaire submitted as a Microsoft Word document
- A minimum of 15 images submitted according to the *Electronic Submission Guidelines* attached
- A signed Grant of Rights form

A series of questions have been prepared for each award and teams must answer these questions thoroughly and completely. They must also provide an in-depth narrative of the design and development process as one part of their submitted material. Teams must also include a minimum of 15 high-quality graphic images (see *Electronic Submission Guidelines*) that illustrate the evolution of their robot design from inception to its final creation. These graphic images must include a final image (or two) of the finished robot shot clearly against a white background or wall, as well as the following:

- Original hand-sketches of robot
- Photographs of robot concepts, development, or prototypes
- CAD models of robot
- Detail photographs of the robot's important features
- Photographs of the robot during the building process

The submitted graphics are as important as the submitted text to tell the story of how your team progressed from idea to reality so a good variety of types of images from sketches to completion will communicate this best. Be sure to read the *Electronic Submissions Guidelines* very carefully so you are sure you are supplying the correct content.

Electronic Submission Guidelines:

Files may be provided on either a MAC or PC formatted media: (be sure to copy MAC files to MAC formatted disks...MAC files copied onto PC formatted disks may be corrupted). Files must be sent on one of the following media: ZIP (100MB), CD-ROM, or DVD.

Submit 2 copies of your files (keep the original) with the following specifications:

Size and format:

- 350 dpi resolution or (72 DPI for screen grabs only)
- **Minimum** size 4" x 5" (larger dimensions preferred)
- **.TIFF** or **.EPS** files only– RGB color or CYMK color
- Illustrator files need to be EPS and all fonts need to be converted to outline (vector)

Do NOT send JPG, Quark Express files, Quick Time, PDF, PSD, GIF, or Pagemaker files, they will not be accepted. The only accepted files are TIFF or EPS

The information you provide will be used in a credit to accompany your submission and in the directory should it be selected, so write legibly, be as complete as possible, and double check all spelling. Incomplete or illegible forms will be disqualified.

Note to teams: You can convert Autodesk Inventor files to .TIFF files by saving them as .bmp files, opening them in Paint, and resaving as .TIFF.

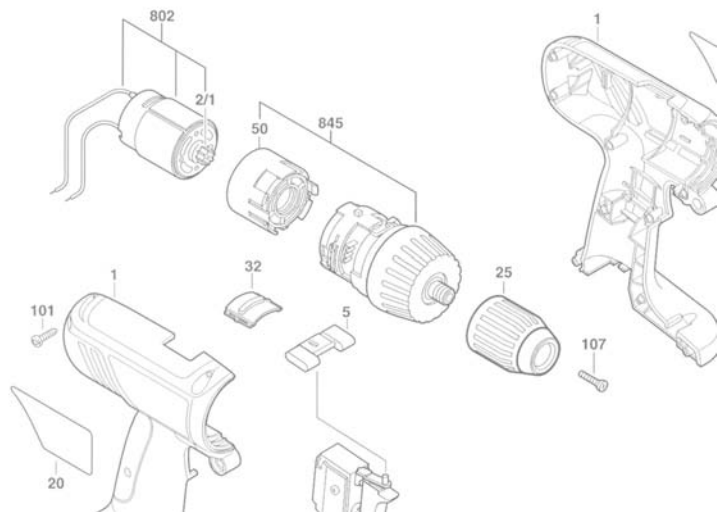
Labeling Submission:

Please label each disk with the following information:

- FIRST Robot Book
- Team Number
- Award submission is for
- Contact Name
- Contact Phone Number

Include the following items with the disk:

- Disk directory printout listing contents of the disk
- 8" x 10" color or black and white print out (hi resolution on photo paper) of each image labeled with
 1. Team number
 2. File name(s)
 3. Award submission is for
 4. File Format (.TIFF, .EPS)
 5. File size in megabytes (Mb)
 6. Image size (inches or metric)
 7. DPI (resolution)
- Completed "Grant of Rights" form (included in following pages)
- Completed "Submission Questionnaire" (included in following pages) in a Word .doc format



Packaging/Shipping

Package all media well for shipping. We recommend a padded envelope and do not use paper clips, binder clips, or staples near any photographs as they will damage the images.

