

# Team Update 05

## GENERAL

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### Inspection Checklist

The "Team Compliance Statement" on the [Inspection Checklist](#) has been edited to refer to the 2022 Kickoff instead of the 2020 Kickoff.

# Team Update 04

## GENERAL

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### FIRST Choice

FIRST Choice Round 2 has ended, and AndyMark is processing priority lists. Since Round 2 opened, three inventory discrepancies have been discovered. This means that for the following items, fewer items will be available when FIRST Choice opens for normal ordering than what might be expected (AndyMark's confirmed that inventories still exceed demand from priority lists, so these changes have not impacted number of parts assigned to Round 2 priority lists).

- PSoC prototyping kits, PN CY8CKIT-059: 90 short (actual 1,207)
- Duct Tape, Blue, PN 70006315231: 840 short (actual 2,028)
- Duct Tape, Yellow, PN 70006315199: short 24 (actual 2,678)

### Single-Day Event Plan

The [Single-Day Event plan](#) has been updated to include links to inspection checklists and emphasis that Inspection is required at the event itself.

## SECTION 5.3 HUB

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An agitator extends up the center of each HUB and rotates throughout the MATCH. **The motors driving the agitator assemblies are supplied with (nominal) 12V each, and their direction may vary from MATCH to MATCH.** Generally, the agitator causes a single CARGO dropped into the UPPER HUB to reenter play in approximately 7 seconds and a CARGO dropped in the LOWER HUB to reenter play in approximately 5 seconds.

## SECTION 5.7 CARGO

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CARGO is inflated to 3½ psi. **±½ psi.** (checked **every morning and lunch break and as outliers are suspected** using [this gauge](#) at official events).

## SECTION 8 GAME RULES: HUMANS

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FIRST is committed to [Equity, Diversity, and Inclusion](#) and as such, FIRST makes reasonable accommodations for persons with disabilities that request accommodation. If a participant needs an accommodation for an event, please talk to a volunteer at the event or contact local leadership before the event so they can help ensure the accommodation is provided. ~~Accommodations are determined reasonable given they do not create an undue hardship or cause safety concerns.~~

Accommodations are adjustments that allow all people with disabilities to access the building and participate in the game. Accommodations are determined reasonable given they do not create an undue hardship or cause safety concerns.

## SECTION 10 INSPECTION & ELIGIBILITY RULES

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The links to inspection checklists in the Blue Box now point to the live documents.

# Team Update 03

## GENERAL

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### Venue Heights

Teams can expect at least 16 ft. of clearance above the surface of the FIELD. Most venue practice fields, but not all, also have this clearance. All practice fields have at least 10 ft. of clearance above the carpet.

### Dean's List Update

The remote [2022 Dean's List Award - District & Regional Event Remote Interviews List](#) (hosted on the [Submitted Awards](#) page) now includes the Great Northern Regional and all Minnesota regional events.

### Event Rules

Please note the [Safety Manual](#) has been edited to reflect this exception.

- E101 \*Personal safety comes first.** All team members must observe the following safety practices throughout the event:
- A. wear safety glasses (only ANSI-approved, UL Listed, CE EN166 rated, AS/NZS certified, or CSA rated non-shaded) while in and around the playing FIELD and in the pit area. Lightly tinted lenses are permitted provided eyes are clearly visible to others, but reflective lenses are prohibited. Accommodations will be made for participants that require tinted safety glasses. **The only exception is for teams in their first 10 minutes of their load in and for the first 10 minutes pits are open each day of the event as long as they're not working on the ROBOT or setting up their pit.**

### WPILib Update

An [update for WPILib C++/Java](#), v2022.2.1, has been released. This version fixes a significant bug with joystick data locking up in Java programs, as well as an issue with WPILib tools not launching or quitting unexpectedly. It is strongly recommended that all Java teams upgrade to this version and recommended that C++ teams do as well.

