

The 2002 FIRST Robotics Competition
TEAM UPDATE #1

Date: January 8, 2002

PLEASE DISTRIBUTE THIS TO OTHER TEAM MEMBERS!

FIRST will provide rules updates and other important information to teams via the FIRST web site at http://www.usfirst.org/robotics/doc_updt.htm

Please check the team updates portion of the web site on a regular basis to insure that your team does not miss critical information about the 2002 FIRST Robotics Competition. FIRST recommends assigning at least one team member the duty of keeping up to date on all team updates. This person or group should be responsible for distributing information contained in team updates to the appropriate team members.

NEW PROCESS FOR QUESTIONS AND ANSWERS

We realize that many of you will now have technical questions. In order to simplify the process and get you an answer in the shortest time possible, we have created a message board. The message board will allow you to both submit your questions as well as view FIRST responses to the other teams questions. Before submitting a question you will want to check to see if the same question has already been posted and answered. Since our technical team will be busy monitoring the board continuously and not immediately available to answer questions via telephone, we highly urge you to use this board to submit all technical questions.

The first step is to quickly create a Yahoo id if you want to post on the website. You will not need one for just browsing the posted messages. Create your Yahoo Id, then join the group.

To just read the generated messages and responses by email, **email FRCtech2002-subscribe@yahoo.com** from your regular email. Then, you can either email us at FRCtech2002@yahoo.com or visit the website and post your question directly at <http://groups.yahoo.com/group/FRCtech2002>. This is a moderated board and all questions will be reviewed before being posted. Although we have the utmost confidence in our teams, if a message comes through that is offensive or unclear it will be deleted - so please keep your questions concise and "professionally gracious".

ADDITIONAL HARDWARE LIST CORRECTIONS

The timing belt entry has been changed to the following:

Belt	Any size, Any length for use with pulleys
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RULES UPDATE AND CLARIFICATION

The following rule is added to Appendix A of The Game section of the manual

DQ8. A robot cannot inhibit the movement of another robot by pinning against the field border or goals for more than 10 seconds. If a robot has been pinned for 10 seconds, the team with the pinning robot will be told by the referee to release the 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 starts over. If a referee determines this rule to be violated, the pinning alliance will be disabled.

Rule M10 has been updated as follows:

Replace “PNEUMATICS section of the kit list” with “BOM and Custom Cylinder order form found in the 2002 Pneumatics Manual”

Rule K1 has been updated. Add the following line below the first paragraph:

- The soccer ball and reflective tape provided are not for use on the robot.

KIT OF PARTS

The following items will be shipped to teams at a later date. (TBD)

- Anderson Power Products Catalog
- Quick Disconnect Power Connectors with 1' leads
- Revolving Light with red and blue lenses
- Reflexite retro reflective tape – 18” piece
- 10' #6AWG Red conductor wire

The Crimping Tool, Van Door Motors and Velcro sticky back coins were not provided in the 2002 Kit of Parts.

The Atwood Mobile (Chiaphua) motors and their mating gear may be found from local RV equipment dealers by purchasing power jacks used to raise and lower trailers. The motor and gear are components contained in all models of Atwood Power Jacks manufactured by Atwood Mobile Products.

<http://www.atwoodmobile.com/Products/chassis/powerjack.cfm>

These power Jacks sell in the \$200-\$300 range.

Please refer to the following kit list for the updated version.

2002 FIRST Robotics Competition Kit Parts

Bearings

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Pillow Block	1/2"	2	The Torrington Company
Radial Ball Bearing With Spherical O.D., RA008RRB	1/2" I.D., Self Locking Collar	4	The Torrington Company
Single Row Radial Flanged Ball Bearing, FS1KDD7	1/4" I.D.	4	The Torrington Company
Single Row Radial Flanged Ball Bearing, FS3KDD	3/8" I.D.	4	The Torrington Company
Two Bolt Self Aligning Flange, 40MST	Fits 1/2" Bearing	8	The Torrington Company

