2009 FRC Inspection Checklist Rev B – January 25, 2009

TEAM NUMBER:_____

INSPECTOR:_____ INITIALS + DATE (after passing):_____

Initial Inspection Items (start with Bumpers and Trailer Hitch removed)

____ **Robot Weight** - Weigh less than 120lbs in any and all configurations (excluding bumpers, battery and hitch)
- weight = _____ pounds

____ **Excursion Beyond Bumper** - No robot components can extend beyond the Bumper Perimeter at any time
____ **Vertical Surfaces** - Perimeter surfaces near floor must be approximately vertical
____ **Size** - Fit within a 28"x38"x60" rectangular volume (Bumpers and Trailer Hitch excluded).
____ **Standard Bumpers** - must follow all specifications
- Weight = _____ pounds (must be <= 18 pounds)
- Bumper Perimeter =_____inches (tape measure pulled tight around perimeter)
- Length of Bumper Segments =_____inches (all must be >= 6")
- % of Bumper Perimeter covered by Bumpers =_____% (must be >= 66.7%)
- All corners must be protected by bumpers on both sides and include pool noodles within corner
- Must use approximately ¾" thick x 5" tall plywood backing and a pair of vertically-stacked 2.5" pool noodles with no extraneous holes for weight reduction (mounting holes and small cut-outs for boltheads and similar are acceptable)
- Must use a durable fabric cover for the noodles
- Must be removable for inspection
- Must be securely mounted when attached
- Bumper must reside between 1" and 7" from floor
- Must be mounted with a structural robot component supporting the entire length of each segment

____ **Trailer Hitch** - must include a spec-compliant Trailer Hitch
- Horizontal center-line must be between 2.5" and 3.1"
- Must be securely mounted to the Bumper Perimeter
- Must use the 7" steel spacer and a 7" section of C-channel aluminum from the kit-of-parts

____ **Trailer-to-Robot Interaction** - The Trailer Hitch and Bumpers must be oriented such that, when an attached Trailer swings side-to-side, the only robot-to-trailer interaction is (Robot)bumper-to-(Trailer)bumper.
____ **Rover Wheels** - Can only use unmodified Rover Wheels for traction (in a normal orientation, only typical wear-and-tear)
____ **Other Floor Contact** - In addition to Rover Wheels, can only use relatively friction-free elements in contact with the ground (high friction wheels are fine if they freely roll and slip and don't damage the floor)
____ **Securely-Fastened Items** - Securely fastened battery and control system
____ **Team Number** - Team number clearly displayed on at least 4 surfaces that are separated by approximately 90º intervals around the perimeter of the robot. The numbers must be at least 4" tall with at least 3/4" high contrast stroke.
____ **Team Name** - Prominently and proudly display the team's school name and primary sponsor name/logo
____ **Robot Signal Light** - The Panel Signal Device from the KoP must be visible from 3' in front of the robot, and be plugged into the RSL port on one of the Digital Sidecars. Confirm operation via powering-up.
____ **Decorations** - No offensive or otherwise inappropriate decorations.
____ **Firmware Versions** - The cRIO image and DS firmware must be up-to-date
- cRIO image version = _____ (must be _____)
- DS image version = _____ (must be _____)

____ **Battery Voltage Monitoring** – the cRIO must be configured for battery voltage monitoring on Analog Input 8 of cRIO Slot 1.

Detailed Inspection Items

____ **No Sharp Edges**
____ **No Harmful or Distracting Devices** - eg sound, lasers, noxious or toxic gases or inhalable particles or chemicals
____ **No Unsafe Energy Storage Devices** - carefully consider safety of any springs
____ **No Risk of Damage to Other Robots** - e.g. spearing, entangling, upending or adhering
____ **No Interference** - Cannot interfere with other robots' electronics and sensors (particularly via color distraction).
____ **No Hydraulics or Leaking Lubricants**
____ **Power Distribution** - must be wired per the FIRST Power Distribution Diagram and Data Connectivity Diagram
____ **Battery** - do not use batteries or pre-charged electrical energy sources other than a single MK ES17-12 battery