## SECTION 5.6.1.1 DRIVER STATION LED STRINGS

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**DRIVER STATION light strings remain active after TELEOP ends and turn off 5 seconds later (to indicate that the time frame described in [Section 6.4, item C](#) is complete).**

## SECTION 6.4.1 POINT VALUES

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A ROBOT may only earn points for a single RUNG. To qualify for HANGAR points from a given RUNG, a ROBOT may only be contacting:

- RUNG(S) at that level or higher (i.e. the level is determined by the lowest RUNG with which a ROBOT is in contact),
- truss structure,
- LAUNCH PADS,
- the ALLIANCE WALL,
- **CARGO,**
- guardrails, and/or

- another ROBOT qualified for any HANGAR points.

## SECTION 11.7.6 SMALL EVENT EXCEPTIONS

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District points for Draft Order Acceptance (per [Section 11.8.1.3 Playoff Round Performance](#) [Section 11.8.1.2 ALLIANCE Selection Results](#)) are awarded as if a full set of ALLIANCES was selected (i.e. the second selection of the 3-seed ALLIANCE still receive 3 points regardless of how many ALLIANCES are formed).

## SECTION 11.8.2 DISTRICT CHAMPIONSHIP ELIGIBILITY

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*Table 11-8 2022 District Championship Capacities*

District Championship	Capacity
Pacific Northwest District Championship	42 <b>50</b>

# Team Update 02

## GENERAL

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### Playing Field Page

A [link to resources to 3D print a RAPID REACT FIELD](#), courtesy of AutomationDirect has been added to the [Playing Field page](#).

### Virtual Kit of Parts

The codes initially loaded for Tableau were corrupted. We've re-uploaded the codes, and initial testing indicates the issue has been resolved. Please retrieve your new code from the Dashboard before authenticating the Tableau software. Our apologies for the inconvenience!

## SECTION 5.7 CARGO

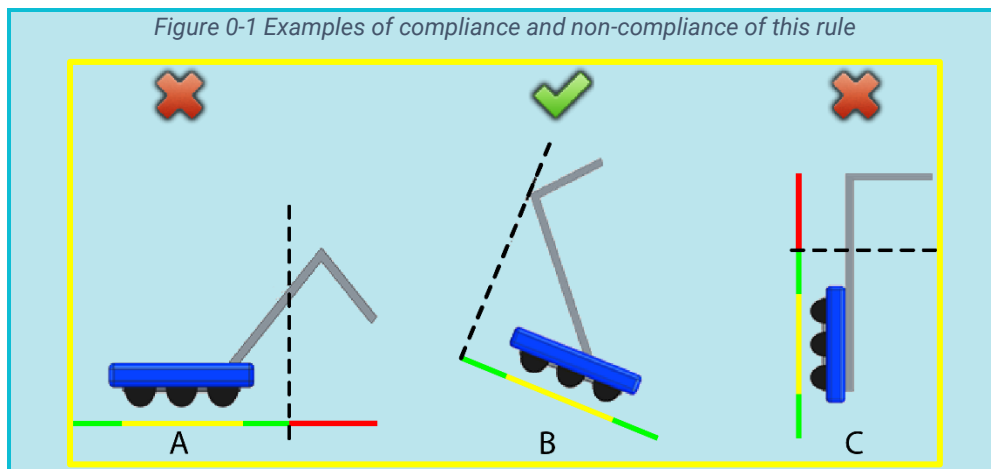
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CARGO is inflated to 3½ psi. (checked using [this gauge](#) at official events).

## SECTION 7.1 ROBOT RESTRICTIONS

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**G107** Figure 7-2, example C has been modified to show the extension reaching beyond the ROBOT'S FRAME PERIMETER.



## SECTION 7.4 CARGO

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**G405 Don't catch CARGO.** A ROBOT may not REPEATEDLY score or gain greater-than-MOMENTARY CONTROL of CARGO released by an UPPER EXIT until and unless that CARGO contacts anything else besides that ROBOT or CARGO controlled by that ROBOT.

## SECTION 8 GAME RULES: HUMANS

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FIRST is committed to [Equity, Diversity, and Inclusion](#) and as such, FIRST makes reasonable accommodations for persons with disabilities that request accommodation. If a participant needs an accommodation for an event, please talk to a volunteer at the event or contact [local leadership](#) before the event so they can help ensure the accommodation is provided. Accommodations are determined reasonable given they do not create an undue hardship or cause safety concerns.