Control System

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
15 Pin Solder Cup Connector	DB15 Female	2	AMP Foundation
25 Pin Solder Cup Connector	DB25 Male	2	AMP Foundation
Circuit Breaker	60 Amps, Ratings: 1-63A set at 77°F	1	SquareD
Fuse Panel	ATC, 12 fuseable, 12 unfused	2	Bussmann
LED, Panel Mount	Red, 12V	2	Chicago Miniature Lamp, Inc.
LED, Panel Mount	Green, 12V	2	Chicago Miniature Lamp, Inc.
LED, Panel Mount	Amber, 12V	2	Chicago Miniature Lamp, Inc.
Muffin Fan (Tiny)	12 Vdc	5	EBM Industries
Plastic Shield for 25 Pin Connector	fits DB25 Connector	2	AMP Foundation
Snap-Action Circuit Breaker	30 amp,12 volt, Auto-Resetting	6	Snap-Action, Inc.
Snap-Action Circuit Breaker	20 amp,12 volt, Auto-Resetting	6	Snap-Action, Inc.
1 Conductor Wire	10', #6 AWG, Black	1	Delphi Packard Electric Systems
9 Pin Cable	DB9 Male to Female, 6', Shielded	4	Innovation First
Battery	12 volt	2	Exide
Muffin Fan	12 Vdc	1	EBM Industries

2002 FIRST Robotics Competition Kit Parts

Optical Sensor		4	Banner Engineering Corporation
PWM/Relay Cable	Hitec/JR-style, 36" Long	8	Innovation First
PWM/Relay Y Cable	Hitec/JR-style, 24" Long	2	Innovation First
Servo	42 oz./in. peak torque, 0.19 sec./60°	2	Hitec RCD, Inc.
1 Conductor Wire	35', #10 AWG, Red	1	Delphi Connection Systems
1 Conductor Wire	35', #10 AWG, Black	1	Delphi Connection Systems
15 Pin Molded Cable	DB15 pin M-M, 6 feet	2	Innovation First
2 Conductor Jacketed Wire	35', #16 AWG	1	BICC General
2 Conductor Jacketed Wire	30', #24 AWG	1	BICC General
3 Conductor Shielded Wire	30', #24 AWG	1	BICC General
Battery Charger	Sealed Lead Acid Battery, 4 amp	1	Exide
Connector for Seat Motor	2 pin, 16 AWG x 12" cable	2	Delphi Packard Electric Systems
Connector for Yaw Rate Sensor	3 pin, 24 AWG x 12" cable	1	Delphi Packard Electric Systems
Operator Interface		1	Innovation First
Power Supply for Operator Interface	9 Vdc	1	Innovation First
Radio Modem for Operator Interface	RS-422, 9 pin F, metal antenna	1	Innovation First
Radio Modem for Robot Controller	RS-422, 9 pin F, rubber antenna	1	Innovation First
Relay Module (Spike)	12V, 20A Max	4	Innovation First
Robot Controller		1	Innovation First
Speed Controller (Victor 883)		4	Innovation First
Yaw Rate Sensor		1	BEI Systron Donner
1 Conductor Wire	10', #6 AWG, Red	1	Delphi Packard Electric Systems

2002 FIRST Robotics Competition Kit Parts

Anderson Power Products Catalog	Catalog	1	Anderson Power Products
Quick-Disconnect Power Connector (with 1' leads)	#6 AWG Red/Black Wire, pair	2	Anderson Power Products
Revolving Light	w/ red and,blue lenses	1	North American Signal
Flightstick Joystick	7" Cable with Male DB15	2	CH Products

Documentation

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
FedEx Airbills		4	FedEx
FedEx Envelope - Introduction Letter		1	
Kee Klamp Pipe Fitting Brochure		1	Kee Industrial Products
Kee Lite Pipe Fitting Brochure		1	Kee Industrial Products
The Robotics Competition 2002 - Manual		1	FIRST
Microsoft, XP, Project, Front Page		1	Microsoft

Fasteners

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Velcro 1" Hook & Loop Tape	36" Length, Adhesive Backing	1	Velcro USA, Inc.
Velcro 1" One Wrap Tape	24" Lengths, Orange	1	Velcro USA, Inc.
Velcro 18" One Wrap grip tie	1"x18" grip tie White	2	Velcro USA, Inc.
Velcro 5/8" One Wrap Tape	24" Lengths, Red	1	Velcro USA, Inc.
Velcro 8" One Wrap grip tie	1"x8" grip tie Gray	10	Velcro USA, Inc.
Velcro grip tie (2 in a pack)	6"x 1"	1	Tyton Hellermann
Velcro Grip Ties	8" x 1.75"	2	Tyton Hellermann
Drill Housing Screws	#4 x 3/4, Pan Head - Phillips	10	Fastenal Company
Drill Motor / Gearbox Screw	M4 x 6mm, Button Head 19	4	Fastenal Company
Helical Plastic Wire Wrap	1/4" Ø x 24"	1	Tyton Hellermann