____ **Insulated Battery Terminals** - must be well-covered with insulation
____ **Breakers** - all breakers (120A main breaker and all PD breakers) must be readily accessible
____ **Allowable PD Breakers** - Only 20, 30 and 40A Snap-Action breakers may be installed in the PD
____ **Wire Size** - obey the wiring size conventions for attaching loads to the PD.
____ **Wire Colors** - must be color coded - red/white/brown for + supply wires and black/blue for supply return wires
____ **1 Wire per WAGO** - only 1 wire may be inserted in each WAGO, splices may be used to distribute power to multiple Breakouts and Sidecars but all wires in the splice are subjected to the Wire Size rules
____ **Isolated Frame** - must be electrically isolated from battery (>100k Ohm between either battery post and chassis)
____ **No Unauthorized Wireless Communication** - the robot shall contain no wireless communication devices other than those found in the KoP without specific FIRST permission.
____ **Unaltered Hardware and Software** - the Driver Station, radios, PD, cRIO, Breakouts, Jaguars, Victors, Spikes and Digital Sidecars may not have altered software or hardware. The cRIO may be programmed by teams but its FPGA firmware may not be altered.
____ **Servos** - must be attached directly to the Digital Sidecar. Any Servo may be used up to max torque of 55 oz-in and max speed of 100 rpm at 6VDC.
____ **Actuator Control** - Motors and other actuators must be controlled by Spike, Victor or Jaguar and driven directly by signals from a Digital Sidecar (including brake/coast signals).
____ **Motors** - Only KoP motors (in KoP quantities) may be used with up to 2 additional CIMs.
____ **Solenoids** – solenoids and electromagnets other than motors, servos and pneumatic valves are not permitted
____ **Custom Circuits** - cannot be attached to the cRIO's serial port and cannot directly control Victors, Jaguars, Spikes or servos (including brake/coast controls).
____ **Jaguar CAN Connections** - cannot attach to the CAN bus connectors on Jaguars
____ **Decorations** – can only draw power from a 20A breaker on the PD
____ **BoM Cost** - shall not include more than $3500 of additional components with no single component > $400.
____ **Component Availability** - non-kit parts must be readily available from a vendor with capacity to support all teams.

Pneumatics Rules (n/a for robots that do not use pneumatics)

____ **Pressure Rating** - all pneumatic components must be rated for at least 125PSI
____ **Accumulators** - up to 4 Clippard AVT-32-16 pneumatic storage tanks may be used
____ **Tubing** - no extraneous tubing or tubing with ID other than 0.16"
____ **Compressor** - no additional compressors are allowed. Only the KoP Thomas compressor may be used.
____ **Compressor Control** - must use a Spike (recommend replacing Spike's 20A fuse with a 20A breaker)
____ **Valve Control** - pneumatic solenoid valves may be controlled by either an IFI Spike or an NI 9472.
____ **Relief Valves** - must include a 125PSI relief valve and easily-accessible manual vent valve on the robot.
____ **High-Pressure Regulator** - must include an on-robot 120PSI (max setting) regulator and visible gauge immediately downstream of the compressor and 125PSI relief valve.
____ **Working-Pressure Regulator** - must include an on-robot 60PSI (max setting) regulator and visible gauge upstream of all pneumatic valves and actuators.
____ **Confirm Operation** - Confirm operation of the pneumatic system by powering-up, checking gauges for pressure and operating the manual vent to release all stored air pressure.
____ **Allowable Cylinders** - any may be used, must be rated for at least 125PSI, <= 24" stroke, <= 2" bore
____ **Allowable Rotary Actuators** - any may be used, must be rated for at least 125PSI
____ **No Unsafe Alterations** - pneumatic parts cannot be altered such that their 125PSI rating may be compromised
____ **Pressure Sensing for Compressor Control** - Pneumatic pressure must be sensed using the kit's Nason pressure switch wired directly to a Digital Sidecar with the compressor enabled based on the switch's state.
____ **Off-Robot Compressor** - The compressor may be located either on or off the robot. If used off-robot, there must be 125PSI relief valves both on and off-robot and the on-robot control system must be used to control the compressor.

Team Compliance Statement

We, the Team Mentor and Team Captain, attest by our signing below, that our team's robot was built after the 2009 Kickoff on January 3, 2009 and in accordance with all of the 2009 FRC rules, including all Fabrication Schedule rules. We have conducted our own inspection and determined that our robot satisfies all of the 2009 FRC rules for robot design.

Team Captain:_____

Team Mentor:_____