## SECTION 9.3 BUDGET CONSTRAINTS & FABRICATION SCHEDULE

Item C is removed from R304 because charging batteries is not considered "work on" the robot and does not apply.

**R304** \*During an event, only work during pit hours. During an event a team is attending (regardless of whether the team is physically at the event location), the team may neither work on nor practice with their ROBOT or ROBOT elements outside of the hours that pits are open, with the following exceptions:

- A. exceptions listed in R302, other than R302-E-c and
- B. software development, and
- C. ~~batteries may be charged during the designated load-in time.~~

## SECTION 9.7 CONTROL, COMMAND, & SIGNAL SYSTEMS

**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 ~~2022\_v2.4~~ 2022\_v3.0 or later.

**R715** \*Control PCM/PH(S) and Servo Hubs from roboRIO. Each PCM/PH and REV Robotics Servo Hub must be controlled with signal inputs sourced from the roboRIO and passed via a CAN bus connection from the built-in CAN on the roboRIO (either directly or daisy-chained via another CAN bus device).

## SECTION 12 GLOSSARY

Carriage returns have been fixed in the glossary version of the definition of CONTROL.

Term	Definition
CONTROL	the state of a CARGO if any of the following are true: <ul style="list-style-type: none"><li>A. the CARGO is fully supported by the ROBOT,</li><li>B. the CARGO travels across the FIELD such that when the ROBOT changes direction, the CARGO travels with the ROBOT,</li><li>C. the ROBOT is holding CARGO against a FIELD element in attempt to guard or shield it, or</li><li>D. the ROBOT is preventing a CARGO from leaving a LOWER EXIT.</li></ul>

# Team Update 01

## GENERAL

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### Control System

The 2022 NI Driver Station software does not run on machines employing Windows 7 (e.g. Classmate PCs or Acer Aspire PCs distributed in Kickoff Kits from 2010-2016) because NI no longer supports Windows 7 as Microsoft ended support for it on January 14, 2020.

### Field Tour Videos

The narration in the [2022 Field Tour Video: Hub](#) states an incorrect number of AUTO CARGO required to decrease the CARGO BONUS threshold (states 4 instead of 5). A note has been added in the video description, the close captioning has been updated, and a pop-up has been edited in to correct the number.

### Kit of Parts

#### Drive Base Kit

- Due to a delivery error, some [Drive Base Kits](#) shipped without the 160-tooth belts (part number 800-5M-15).
- Due to a manufacturing error, some [Drive Base Kits](#) shipped with out-of-spec hubs (part number am-4124). The issue is that the center hex hole is not concentric with rest of hub, which could cause assembly and performance issues. To check your hub and learn more about this issue, please refer to [this document](#) published by AndyMark. Some hubs have already been replaced by Kickoff locations that received “good” hubs to distribute with the Kickoff Kits.
- We’re so sorry for these disruptions. Please make sure to inventory your Kickoff Kit and report any missing/damaged/out-of-spec items, including belts and hubs if applicable, using the replacement parts request system (described on the [Kickoff Kit section of the Kit of Parts page](#)) by noon, Friday January 14, 2022.

#### REV Robotics Compliant Wheel Part Number

The part number listed on the REV Robotics box (in the [Everyone Tote](#)) for the compliant wheel should be REV-21-2030.

#### Voucher Book

Consider adding the following Voucher Suppliers to the checklist in your Kickoff Kit and at the start of the [2022 Virtual Kit Catalog](#):

- [Swyft Robotics](#)
- [TE Connectivity](#)
- [monday.com](#)
- [Upverter](#)

Please note that the Digi-Key voucher does not apply to Marketplace products.

The following vouchers do not require a code from the team’s dashboard (i.e. the “Access Code:” field on their pages should be “n/a”): Digi-Key, DriveWorks, Mastercam, One IPM, and SolidProfessor.

#### Kit of Parts Webpage

A link to a [SOLIDWORKS video](#) describing how to access models of Kickoff Kit items has been added to the [Kickoff Kit section of the page](#).

