

# 2005 KIT OF PARTS

## 1.1 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”.

The FIRST 2005 Kit of Parts is provided in 5 containers. These include; 2 each - Large plastic containers (one black and one gray) of robot parts and construction materials, 1 each - KitBox Box, 1 each – Electronics Kit, and 1 each – Transmission Kit.

### 1.1.1 2005 Kit Changes

The following important changes for 2005 Kit Items have been made:

- New Sensors, including a new Vision System assembly (replacing Infrared sensor), Gear Tooth Sensor, and Accelerometer Sensor.
- Removed 2 Bosch drill motors & transmissions and replaced them with 2 CIM motors with FIRST transmissions.
- Removed the MAXI and the ATO fuse panels and replaced both with a single Circuit Breaker/Power Distribution panel.
- A New KitBox kit replaces the extruded aluminum stock materials provided last year.

The following part items will be found inside the Black container.

#### BLACK CONTAINER ITEM 1

| <i>BATTERY BOX</i> |                |                       |             |     |
|--------------------|----------------|-----------------------|-------------|-----|
| Check              | Part Name      | Description           | Part Number | Qty |
|                    | Battery, Exide | 12V, 18AH, Deep Cycle | ES18-12     | 2   |

#### BLACK CONTAINER ITEM 2

| <i>LOOSE MATERIALS</i> |                       |                        |                 |     |
|------------------------|-----------------------|------------------------|-----------------|-----|
| Check                  | Part Name             | Description            | Part Number     | Qty |
|                        | Coil, Wire, Black     | 10' , # 6 AWG, Black   | # 6 AWG Black   | 1   |
|                        | Coil, Wire, Red       | 10' , # 6 AWG, Red     | # 6 AWG Red     | 1   |
|                        | Compressor, Thomas    |                        | 405ADC38-12     | 1   |
|                        | Volume Tank, Clippard | 2" bore by 6" long     | AVT-32-16       | 1   |
|                        | Tetrahedron Discs     | Plastic for Comp goals | 3 Leafed Clover | 4   |
|                        | Wheel, wheelchair, 8" | Precision Hub          | WHL70C          | 4   |

#### BLACK CONTAINER ITEM 3

| <i>MSC BAG</i> |           |                    |             |     |
|----------------|-----------|--------------------|-------------|-----|
| Check          | Part Name | Description        | Part Number | Qty |
|                | MSC Bag   | Documentation & CD |             | 1   |

**BLACK CONTAINER ITEM 4**

| <b>PNEUMATICS BAG</b> |   |                       |                    |            |
|-----------------------|---|-----------------------|--------------------|------------|
| <b>Check</b>          | <b>Part Name</b>                                  | <b>Description</b>    | <b>Part Number</b> | <b>Qty</b> |
|                       | <b>Teflon Tape</b>                                | ¼" x 100'             |                    | 1          |
|                       | <b>Pressure Gauges, Wika</b>                      | 1/8" NPT – 0-160 psi  | 9690242            | 3          |
|                       | <b>Solenoid, Festo, Single valve kit</b>          | Single solenoid valve | VPLE18-M5H-4/2-1/4 | 1          |
|                       | <b>Vibration isolators, Lord</b>                  |                       | SMB003-0100-2      | 3          |
|                       | <b>Secondary Regulator &amp; Bracket, Monnier</b> | Regulator & Mtg Kit   | 101-3002-1         | 1          |
|                       | <b>Pressure Switch, Nason</b>                     | Opn; 115, Clse; 95psi | SM-2B-115R         | 1          |
|                       | <b>Main Regulator, Norgren, 60psi</b>             | 60 psi Max output     | R07-153-RNEA       | 1          |
|                       | <b>Regulator Mounting Kit</b>                     | Bracket & Nut         | 18-025-003         | 1          |
|                       | <b>Relief Valve, Norgren, 120 psi</b>             | 120 psi Relief Valve  | 16-004-074         | 1          |
|                       | <b>Gauge, Norgren,</b>                            | Gauge, 0-160 psi      | 18-013-212         | 1          |
|                       | <b>Parker Brass Bag</b>                           |                       |                    | 1          |

