2015 RM BEST Kickoff

Robot Kit & Rules

JoAnne Fry

September 12, 2015
2015 Returnable Kit

- Provided to you in a red tote with a kit number at Kickoff
- Use the returnable kit items carefully – we inventory, test, refurbish & use each year
- Return the red tote and all the contents
  - Do an inventory first!
  - You will be charged for damaged / lost items

The USB stick included in the Teacher’s Packet includes a Return Kit Photo Guide
2015 Returnable Kit List

- **BEST Control System Kit**
  - Cortex microcontroller, joystick, communication keys, batteries & chargers
  - Large/small motors, motor controllers
  - Sensor & motor interface cables, servo power adaptor cables
  - USB A-A cable, Programming Hardware Kit

- **BEST Servo Kit**
  - 4 Futaba 3003/3004 servos horns, extension cables

- **BEST Motion Components Kit** replaces Belt and Pulley Kit

- **Red and Blue Totes** – these must be returned also
2015 **Consumable Kit**

- Provided to you in a **blue tote** with a kit number
- Provided are big items that don’t fit in **blue tote**
- **Do an inventory first!** The USB stick included in the Teacher’s Packet includes a Consumable Kit Photo Guide to Help You.
- Use / keep the items in the Consumable kit
- Return the **blue tote** and any unused items you don’t want – **we recount/reuse returned items and they are much appreciated**
2015 Consumable Kit List

- Igus® donated parts
- Plastic & metal stock
- Wood & foam stock
- PVC pipes & fittings
- Hardware
- Electrical
- Tapes & adhesives

- Threaded fasteners
- Miscellaneous
- Game field pieces
- Approved Optional Items that you can add & use
- Software license keys – given to you in Team Check-in Packet
2015 Returnable Kit Changes

- Motion Components Kit replaces Belt & Pulley Kit
  - Removed MXL Belt Items
  - Added HTD Belt Items
  - Replaced silver rollerblade wheel & axle with yellow one
- Removed 9V Cortex Backup Battery Holder
- Removed Optional 1/16” Allen Wrench
- Allow VEX Competition Retention Clips on the Cortex
- Some items listed as hub optional are still provided
  - Spare servo horn screw
  - Programming Hardware Kit
2015 **Consumable** Kit Changes

- Added ¾” Foam Board
- Removed 1/8” PVC sheet
- Added 1/8” Polycarbonate Sheet
- Changed ¼” Diameter Dowel from Hardwood to Oak (higher quality)
- Changed Length of #10 Socket Head Screw to 1” (3/4” is still allowed)
- Allow Bank Wrappers on Pennies
- Some game field items are provided for practice
  - (Golf balls)
  - Coal (stress ball)
  - Chalcopyrite (PVC elbows & tees)
  - Filter (blue foam) ½” thick

(Note actual game field piece is ¾” thick)
Consumable Kit Changes

Increased Length to 1’ (3/4” still okay)
2015 Consumable Kit Changes

- Per the **Random Elimination Protocol** for 2015
  - Removed 3/8” Plywood
  - Removed Heavy Door Spring
  - Removed 2.5” Hinges

NEW
Consumable Kit Elimination Items
Useful Information with lots of pictures

- Batteries
- VEX Cortex Microcontroller Operation
  - Basic Operation, Re-syncing Controller & Joystick, Tethered Operation, VEXnet Keys
- VEX Cortex Microcontroller Connections
  - General, Servo Connections, Motor Connections, Analog & Digital Inputs
- Using the Microswitches
- Servo Notes
- Wheel Attachment
- Motor Mounting
- Drive Component Usage
Please be kind to your **Returnable** Kit (and follow the rules)

- No paint, adhesives or Velcro on any Returnable Kit item! *(Blue painter’s tape is okay!)*
- Secure the Cortex and the batteries on the robot

Your team may be charged for damaged or painted items
To prevent breaking the gears in the small motor, do not exceed kinetic energy load levels of $16 \text{ in}^2 \cdot \text{lb/sec}^2$

- Higher levels of load/energy can be driven, but unless you are careful (slow and gentle) when reversing directions, the gears will be broken (and your team will be expected to pay for the motor).

- Do not bend the motor tabs

- Mount motors using motor mounts!