## Playing Field Assets

The following assets have been added:

- a link to a [SOLIDWORKS blog](#) with additional information about using SOLIDWORKS field assets.
- field CAD in Onshape
  - [Full Version](#)
  - [Light-weight Version](#) (some nuts and bolts removed to improve load time, recommended for use with Chromebooks or if limited internet connection)
- additional VR tools and references from AutomationDirect.com
  - a link to AutomationDirect.com's [Oculus Quest Support Page](#)
  - [Oculus Quest installation instructions](#)
  - a link to AutomationDirect.com's [SteamVR Support Page](#)
  - [VR Experience for SteamVR](#)
- [Machine Learning imagery](#) from WPI
- drawing [TE-22330](#) which details the Team Element: Cable Protector
- flat versions of the UPPER HUB Plastic (TE-22197) and UPPER HUB Vision Plastic (TE-22201) are included as STEP and SOLIDWORKS Part files in the [Complex Hub Team Element zip packet](#)
- specific links to Team Element assembly drawings in the [Drawings section of the Playing Field Page](#).

The following assets have been modified:

- [Team Element: Complex Hangar](#)
  - A note has been added to TE-22310 to clarify the location of LOW RUNG relative to the other RUNGS.
  - A note has been added to TE-22316 and TE-22322 to clarify RUNG heights when floor protection is absent.
  - The LOW RUNG has been raised by ½ in. on TE-22316 to better match the official FIELD.
- [RAPID REACT specific](#) drawing package (Official Element: HUB)
  - The angle of the plastic ramp in the LOWER EXIT has changed from 5° to 7½° and is reflected in the *FIRST* official CAD model, GE-22324, and all parent assemblies.
- [Team Element: Hub Complex Read Me](#) has been updated to change the quantity of 4 in. x 4 in. x 8 ft. lumber pieces from 6 to 8.

## SECTION 5.8 VISION TARGETS

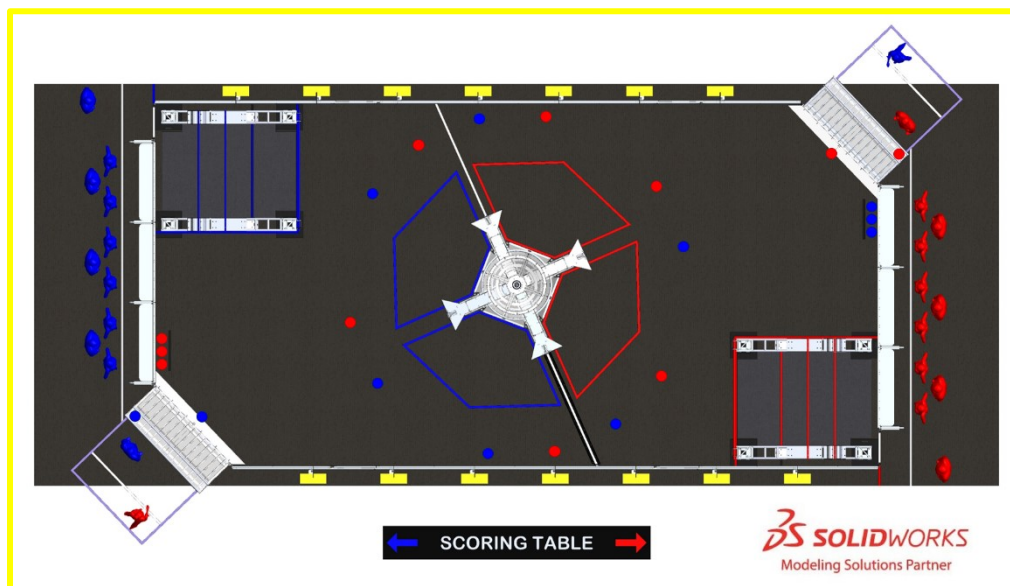
The distance from FIELD carpet to the top of the target assembly is 8 ft. 8 in. (~264 cm); the distance from FIELD carpet to the bottom of the vision tape is 8 ft. 5½ in. (~258 cm).



## SECTION 6.1 SETUP

Figure 6-1 is updated to correct the starting location for CARGO not staged in ROBOTS.

