

TEAM NUMBER: _____

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

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

- _____ **Firmware Versions** - The cRIO image and DS firmware must be up-to-date (refer to the training doc for details)
- _____ **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.
- _____ **WPA Encryption** - The robot radio must be configured for WPA encryption (refer to the Assistant FTA for details)
- _____ **Robot Weight** - Weigh less than 120lbs in any and all configurations (excluding bumpers, battery and trailer 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 robot base)
 - Bumpers can only be placed directly on the BUMPER PERIMETER
 - Length of Bumper Segments = _____ inches (all must be ≥ 6 ")
 - % of BUMPER PERIMETER covered by Bumpers = _____ % (must be $\geq 66.7\%$)
 - All corners must be protected by bumpers on both sides and include pool noodles within corner
 - Must use approximately $\frac{3}{4}$ " 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 bottom edge must be between 1" and 2" 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 either of the 3 permitted aluminum C-channel designs
- _____ **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 with tread only touching the floor, only typical wear and tear, they can be lifted or dragged as well as being rolled or twisted)
- _____ **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 as long as they freely roll and slip and don't damage the floor)
- _____ **Securely-Fastened Items** - Securely fastened battery and control system
- _____ **Team Number** - clearly displayed on at least 4 surfaces that are separated by approximately 90° intervals around the perimeter of the robot. The numbers must be at least 4" tall with at least $\frac{3}{4}$ " high contrast stroke.
- _____ **Team Name** - Prominently and proudly display the team's school name and primary sponsor name/logo
- _____ **Decorations** - No offensive or otherwise inappropriate decorations
- _____ **Battery Voltage Monitoring** - the cRIO must be configured for monitoring on Analog Input 8 of cRIO Slot 1
- _____ **Driver Station ESD Rework** - must be present as described by FIRST or a similar manner to ground the enclosure
- _____ **Propeller and Shooter Safety** - must be reasonably protected from finger access and ejection of debris

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 or pneumatic systems
- _____ **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
- _____ **Main Breaker Accessibility** – the 120A main breaker 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 (with exception of programming the cRIO's PowerPC).
- _____ **Servos** - must be attached directly to the Digital Sidecar's PWM Outputs. An unlimited number of FTC servos (HS-475HB) or any servo up to max torque of 55 oz-in and max speed of 100 rpm at 6VDC may be used.
- _____ **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).
- _____ **One Actuator Per Driver** – only one motor or load may be attached to each Spike, Victor or Jaguar (however multiple pneumatic valves may be driven by a single Spike)
- _____ **Solenoid Breakout** – only pneumatic valves may be driven by the Solenoid Breakout module
- _____ **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, Sensors and Additional Electronics** - cannot be attached to the cRIO's serial port or Ethernet port 2 (except for the Axis 206 camera), cannot attach to Jaguar CAN or limit switch ports, cannot directly control Victors, Jaguars, Spikes or servos (including brake/coast controls which can only be connected to Digital Sidecar).
- _____ **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.
- _____ **Wireless Adapters** – no driver station wireless adapter can be used at any time, the on-robot wireless adapter must not be powered while in the pits or on practice field, tethered operation required when not on the competition field

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"
- _____ **Gauges** - must be present on both the compressor outlet and Norgren regulator outlet and be readily visible
- _____ **Relief Valves** - must include, on the robot, a 125PSI relief valve and easily-accessible manual vent valve
- _____ **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)
- _____ **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.
- _____ **Valve Control** - pneumatic solenoid valves must have a max Cv of 0.32, controlled by either Spike or NI 9472.
- _____ **Working-Pressure Regulator** - must include a 60PSI (max setting) Norgren regulator upstream of all pneumatic valves and actuators (may be off-robot but the stored pressure on the robot cannot exceed 60PSI in this case)
- _____ **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
- _____ **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.
- _____ **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.

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: _____