demonstrate that the wire used meets the requirements of this rule (e.g. wire samples and evidence that they are the required size).

R623 ***Use only appropriate connectors.** Branch circuits may include intermediate elements such as COTS connectors, splices, COTS flexible/rolling/sliding contacts, and COTS slip rings, as long as the entire electrical pathway is via appropriately gauged/rated elements.

Slip rings containing mercury are prohibited per R203.

R624 ***Use specified wire colors (mostly).** All non-SIGNAL LEVEL wiring with a constant polarity (i.e., except for outputs of relay modules, motor controllers, or sensors) shall be color-coded along their entire length from the manufacturer as follows:

A. red, yellow, white, brown, or black-with-stripe on the positive (e.g. +24VDC, +12VDC, +5VDC, etc.) connections
B. black or blue for the common or negative side (-) of the connections

Exceptions to this rule include:

C. wires that are originally attached to legal devices and any extensions to these wires using the same color as the manufacturer
D. Ethernet cable used in POE cables

R625 ***Don't modify critical power paths.** CUSTOM CIRCUITS shall not directly alter the power pathways between the ROBOT battery, PDP/PDH, motor controllers, relays (per R504-B), motors and actuators (per R501), pneumatic solenoid valves, or other elements of the ROBOT control system (items explicitly mentioned in R701). Custom high impedance voltage monitoring or low impedance current monitoring circuitry connected to the ROBOT'S electrical system is acceptable, if the effect on the ROBOT outputs is inconsequential.

A noise filter may be wired across motor leads or PWM leads. Such filters will not be considered CUSTOM CIRCUITS and violate neither this rule nor R712.

Acceptable signal filters must be fully insulated and must be 1 of the following:

– 1 microfarad (1 µF) or less, non-polarized, capacitor may be applied across the power leads of any motor on your ROBOT (as close to the actual motor leads as reasonably possible) or
– a resistor may be used as a shunt load for the PWM control signal feeding a servo.

8.7 Control, Command & Signals System

R701 ***Control the ROBOT with a roboRIO.** ROBOTS must be controlled via 1 programmable NI roboRIO or roboRIO 2.0 (P/N am3000 or am3000a, both versions referred to throughout this manual as "roboRIO"), with image version 2024_v2.1 or later.

There are no rules that prohibit co-processors, provided commands originate from the roboRIO to enable and disable all power regulating devices. This includes motor controllers legally wired to the CAN bus.

R702 ***Communicate with the ROBOT with the specified radio.** 1 OpenMesh wireless bridge (P/N: OM5P-AN or OM5P-AC), that has been configured with the appropriate encryption key for your team number at each event, is the only permitted device for communicating to and from the ROBOT during the MATCH.