Section

10

THE KIT OF PARTS

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10. THE KIT OF PARTS

10.1 THE KIT OF PARTS - GENERAL

FIRST provides a Kit Of Parts (KOP) to each FRC team. The items listed on the *2010 Kit Of Parts Checklist (*http://www.usfirst.org/community/frc/content.aspx?id=452) are considered Kit Parts. Some Kit Parts may legally be used in additional quantities as described in *Section 8 The Robot* of the FRC Manual. Additional quantities of these parts are considered to be "Additional Parts" and not "Kit Parts".

Section 10 The Kit Of Parts is dedicated to important information about specific kit items. For instructional tips, please refer to the *2010 FRC Recommendations* document posted on the *FIRST* website off of the manual landing page, http://www.usfirst.org/community/frc/content.aspx?id=452.

Some of the exciting and important additions found in the 2010 KOP include the following items:

- Redesigned Driver Station (Classmate PC, USB Hub, E-stop button, USB Restoration Key, FirstTouch I/O module, and breadboard)
- 2010 slick/stick wheel combination
- One-pitch chain links
- Custom-order Gates belting and sprockets
- Magnetic encoder set with magnets
- Java download and associated libraries
- Serial cable
- Fluke digital multimeter for Rookie teams
- Expanded Autodesk software available for download

The FRC 2010 KOP is provided in multiple containers. They consist of the following packages:

1 – Red large black plastic tote for pickup at Kickoff

1 – Blue large black plastic tote for pickup at Kickoff

1 – AndyMark, Inc. drive train kit for pickup at Kickoff

1 – Panel Signal device from Rockwell Automation for pickup at Kickoff

1 – Brass bag from Parker for pickup at Kickoff

1 – Norgren regulator for pickup at Kickoff

1 – Double solenoid valve from FESTO for pickup at Kickoff

2 – Pairs of safety gloves (1 medium, 1 large)

1 – Regulator/bracket set from Monnier for pickup at Kickoff

1 – Rookie box for pickup at Kickoff (distributed to 2010 Rookie teams only)

1 or 2 – Batteries box from EnerSys for pickup at Kickoff (Rookies receive 2 batteries, Veterans receive 1 battery.

1 – Bag & Tag set (1 per team per Bag & Tag event)

10.1.1 Replacement Parts Requests

Use the *2010 Kit of Parts Checklist* provided at http://www.usfirst.org/community/frc/content.aspx?id=452 to inventory your KOP. The inventory must be completed within 48 hours of receiving the kit in order to determine that all items are present.

The first column on the checklist should be marked when the item and quantities are correct. Photos are included in the checklist in case you are not sure what a particular part looks like.

If you find that certain Kit Parts are missing or damaged, you will need to submit a "Replacement Parts Request" by 11:59pm (EST), January 13, 2010. The Replacement Parts Request link will be posted on the Team Information Management System (TIMS) after the Kickoff event. Replacement parts will be shipped only via this online request system.

The steps required to submit a Replacement Parts Request (after the kickoff) are as follows:

- Log into TIMS with your Logon ID and Password
- Click on the "Submit a Replacement Parts Request" link on right side of the Team Summary page
- Follow TIMS instructions to complete a Replacement Parts Request. Please be specific when describing the issue with the part (missing, damaged, etc).

Please remember that this is a **time limited**, **one-time only** opportunity to submit your Replacement Parts Request. Make sure that your request is both accurate and complete prior to pressing the "Submit Request" button. Once the request is submitted you cannot make any changes to it. Please note that the system will not allow teams to request a quantity of parts higher than the number originally sent with the kit. This system is also not to be used to order additional and/or purchased parts.

Any kit irregularities must be reported by 11:59pm (EST),
Wednesday, January 13, 2010 per the instructions in this document.

Replacement Parts Requests will be processed daily and shipped during the next open shipping window. Items will be shipped to the shipping contact listed in your team's TIMS record.

For teams that have their kits shipped directly to them at their expense, you must email frcparts@usfirst.org within 48 hours of KOP receipt. Please be sure to include your team number, part name, description, quantity required, and description of the reason for the request (missing, damaged, etc).

10.1.2 Obtaining Additional or Spare Parts

Depending on what parts are left over after kitting and replacement parts shipments, FRC will provide spare parts at the Regional events. The items included in this limited group will be posted before the Event season. If your robot uses parts that are not included on this list, and there is a reasonable possibility that the part could be damaged or broken during competition, it is recommended that you bring the appropriate SPARE PARTS with you to events in accordance with *Section 8.3.5.*

If, at any event, your team needs to borrow a cRIO-FRC, Driver Station component, Power Distribution Board, Digital Sidecar, or Analog/Solenoid Breakout, additional collateral will be required and defined closer to the Event season.

Some Kit Parts will be available to teams that wish to purchase more. The resources available vary by part. Details will be published on the *FIRST* website at http://www.usfirst.org/community/frc/content.aspx?id=452.

10.2 PART INFORMATION

This section of the manual provides additional information about *some* of the parts included in your KOP. For a complete list of the 2010 KOP contents, please refer to the 2010 KOP Checklist located on the *FIRST* homepage (http://www.usfirst.org/community/frc/content.aspx?id=452).

10.2.1 Control System Components

Please refer to the FRC website for details about the components included in the 2010 FRC Control System, including the new Driver Station (http://www.usfirst.org/roboticsprograms/frc/content.aspx?id=14532).