Send the complete submission package to:

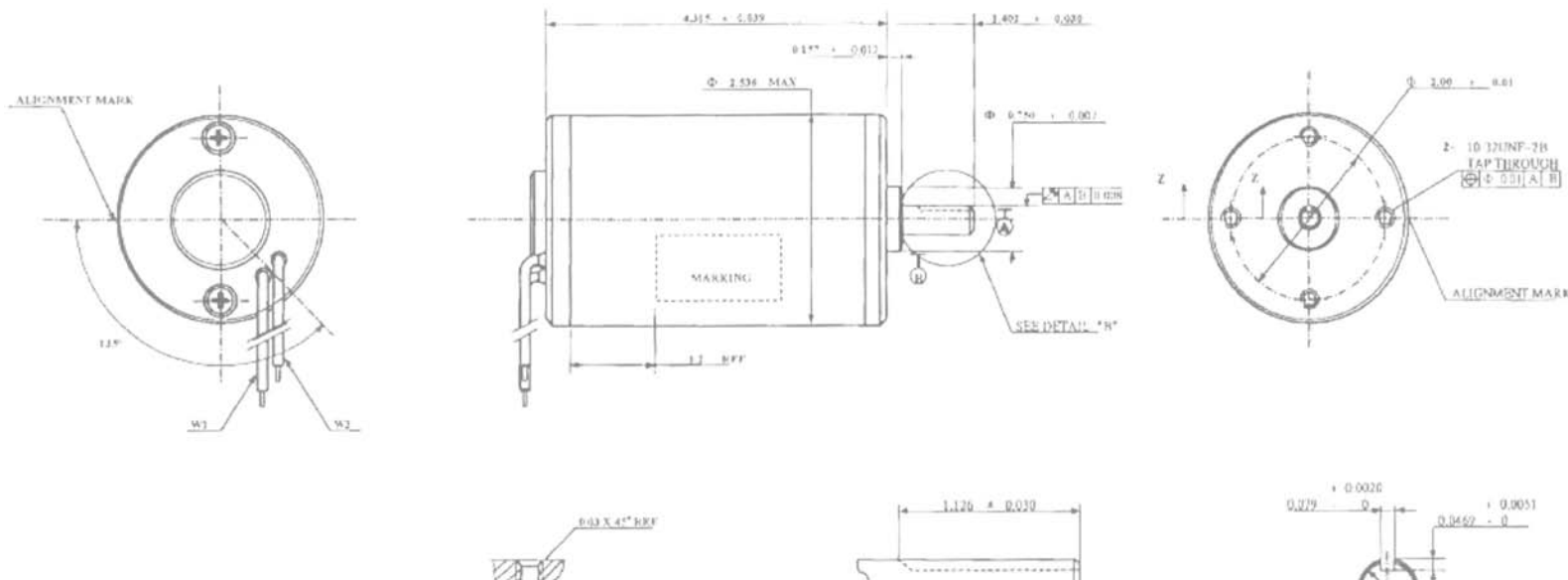
FIRST Robotics Competition
FIRST Robot Book Opportunity
200 Bedford Street
Manchester, NH 03102

You must include your team number on the package as part of the return address.

Deadline to submit materials: Must be postmarked **no later than exactly one month from the day the award was won.**

Take the time to double check that you have put everything in the package, that all the forms are completed, all criteria is met and the disk can be read before you mail it to FIRST. **Incomplete packages will not be forwarded to the author.**

Upon publication, teams whose work is selected for the book will be notified and will receive a 50% discount on purchasing unlimited copies of the book.



Submission Questionnaire

The following team questions will aid in the creation of the *FIRST Book of Robot Design*. Questions must be submitted as a Word document.

The “General Robot Description Question” must be completed for every award submission.

General Robot Description Question:

Please describe in-depth the design, development process, and any challenges you faced along the way. Provide step-by-step images to illustrate the important moments.

Award: General Motors Industrial Design – This award celebrates form and function in an efficiently designed machine that effectively achieves the established challenge.

Questions:

1. Describe your team’s strategy for playing the 2006 FRC game.
2. What was the most important feature or function to execute your game strategy? Describe its function and the problems solved while creating and constructing this feature.
3. Please provide specific examples of overcoming the design challenges created by limits of time and resources.
4. What assembly and integration problems were solved while building the robot?
5. What was the most difficult portion of the design process (idea generation, selection of alternatives, analysis, fabrication, testing, integration) and why? Please walk us through the design that produced your machine.
6. What features had to be sacrificed in order to achieve the present machine?
7. Did practices reveal any unexpected features of the machine (positive or negative)?
8. Is this machine modeled on any real world systems, or can the design be applied to any real world system? If so, please explain the relationship between the machine and other existing systems.