**BLACK CONTAINER ITEM 5**

| <b>PNEUMATICS - SMC</b> |                               |                                     |                    |            |
|-------------------------|-------------------------------|-------------------------------------|--------------------|------------|
| <b>Check</b>            | <b>Part Name</b>              | <b>Description</b>                  | <b>Part Number</b> | <b>Qty</b> |
|                         | <b>Flow Control</b>           |                                     | NAS2201F-N01-07S   | 6          |
|                         | <b>Fitting, Straight</b>      | ¼" tube                             | KQH07-34S          | 10         |
|                         | <b>Fitting, 90 Elbow</b>      | ¼" tube                             | KQ2L07-34S         | 5          |
|                         | <b>Solenoid Valve, Double</b> |                                     | SY3240-5LOZ        | 2          |
|                         | <b>Fitting, 90 Elbow</b>      | 90 ° Elbow ¼" tube                  | KQLO7-35 -S        | 10         |
|                         | <b>Fitting, Tee-Union</b>     | Tee union -1/4" tube                | KQTO7-00           | 5          |
|                         | <b>Fitting, Male Run T</b>    | 1/8 NPT- ¼" tube                    | KQY07-34S          | 2          |
|                         | <b>Fitting, Male Run T</b>    | 1/4 NPT- ¼" tube                    | KQY07-35S          | 2          |
|                         | <b>Pilot Valve</b>            | 12Vdc w/600mm lead wire             | SY114-6LOZ         | 4          |
|                         | <b>Lead Wire Assy</b>         | 12Vdc w/600mm lead wire             | SY100-30-4A        | 4          |
|                         | <b>Fitting, 90 Elbow</b>      | Male, 90 Elbow, 5/32" tube- 1/8 NPT | KQ2L03-34S         | 1          |
|                         | <b>Fitting, Straight</b>      | Male Conn. 5/32" tube - 1/8 NPT     | KQH03-34S          | 1          |

**EVENT PICK-UP ITEM 6**

| <b>EVENT PICK-UP</b> |                          |                          |                    |            |
|----------------------|--------------------------|--------------------------|--------------------|------------|
| <b>Check</b>         | <b>Part Name</b>         | <b>Description</b>       | <b>Part Number</b> | <b>Qty</b> |
|                      | <b>Led Light Cluster</b> | Replaces revolving light |                    | 2          |

The following part items will be found inside the Gray container

**GRAY CONTAINER ITEM 1**

| <i>BEARING BAG</i> |                                      |                    |             |     |
|--------------------|--------------------------------------|--------------------|-------------|-----|
| Check              | Part Name                            | Description        | Part Number | Qty |
|                    | Bearing S3KDD                        | 3/8" wheel bearing | S3KDD       | 8   |
|                    | Bearing, Transmission- 39KDD         |                    | 39KDD       | 6   |
|                    | Bearing, Transmission-9103KDD        |                    | 9103KDD     | 2   |
|                    | Tool, Ratcheting Screwdriver, 7 in 1 | T-Top Auto Driver  |             | 1   |

**GRAY CONTAINER ITEM 2**

| <i>MISCELLANEOUS BAG</i> |                             |                           |              |     |
|--------------------------|-----------------------------|---------------------------|--------------|-----|
| Check                    | Part Name                   | Description               | Part Number  | Qty |
|                          | Bolt, Elevator              | 3/8" x 16 x 1 zinc coated | EB616ZH      | 1   |
|                          | Motor Bracket, CIM          | Zinc coated               |              | 2   |
|                          | Connector, Quick Disconnect | #6 Wire Pair, 12"         | 6331G1       | 2   |
|                          | Fan, Muffin (Tiny)          | 12 Vdc                    | 412          | 6   |
|                          | Fan, Muffin, (Large)        | 12 Vdc                    | 4212/19H-490 | 2   |
|                          | Motor Shaft, Flexible       | 13.5" fits seat motor     | 16723160     | 2   |
|                          | Latex Tubing                | 1/4" ID, 3/8" OD, 5 feet  | 5234k44      | 2   |
|                          | Magazine, Nuts and Volts    |                           |              | 1   |
|                          | Magazine, Servo             |                           |              | 1   |