2002 FIRST Robotics Competition Kit Parts

Helical Plastic Wire Wrap	1/2" Ø x 24"	1	Tyton Hellermann
Polyethylene grommet	3/16" x 24"	1	Tyton Hellermann
Polyethylene grommet	3/8" x 24"	1	Tyton Hellermann
Torque Motor Anti-Rotation Bracket		1	Belimo Aircontrols, Inc.

Misc Hardware

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Drill Housing Cover		2	S-B Power Tool Company
Flexible Shaft Coupling	Black	2	DEKA

Motors & Pumps

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Drill Drive Assembly	225 in-lb max, 3/8-24 UNF outer, M5 X 0.8 left-hand inner	3	S-B Power Tool Company
Drill Motor	12 Vdc	3	S-B Power Tool Company
Johnson Electric Motor	40.55W max @ 27.59 m-Nm, 14043 Rpm	1	Johnson Electric North America, Inc.
Drill Housing Kit w/ Shift Lever	T-Handle Style Grip, Left/Right	2	S-B Power Tool Company
Fisher-Price 10 Web Jeep Driver	Black	2	Fisher-Price, Inc.
Fisher-Price Axle	7/16" Ø x 26"	1	Fisher-Price, Inc.
Fisher-Price Motor/Gearbox	12 Vdc stall torque (mNm) 532.19+/- 10%	2	Fisher-Price, Inc.
Globe Motor with Drive Assembly	12Vdc	2	Globe Motors
Torque Motor		1	Belimo Aircontrols, Inc.
Gear, cluster (for Chiaphua motor)		2	Atwood Mobile Products
Motor, Chiaphua		2	Chiaphua
Seat Motor, Keyang	12 Vdc	2	Delphi Automotive
Window Motor, Left, Jideco		1	Jideco
Window Motor, Right, Jideco		1	Jideco

2002 FIRST Robotics Competition Kit Parts

Motor, Mabuchi		1	Mabuchi Motor America Corporation
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Other

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Worm Gear Actuator-Left Hand	2 inch linear movement	1	Excellence Manufacturing, Inc.
Worm Gear Actuator-Right Hand	2 inch linear movement	1	Excellence Manufacturing, Inc.
PUMA Size 5 Soccer Ball, Yellow	Size 5, Yellow	1	PUMA
Reflexite, retroreflective		1	Reflexite

Pneumatics

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Pneumatics Kit		1	Various

Pulleys

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Bushing (for CMT pulleys)	fits 0.375"+0-.0005 (h6 tolerance) shafts, pulley hub to	2	Custom Machine & Tool Co., Inc.
Bushing (for CMT pulleys)	fits 0.500"+0-.0005 (h6 tolerance) shafts, pulley	2	Custom Machine & Tool Co., Inc.
Pulley, aluminum timing (use CMT 1216 bushing)	20 teeth,5mm HTD pitch,to 15mm belt,use CMT 1216	2	Custom Machine & Tool Co., Inc.
Pulley, plastic timing (use CMT 1216 bushing)	30 teeth,5mm HTD pitch,to 15mm belt,use CMT 1216	1	Custom Machine & Tool Co., Inc.
Pulley, plastic timing (use CMT 1216 bushing)	60 teeth,5mm HTD pitch,to 15mm belt, use CMT 1216	1	Custom Machine & Tool Co., Inc.

Rods & Shafts

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Flexible Motor Shaft	13.5" Long, Fits Seat Motor	2	Grand Rapids Controls
Aluminum Rod	1/2" Ø x 24"	1	Northstar Steel and Aluminum, Inc.
Shaft, TGP (turned, ground, polished)	1/4" Ø x 18" TGP	1	Northstar Steel and Aluminum, Inc.
Shaft, TGP (turned, ground, polished)	3/8" Ø x 18" TGP	1	Northstar Steel and Aluminum, Inc.
Shaft, TGP (turned, ground, polished)	5/16" Ø x 18" TGP	1	Northstar Steel and Aluminum, Inc.
Shaft, TGP (turned, ground, polished)	1/2" Ø x 18" TGP	1	Northstar Steel and Aluminum, Inc.