Award: Delphi “Driving Tomorrow’s

Technology” – This award celebrates an elegant and advantageous machine feature, which includes 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 is based on the team’s ability to verbally describe in a concise manner, as well as demonstrate, this chosen machine feature.

Questions:

1. What was the machine feature that won this award?
2. How does the feature contribute to the robot’s performance?
3. Describe the design process of that feature, from initial ideas to concepts to prototypes to final design.
4. What design alternatives were suggested for this machine feature before the chosen design was selected?
5. What engineering analysis was done before the device was constructed?
6. Was any software used as a design tool? Please describe how that software benefited the design process.
7. What challenges were overcome in getting the feature functioning on the robot?
8. When was the first functioning prototype of this feature ready for testing, and how was that testing accomplished?
9. Was the feature modified during testing to improve performance?
10. How did team members guide the design and development of this feature?

Award: Motorola Quality – This award celebrates machine robustness in concept and fabrication.

Questions:

1. What makes this machine robust?
2. Provide some examples of how the machine's robustness contributes to the machine's performance.
3. What factors established the need for a robust design?
4. What was the most important component in the Kit of Parts in the area of machine robustness?
5. How did experimentation and testing assist in creating a high quality robot?
6. What research was conducted to aid the design process?
7. What were the goals and objectives of this design and how did these goals result in producing the high quality finished product?
8. Describe the creative process (from brainstorming to the final build).
9. Where did your design inspiration come from?
10. Before products are developed, a series of design reviews are often conducted, such as Concept Review and Selection, Preliminary Design Review, Design Safety Review, Prototype Review, Customer Testing Review, Detailed Design Review, Quality Review). Though your team may not have established a formal review process, can you describe how the design was reviewed and improved over the six week time period?

Award: Xerox Creativity – This award celebrates creative design, use of a component, or a creative or unique strategy of play.

Questions:

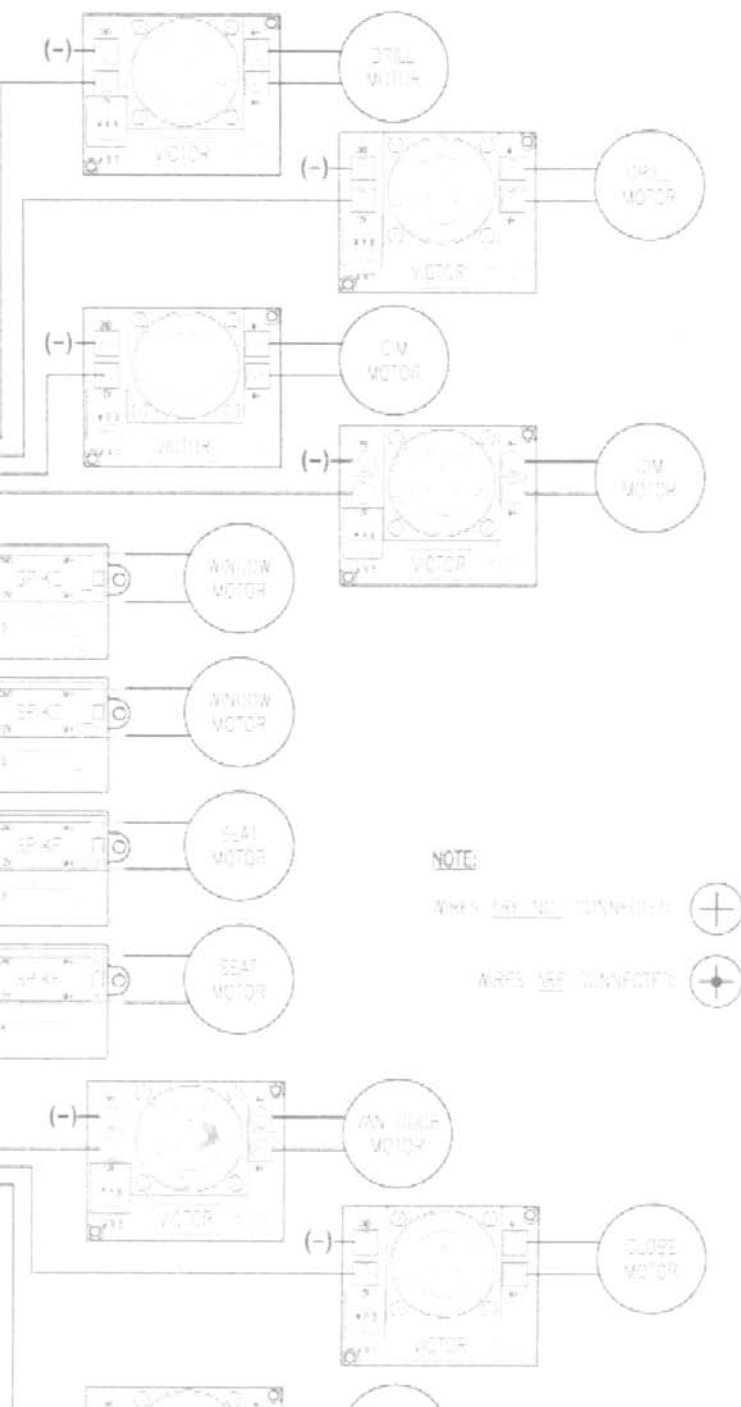
1. What are the creative attributes of your design?
2. Creativity can either be instantaneous (i.e. the Eureka moment) or the result of a systematic process to generate ideas (such as brainstorming, using analogies, applying checklists, word associations, manipulating an existing solution). Please describe the process which produced the creative aspect of your design.
3. What design ideas or robot functions were thought of but not implemented on the final robot, and why?
4. For the existing design, how many different alternatives were considered and why was the existing system selected?
5. Moving from an idea to reality is often difficult. How has the design changed from its original concept to the constructed device?
6. How did the FIRST robot rules or FIRST game rules affect your creative process?
7. What design tools were used to first describe the idea, refine the design, and construct the device? (Note these tools may range from a sketch, to a CAD model, to engineering calculations).
8. Did the schedule impact your creative process? Did the time constraint force an alternative solution? Did the small amount of time for the entire process (from inception, to concept, to prototype, to testing, to refinement, to final design) dampen creativity?