**GRAY CONTAINER ITEM 3**

| <i>MISCELLANEOUS #2 BAG</i> |                                 |                           |               |     |
|-----------------------------|---------------------------------|---------------------------|---------------|-----|
| Check                       | Part Name                       | Description               | Part Number   | Qty |
|                             | Hardware, Set Screws            | 10-32 x 1/8"              |               | 4   |
|                             | Washer, Flat Nylon              | 5/16" x .062" flat washer |               | 8   |
|                             | Anderson Power Products catalog |                           |               | 1   |
|                             | Valve, BoschRexroth             | Valve, 12V                | 5728400410    | 1   |
|                             | Connector, BoschRexroth         | Female Connector          | H894101-02202 | 1   |
|                             | Nut, BoschRexroth               | Gray Nut – 1/4" tubing    | H893071-4904  | 3   |
|                             | Gasket, BoschRexroth            | Square gasket for conn.   |               | 1   |
|                             | Screw, BoschRexroth             | Screw for gasket          |               | 1   |

**GRAY CONTAINER ITEM 4**

| <i>COUPLER BAG</i> |                             |                       |             |     |
|--------------------|-----------------------------|-----------------------|-------------|-----|
| Check              | Part Name                   | Description           | Part Number | Qty |
|                    | Wheel Hub, Plastic          | Hub for Skyway wheels |             | 4   |
|                    | Coupler, Flexible Shaft     | Black                 |             | 2   |
|                    | Coupler, Nippon-Denso Motor | Inj. molded           |             | 2   |

**GRAY CONTAINER ITEM 5**

| <b><i>LOOSE MATERIALS</i></b> |                                       |                                       |                    |            |
|-------------------------------|---------------------------------------|---------------------------------------|--------------------|------------|
| <b>Check</b>                  | <b>Part Name</b>                      | <b>Description</b>                    | <b>Part Number</b> | <b>Qty</b> |
|                               | Motor, Globe, w/drive assy            | 12 Vdc                                | 409A587            | 2          |
|                               | Battery Charger, Automatic            | 6 Amp                                 | CXC-2005           | 1          |
|                               | Motor, CIM                            | Keyed output shaft                    | FR801-001          | 4          |
|                               | Motor, Nippon-Denso, Window , RH      |                                       |                    | 1          |
|                               | Motor, Sliding Door                   | Taigene                               |                    | 2          |
|                               | Joystick, Analog                      | AVB Top Shot Analog                   | GC-1000FR          | 2          |
|                               | Motor, Window, Jideco                 | RH or LH provided                     |                    | 1          |
|                               | Motor, Fisher-Price, w/21T #7 Gearbox | 12 Vdc., stall torque 532.19 (mNm)    |                    | 2          |
|                               | Cylinder                              | 1.5" bore x 8" stroke; rear pivot mt. | 1.5DPSR8.00        | 1          |
|                               | Tubing, 1/4" OD                       | 20 meters                             | TIUB07B-20         | 1          |

**GRAY CONTAINER ITEM 6**

| <b><i>SENSOR ENVELOPE</i></b> |   |                    |                    |            |
|-------------------------------|---|--------------------|--------------------|------------|
| <b>Check</b>                  | <b>Part Name</b>                        | <b>Description</b> | <b>Part Number</b> | <b>Qty</b> |
|                               | Sensor Assembly, Gear Tooth Hall-Effect | Hall-Effect        | ATS665LSG          | 2          |
|                               | Accelerometer, w/connector harness      |                    | 3LG20-15           | 1          |