Robot Radio - The Robot Radio, WGA600N, has been discontinued by the manufacturer and will likely not be available to teams as spares or replacements. *Section 8* does allow teams to use the alternate gaming adapter, the WET610N, in the competition. Please note that while permitted, the device does not have reverse polarity protection and link time is significantly longer (~1 minute).

Breakout Board mounting hardware – The hardware for use in securing the breakout boards ot the cRIO modules have been packaged with the analog breakout board. Please be sure to double check the analog breakout board packaging before reporting these screws missing.

USB Restoration Key – The USB restoration key included in the KOP is for use in restoring your Classmate PC in the event it has been corrupted, etc. While the images is stored on a 4GB “thumb drive,” it is not intended to be a general use USB drive and should be used only for Classmate restoration purposes.

10.2.2 Drive Train kit

Please refer to the AndyMark, Inc. website for details about the C-base chassis kit included in the 2010 FRC KOP (www.andymark.biz).

10.2.3 Motors

FisherPrice Motors - Unlike in the 2009 KOP, the FisherPrice motors provided in the 2010 KOP are not already assembled to the plastic gearboxes. For the motor curve, please refer to www.usfirst.org/community/frc/content.aspx?id=482.

10.2.4 The Drive Train

Wheels - The wheels supplied in the 2010 KOP are a combination of slick and sticky treads. The slick tread material is Celcon M90, and has the following coefficients of friction on white, rippled fiberglass plastic sheet

Inline, static: 0.06
Inline, dynamic: 0.05
Transverse, static: 0.14
Transverse, dynamic: 0.10

There are no explicity prohibitions on wheels for the 2010 season, however please refer to Section 8 regarding wheel usage and rules.

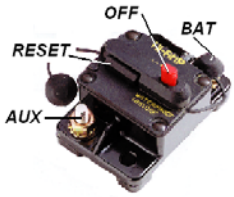
10.2.5 Electrical Components

Batteries - The batteries supplied in the 2010 KOP are different from those provided in the 2009 KOP, EnerSys part number NP18-12. EnerSys NP18-12 and MK Battery ES17-12s are the only permitted batteries in the *FIRST* Robotics Competition. Please refer to *Section 8* for details on power supply.

Please remember that if you plan to ship your batteries in your crate, it's important to save the box and the rest of the packaging for transport!

FCI Burndy Battery terminal lugs - FCI Burndy Products has donated two types of lugs for connecting your quick-disconnect battery connectors to your battery terminals. The mechanical lugs, PN YAZV6CTC14FX, should only be used if you have the appropriate crimp tool. Lugs with part number KPA4CUNPL are screw lugs, and no crimp tool is required. Details about these parts are posted on the *FIRST* website at http://www.usfirst.org/roboticsprograms/frc/content.aspx?id=452.

Quick Disconnect Battery Connector - Each 2010 KOP contains four quick-disconnect battery connectors. They are assembled from Delphi red and black 6 AWG wire and Anderson Power Products (APP) quick-disconnect connector, SB-50. The datasheet for the connector can be found on APP website at www.andersonpower.com/products/multipole-sb.html.



120 Amp CB Layout

120A Circuit Breaker - The 120A main circuit breaker/disconnect switch functions as the Main Power **ON/OFF** switch for the robot and as a Safety current overload protection device.

To power down the robot power manually, push the Red **OFF** button on the breaker. To reset Robot Power to ON, push the **RESET** lever back into its nested position.

The Positive (Red) wire on the output side of the Anderson connector should have a ¼" Ring lug crimped/soldered on and then be connected directly to the **BAT** post of the 120A main circuit breaker. Tighten the nut. Finish by fully pushing the rubber-insulating cap back down over the nut. This will assure that all power from the 12v battery now flows directly to the 120A breaker. Do not connect anything other than the 120A main circuit breaker/disconnect switch directly to the 12v battery's positive (+) terminal.

A fully charged 12Vdc battery can deliver current in excess of 200 Amps for a sustained period of time (minutes) in a short circuit situation. This amount of current can make wires smoke, melt through insulation in a fraction of a second, start a fire, cause the battery to leak highly corrosive acid or explode, and result in serious burns or other injuries. Always make sure that the 120A main circuit breaker/disconnect switch is wired in series with the 12v battery positive (+) terminal and can break the circuit when necessary.

Battery Connector Plugs - The battery plugs included in your kit are to help protect the contacts of the Anderson connectors when not in use. They can also be used to indicate the charge state of a battery.

10.2.6 Sensing

Sensor Panel - The 2010 Kit of Parts contains a sensor panel including a gyro and accelerometer. For details about these devices, please reference the *2010 Sensors Manual* which will be posted on the *FIRST* website at http://www.usfirst.org/community/frc/content.aspx?id=452.

Optical Encoder - Details for the optical encoders found in the kit can be found on the US Digital website at http://www.usdigital.com/products/encoders/incremental/rotary/kit/e4p/.

Magnetic Encoder - Details for the magnetic encoders found in the kit can be found on the austriamicrosystems website at http://www.usdigital.com/products/encoders/incremental/rotary/kit/e4p/.

Axis 206 Camera - Details about the Axis 206 camera found in the kit can be found on the Axis website at http://www.axis.com/products/cam_206/index.htm.

10.2.7 Pneumatic Components

Please refer to the *2010 Pneumatics Manual,* which will be posted on the *FIRST* website at http://www.usfirst.org/community/frc/content.aspx?id=452 for details about the 2010 pneumatic kit items.