Award: Radio Shack Leadership in Control –

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

Questions:

1. What is the innovative control or application of control components on your robot?
2. What can the robot do in autonomous mode, and how does it accomplish those tasks?
3. Control requires an integration of the hardware and software on a robot. Can you describe how the software was integrated with the robot mechanisms and sensors?
4. How did the design of the control system morph while the robot was developed and what aspects of the robot design influence the control system the most?"
5. How did the control system improve human-machine interaction? (For example, many teams program in dead bands for motors, change the slope of the input to output relationships for joysticks and motors, or use other means to improve the human's ability to control the robot).
6. What sensors were used in the control system and how were these sensors used?
7. Was the control system "bench tested" before being implemented on the robot, and what was discovered from those original tests? How was the control system tested?
8. Control is based on feedback. What forms of feedback to the human and the robot are achieved in your design and how is the feedback measured?
9. How does the control function contribute to the robot's performance?
10. Was the machine designed with control in mind, or was the control system built to accommodate the mechanical design?
11. What surprises were discovered during the development of the control system?



F.A.Q.'s

Q. Who owns the design?

A. The team will continue to own the design. By signing the “Grant of Rights” form, the team is giving permission for Rockport Publishers to publish the design (read the Grant of Rights form for specific rights being granted).

Q. Will someone be able to patent our design from the book?

A. The book will contain a copyright statement indicating that all of the photos and drawings are property of the team who submitted them.

Q. Will teams get any payment for being published?

A. No.

Q. What happens if the disk is corrupted, can we resubmit?

A. We encourage all teams to double check the package before they submit. Due to the planned timing of getting this book written and published, any problems with the submission package will decrease the odds that a team will be considered as a robot design case study for this book.

Q. Will someone contact our team to ask us questions about our design?

A. The “Submission Questionnaire” is designed to give the author all the information needed to publish the book. Be sure to complete it fully. Teams may wish to emphasize one award over others in their submitted material.