- Motor shields on large motors reduce RF interference - do not remove!
- If your cables disconnect from the blocks, secure cables/wiring to prevent stress at the connection.

- We have made this modification to your cables.
Avoid sloppy wiring in the motor circuits, the external motor controllers will fry if the wires are shorted.
Don’t strip servo gears due to overload

- Futaba S3003 servo
  - Torque: 2.75 in-lb.
  - Gear Type: Plastic

- BEST Small Motor
  - Torque 9.49 in-lb.

- BEST Large Motor
  - Torque 23.53 in-lb.

Use rubber mounting grommets and spacers to mount servos. Do not over-tighten!

Fix connections if servos twitch

Servos can handle only a fraction of the load of the motors!
Running into something with this gripper open will strip the servo gears.

In the closed position, the servo is protected (a lot of force would be required to snap off the drive shaft).
Charge Batteries

- Plug and unplug at red/black connections
- Charge 7.2v robot batteries overnight before competitions in SAFE mode
- Plug joystick VEXnet Joystick Power Adapter on game floor
- Have extra 6-packs of AAA batteries as backup
Kit Paperwork

- **Returnable** Kit List
  - Inventory list inside the **red** tote
- **Returnable** Kit Agreement – sign it today to get the kits
- Request for Loan of **Returnable** Kit
  - If you want to keep the kits after Game Day
- **Consumable** Kit List
  - Inventory list inside the **blue** tote
- Generic Kit Usage Guide in [www.best.eng.auburn.edu](http://www.best.eng.auburn.edu) > Participants > File Manager > Public Resources & Training > Kits
  - a soft copy is included on the USB stick provided in the teacher check-in packet.
Returning Your Kit

- Inventory & return your **Returnable** Kit – including both totes – at Game Day

  OR

- Complete a **Request for Loan of** Returnable Kit
  
  - All kits must be returned to RM BEST no later than February 28, 2016
  - Talk to Carolyn Bauer if this is a problem
2015 RM BEST Kickoff

Rules Changes

JoAnne Fry

September 12, 2015
Allow Use of Video Capture on the Robot
2015 Rules Update

- BRI Planned to have only ONE rules document this year
- But the documents are still individual documents this year!
Online Q&A

- Found on BRI Website Participants > Official Q&A
  - Password is D1g4it
  - Answers can supersede the written rules!
    - Changes are typically clarification of Awards, Kits, Game Field, Rules, Software or Other
    - Please read Q&A before submitting a question that is a duplicate
    - Be professional — you are communicating with the CUSTOMER!
BEST Generic Rules

- **Safety Rules**
  - Hazards, pit rules about tools and safety glasses

- **Robot Constraints**
  - Materials, Construction, Returnable Kit, Consumable Kit, Additional Materials, Constraints & Exceptions,
  - Size (& configuration), Weight, Energy Sources, Compliance, General

- **Robot Compliance check-in**
  - Practice & Game Day
  - 2015 Change – Team Demographics Sheet due on Practice Day as part of compliance check. Bring completed Paper Copy AND email to lscott@rmbest.org EXCEL file prior to 2 PM
  - Non-compliance = you can’t compete
Head-to-Head Competition

- General – The Refs are the ultimate authority
- Field colors, Drivers & Spotters
  - Driver list – at Practice / Game Day
    - Two copies are included in your Team Packet at registration!
    - Submit Driver List on Practice Day & Game Day
  - Driver signs score sheets for each match
- Penalties - 20 sec suspension for rule infraction or Disqualification for major issues
• Head-to-Head Competition (continued)
  ❖ **Match Protocol** (5 referee minimum, 3 minute matches with 4 teams, match assignment list, staging area usage, 30 second setup onto field, driver / spotter locations, 30 second removal from field)
  ❖ **Competition Protocol** (seeding phase (5-8 matches per team), wildcard (1 match), semi-finals (8 teams competing in 3 matches each), finals (4 teams competing in 3 matches)

• Other – student eligibility, pit information, availability of spares, practice time
Advice

- **30 second setup time** allowed at match start to get the robot into the starting area.

- **Spotter** helps to arrange / rearrange scoring pieces this year! Make sure spotters know which pieces belong in which scoring bin!

- **Pre-game huddle** with Head Referee & teachers / mentors mandatory.
  - Discuss any Q&A rules issues.