**GRAY CONTAINER ITEM 7**

| <b><i>TERMINAL SUPPLY BAG</i></b> |                             |                    |                    |            |
|-----------------------------------|-----------------------------|--------------------|--------------------|------------|
| <b>Check</b>                      | <b>Part Name</b>            | <b>Description</b> | <b>Part Number</b> | <b>Qty</b> |
|                                   | Circuit Breaker, 120A, Buss | 120A,              | 185-120-F01-1      | 1          |
|                                   | Terminal Lug, Ring, Insul.  | AWG 22-18          | A532-06            | 20         |
|                                   | Terminal Lug, Ring, Insul.  | AWG 16-14          | B523-06            | 6          |
|                                   | Terminal Lug, Ring, Insul.  | AWG 12-10          | C528-06            | 24         |
|                                   | Terminal Lug, Spade, Insul. | AWG 22-18          | A-850              | 6          |
|                                   | Terminal Lug, Spade, Insul. | AWG 16-14          | B-850              | 34         |
|                                   | Wire Nut                    | Red                | 76-B               | 8          |
|                                   | Crimping Tool,.             | 10 AWG >           |                    | 1          |
|                                   | Terminal Lug, SLU-70        | 6 AWG              | SLU-70             | 6          |

**KICK-OFF PICK-UP ITEM 8**

| <b><i>KICK-OFF PICK-UP</i></b> |                  |                    |                    |            |
|--------------------------------|------------------|--------------------|--------------------|------------|
| <b>Check</b>                   | <b>Part Name</b> | <b>Description</b> | <b>Part Number</b> | <b>Qty</b> |
|                                | Sub Base,        | 1/8" ports         | SY3000-27-1T       | 2          |
|                                | Motor, Mabuchi   |                    |                    | 1          |

**INNOVATION FIRST, INC. ITEM 1**

| <b>TRANSMISSION KIT</b> |                                |                    |                    |            |
|-------------------------|--------------------------------|--------------------|--------------------|------------|
| <b>Check</b>            | <b>Part Name</b>               | <b>Description</b> | <b>Part Number</b> | <b>Qty</b> |
|                         | Chain, 10'                     | # 35               |                    | 1          |
|                         | Master Link, Chain             | # 35               |                    | 2          |
|                         | Transmission, Drive Train Assy |                    |                    | 2          |
|                         | Sprocket, Large Wheel          | 28 Tooth           |                    | 2          |
|                         | Sprocket, Transmission, Small  | 21 Tooth           |                    | 2          |

**INNOVATION FIRST, INC. ITEM 2**

| <b>ELECTRONICS KIT</b> |                                   |                                     |                    |            |
|------------------------|-----------------------------------|-------------------------------------|--------------------|------------|
| <b>Check</b>           | <b>Part Name</b>                  | <b>Description</b>                  | <b>Part Number</b> | <b>Qty</b> |
|                        | Cable, 9 pin, M/F, Blk, 6"        | DB9 M/F 6', Shielded                | DB9MF              | 3          |
|                        | Servo                             | 42 oz/in peak torque,<br>0.19       | HS-322S            | 2          |
|                        | Radio Modem – Robot Controller    | RS-422, 9 pin, F,<br>Rubber Antenna |                    | 1          |
|                        | Radio Modem – Op. Interface       | RS-422, 9 pin, F, Metal<br>Antenna  |                    | 1          |
|                        | Relay Module (Spike)              | 12v, 20A                            |                    | 4          |
|                        | Robot Controller Unit             | Module                              |                    | 1          |
|                        | Operator Interface Unit           | Module                              |                    | 1          |
|                        | Power Supply, Op. Interface.      | 9VDC                                |                    | 1          |
|                        | Cable, PWM/Relay                  | Hitec/JR -36"                       | PWM-EXT            | 9          |
|                        | Cable, PWM/Relay - Y              | Hitec/JR -24"                       | PWM-Y              | 2          |
|                        | Speed Controller, Victor 884      |                                     | Victor 884         | 4          |
|                        | Cable, 9-Pin, 6', Red             | DB9 Female/Female                   | DB9FF              | 1          |
|                        | CMU Cam module                    |                                     |                    | 1          |
|                        | IFI Circuit Breaker/ Distr. Panel |                                     |                    | 1          |
|                        | Battery, 7.2V, NiCad, Backup      | 7.2V NiCad                          |                    | 1          |
|                        | Battery Charger for 7.2V Battery  | 7.2V NiCad Charger                  |                    | 1          |
|                        | Adapter, 7.2V Battery Charger     | Old Connector to<br>Spade-Lock      |                    | 1          |
|                        | Circuit Breaker Bag               | 20, 30, 40 Amp<br>Breakers          |                    | 1          |
|                        | RS-232 TTL Board                  |                                     |                    | 1          |
|                        | IFI Camera Base                   |                                     |                    | 1          |
|                        | CBOT Compiler 2005                |                                     |                    | 1          |
|                        | Victor V884 Fan Screws            | Fan screws                          |                    | 8          |