Q. When will we know if our team has been selected to be published?

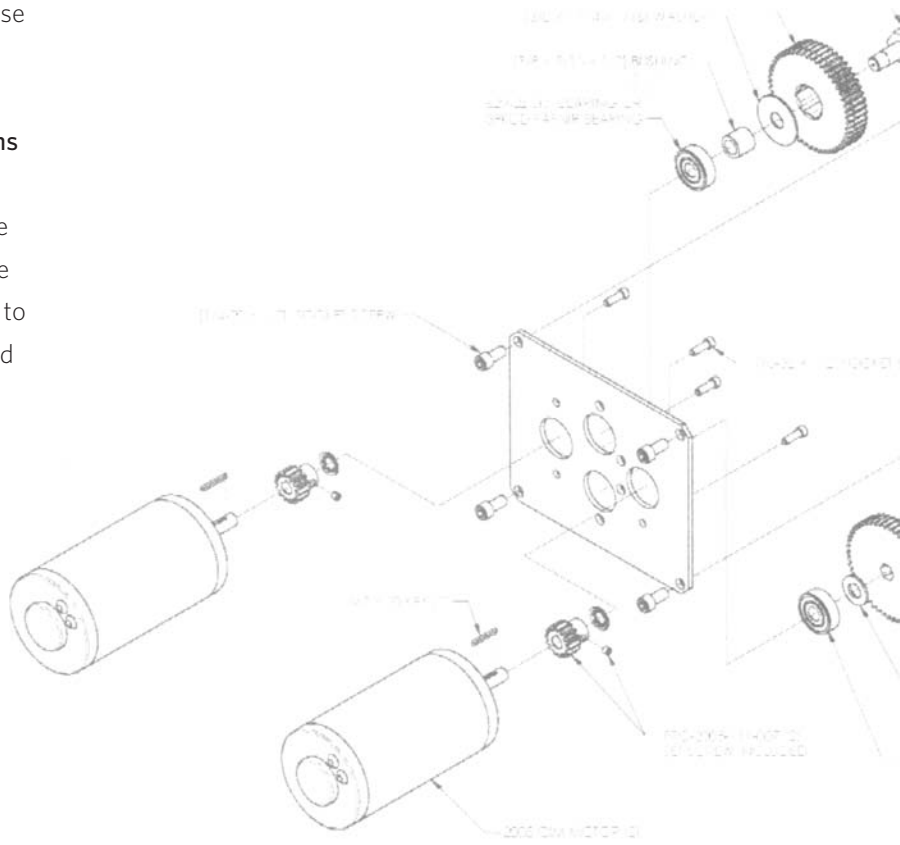
A. Teams will know if their submission was chosen upon publication, currently scheduled for September 2007.

Q. We created all of our CAD drawings using Autodesk Inventor. How do we convert these files to .EPS or .TIFF files?

A. You can convert Autodesk Inventor files to .TIFF files by saving them as .bmp files, opening them in Paint, and resaving as .TIFF. You cannot convert them to .EPS.

Q. How do I submit a Word.doc when the submission questionnaire is in a .pdf format?

A. Acrobat Reader has a Select Text tool. Use it to highlight the Submission Questionnaire portion of the .pdf file and copy to Clipboard (PC users, right mouse click). Open a new Word document and paste the copied text. This will allow you to answer the questions using Word and without retyping.



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The undersigned hereby grants to Rockport Publishers the right to reproduce in any size the work identified below in its forthcoming book tentatively titled **First Robots: Behind the Design** in all editions, revisions and the reprintings of the Book, and promotional and instructional materials thereto; in all known or hereafter invented media which makes the Book available in visual form for reading, and as a contribution to other collective works in all such media. The undersigned hereby confirms that (1) any and all information attached hereto is correct, (2) the undersigned is either the sole owner of all rights to the work (and to any and all photographs, samples, and transparencies of the work being submitted) or has been authorized by the owner(s) of such rights to grant the rights herein granted and (3) the publication of the work will not violate the rights of any third party. The undersigned agrees that (1) the undersigned will not receive any direct financial compensation from Rockport for granting these rights herein, but has and will receive as good and valuable consideration for granting these rights the promotional value of having the work included in the Book, (2) materials submitted will not be returned, (3) the undersigned shall not hold Rockport Publishers responsible for the safekeeping of any materials in Rockport's possession, and (4) Rockport Publishers is under no obligation to include the above-mentioned work in the Book or to publish the Book itself. We also agree that Rockport Publishers is entitled to rely for permission on a facsimile of this original.

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Please fill out and submit a separate Grant of Right for each award you are submitting for.

Fill this out so it reads exactly how you would like your information listed in the directory of the book. If you DO NOT want your address listed, please let us know.

AWARD:

TEAM NAME AND NUMBER:

ADDRESS:

PHONE NUMBER:

FAX NUMBER:

E-MAIL:

LIST ALL MENTORS AND MEMBERS OF TEAM:

(PRINT) NAME:

SIGNATURE

DATE