2002 FIRST Robotics Competition Kit Parts

Springs

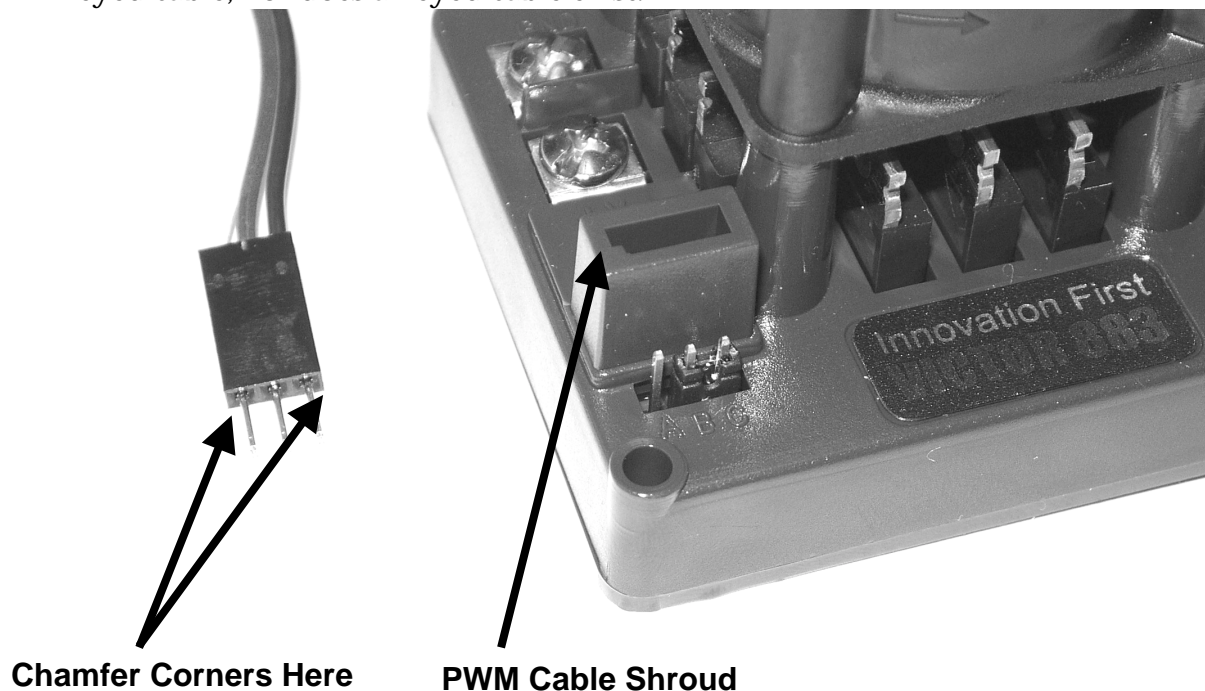
<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Compression Spring	0.600" O.D. x 2.25" Long x 0.067" Wire Diameter	2	Associated Spring Raymond
Constant Force Spring, Extra Small	0.34" I.D.	2	Associated Spring Raymond
Constant Force Spring, Large	1.02" I.D.	2	Associated Spring Raymond
Constant Force Spring, Medium	0.59" I.D.	2	Associated Spring Raymond
Constant Force Spring, Small	0.51" I.D.	2	Associated Spring Raymond
Extension Spring	0.650" O.D. x 2.000" Long x 0.055" Wire Diameter	2	Associated Spring Raymond
Latex Tubing	1/4" I.D., 3/8" O.D., 5'	1	Kent Elastomer
Torsion Spring, Left Hand	180 Degrees, 0.404" Dia , 0.048" Wire Diameter	2	Associated Spring Raymond
Torsion Spring, Right Hand	180 Degrees, 0.404" Dia , 0.048" Wire Diameter	2	Associated Spring Raymond