## INNOVATION FIRST, INC. ITEM 3

| <i>KITBOT BOX</i> |                         |             |     |
|-------------------|-------------------------|-------------|-----|
| Check             | Part Name               | Description | Qty |
|                   | Drive Train Chassis Kit |             | 1   |

### 1.1.2 Missing Materials

#### 1.1.2.1 General Information

FIRST is implementing a new procedure for reporting missing parts for the 2005 season. Because of the lessons learned from the missing parts / reporting of parts issues of 2004, we have implemented several new kit packing practices, which we feel will minimize missing parts and improve the process of reporting those parts that might be missing.

The most important change for the 2005 kit has been the addition of significantly improved Quality Control processes. These changes include:

- Solid communication with the suppliers supporting our needs.
- Performing receiving inspection ensuring proper material delivery and counts. This will limit any delays on kit deliveries and or replacement parts.
- Incoming inspection ensuring that damage is caught prior to the bagging / kitting process.
- 100% inspection of all bags to be placed in the kit.
- 100% inspection of the entire FIRST totes.
- Delivery tracking of all team kits.

Innovation First Inc., a major supplier of parts to FIRST, packs their material independent of FIRST. They have been very diligent in packing the components to be distributed directly from their operation in Texas.

FIRST is extremely confident that the 2005 Kit packing will be to a higher standard and of a higher quality.

#### 1.1.2.2 How to Report Missing Parts

Reporting of missing parts will be on line through the TIMS. Each team will use their password to access a Missing Part Order Form and enter the quantity of each part they did not receive from the allotted amount that should have been in the kit. **A team can only place ONE order.** Once they hit the submit button, they cannot revise the order.

In order to make this system work effectively and let staff move on to other projects critical to preparing materials for the road, the teams will be required to:

- Take a **complete and thorough** inventory of their kit **immediately** after receiving it.
- Complete and submit their Missing Part Order Form prior to 12:01 AM EST on Thursday, January 13, 2005.

### **PLEASE RESPECT OUR REPORTING DEADLINE**

Our goal is that all missing parts shipments will be made prior to the close of the business on Friday, January 14, 2005.

### 1.1.3 Obtaining Replacement or Spare Kit of Parts

We will have a listing of the VERY LIMITED set of parts available at events posted on the FIRST web site no later than January 16, 2005.

**Please note** – If your robot uses any parts no included on this list, and there is a reasonable possibility it may become damaged or broken during a competition event, then it is *STRONGLY RECOMMENDED* that you obtain and bring appropriate SPARE PARTS to events.

#### **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 the Control System, 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 retains the right to bill the provided credit card number for the borrowed items.

All “loan” items are available on a first-come, first-served basis.

#### **Innovation First Products:**

Please contact Innovation First (903-453-0802 or at <http://www.innovationfirst.com> for product support to obtain a Return Merchandise Authorization Number (RMA#) to return warranted control system parts, or to obtain transmission, CMUcam, or chassis components for replacement. Please do **not** contact FIRST for repair or replacement of these items.