Wheels

<u>Part Name/Description</u>	<u>Dimensions</u>	<u>Qty /Kit</u>	<u>Product Supplier</u>
Caster, W/ 1/2-13x1 1/2 stem	300 Pounds, swivel	2	Fastenal
Wheelchair Wheel	6" Ø, 5/16" I.D. Bearings, 1-1/2" Wide Flange	2	Skyway Recreation Products
Wheelchair Wheel	8" Ø, 5/16" I.D. Bearings, 1-1/2" Wide Flange	2	Skyway Recreation Products

IMPORTANT SPEED CONTROLLER INFORMATION

The Victor883 Speed Controllers in the kit have a new PWM shroud to help ensure the PWM cable does not come loose during competition. The opening in the shroud is purposely tight. Since some connectors vary in width, you may have to slightly chamfer the corners of the PWM cable connector to make it fit. Although the opening in the Victor883 appears to be keyed, it does not require a keyed cable, nor does a keyed cable exist.



GOAL AND FIELD CORRECTIONS

Goal weight is 181lbs.

For those of you that took pictures at the NH kick-off of the goals, the 1" angle on the upper deck was not installed according to the prints provided. FIRST will use goals as shown at the Manchester Kick-off and will revise the blue prints to show the changes. FIRST will also add one ¼" flat washer under the head of each hex head bolt that is used to fasten the edging to the upper plywood deck. This will leave less thread exposed between the decks.

PROTOTYPING KIT USED AT NH KICK-OFF WORKSHOP

The Robot Prototyping Kit mentioned by Woodie during the kickoff presentation and used in the rookie workshop is now available for online ordering at <http://www.innovationfirst.com>.

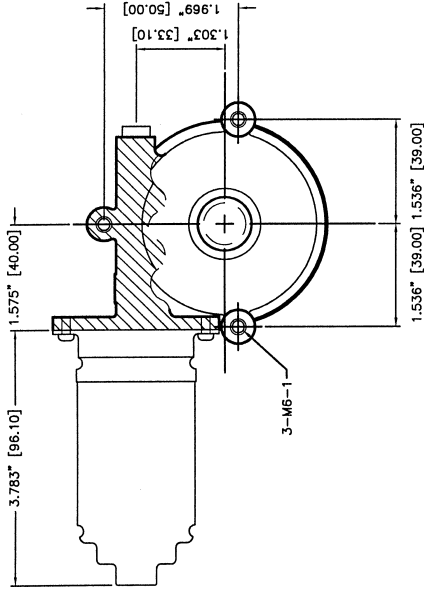
FIRST teams will benefit from the ability to rapidly prototype their robot concepts and robot software. Students will benefit from increased understanding and participation in the brainstorming process. The First Team Special kit is recommended based on the equipment the teams already have in the FIRST kit of parts. The wireless control system in these kits is 100% compatible with the full-size FIRST control system. Limited quantities are available.

[illegible]

Output Gear Information —Jideco Window Motor

The window motor provided in 2002 kits has an output gear that is a non-standard design. With a little care, however, industry standard gears can be successfully mated with it. The window motor gear is a somewhat enlarged 8 tooth metric spur gear of Module 2 (Module = pitch diameter in mm divided by the number of teeth), with a pressure angle of 20 degrees. Although FIRST cannot guarantee that the guideline below will reliably work in all possible team applications, in most cases this gear should be sufficiently compatible with other standard Module 2 gears if their center distance is increased slightly beyond standard design calculated values.

For example, it was found to mate with a Stock Drive Products (<http://www.sdp-si.com/>) 24T gear (cat. # A 1C11MYK20024A) with a center distance of 32.25mm, which is 0.25mm larger than the theoretically calculated 32mm distance to mate with a 24T gear. It also mated with a standard 32T gear (cat. # A 1C11MYK20032A) using a center distance of 40.17mm, which is 0.17mm larger than theoretically required. Based on these evaluations (and not on exact science), it is recommended that teams add 0.3–0.4mm to the theoretical center distance, depending on the number of teeth on any selected mating gear – use a value closer to the 0.4mm limit for smaller gears (24T and under), and a value closer to 0.3mm for larger diameter gears. In any case, teams should carefully evaluate gear engagement for excessive jamming or backlash under all load conditions their robot might encounter.



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