Figure 6-1 MATCH setup



## SECTION 7.2 ROBOT TO ROBOT INTERACTION

**G210** **During AUTO, no defense.** During AUTO, a ROBOT with any part of its BUMPERS on the opposite side of the FIELD (i.e. on the other side of the CENTER LINE from its ALLIANCE'S TARMACS) may contact neither an opponent ROBOT nor CARGO still in its staged location on the opposite side of the FIELD **nor an opponent ROBOT.**

Violation: TECH FOUL

## SECTION 8.4 DURING THE MATCH: AUTO

**H404** **AUTO CARGO delivery.** **During AUTO,** CARGO may only be introduced to the FIELD by a HUMAN PLAYER in a TERMINAL AREA.

Violation: FOUL per CARGO.

## SECTION 8.5 DURING THE MATCH

**H504** **TELEOP CARGO delivery.** **During TELEOP,** CARGO may only be introduced to the FIELD

- A. by a HUMAN PLAYER and
- B. through the GUARD.

Violation: FOUL per CARGO.

## SECTION 9

Throughout this document, the acronym PCH (Pneumatic Control Hub) is changed to PH (Pneumatic Hub).

## SECTION 9.5 MOTORS & ACTUATORS

R501

Table 9-1 Motor allowances

Motor Name	Part Numbers Available	
Current/former KOP automotive motors	Denso AE235100-0160	Denso 262100-3040
	Denso 5-163800-RC1	Bosch 6 004 RA3 194-06
	Denso 262100-3030	Johnson Electric JE-PLG-149
		Johnson Electric JE-PLG-410

**R503 \*Power (most) actuators off of approved devices.** With the exception of servos, fans, or motors integral to sensors of COTS computing devices permitted in R501, each actuator must be controlled by a power regulating device. The only power regulating devices for actuators permitted on the ROBOT include:

- B. relay modules,
  - a. Spike H-Bridge Relay (P/N 217-0220 and SPIKE-RELAY-H),
  - b. Automation Direct Relay (P/N AD-SSR6M12-DC-200D, AD-SSRM6M25-DC-200D, AD-SSR6M45-DC-200D), and
  - c. Power Distribution Hub (PDH) switched channel (P/N REV-11-1850) for controlling non-actuator CUSTOM CIRCUITS only,

**R504 \*Don't overload controllers.** Each power regulating device may control electrical loads per Table 9-2. Unless otherwise noted, each power regulating device shall control 1 and only 1 electrical load.

Table 9-2 Power regulating device allotments

Electrical Load	Motor Controller	Relay Module	Pneumatics Controller
AndyMark PG			
KOP Automotive Motors			
NeveRest	Yes (up to 2 per controller)	Yes	No
Snow Blower Motor			
REV Robotics HD Hex			

**R505 \*Control servos safely.** Servos must be connected to, and only to, 1 of the following:

- A. PWM ports on the roboRIO,
- B. PWM ports on a WCP Spartan Sensor Board (P/N WCP-0045), or
- C. REV Robotics Servo Power Module (P/N REV-11-1144), or
- D. REV Robotics Servo Hub (P/N REV-11-1855).

## SECTION 9.6 POWER DISTRIBUTION

**R615 \*Power roboRIO as specified.** The roboRIO power input must be connected to either:

- B. the terminals of 1 of the non-switchable fused channels on the PDH (20,21,22) with a 10A fuse installed in the associated fuse holder.

No other electrical load shall be connected to these terminals that channel.

## SECTION 9.8 PNEUMATIC SYSTEM

**R812 \*Pressure switch requirements.** The pressure switch must be connected to the high-pressure side of the pneumatic circuit (i.e. prior to the pressure regulator) to sense the stored pressure of the circuit.

It must be either:

- B. REV Robotics P/N REV-11-1107

The analog output of the sensor must be connected directly to 1 of the analog pressure sensor inputs **analog input 0** of the PCH controlling the compressor.

## SECTION 11.1 MATCH SCHEDULE

The top-right label in Figure 11-1 was updated as follows: ~~PLAYER STATION~~ **DRIVER STATION**.

Figure 11-1 Sample MATCH schedule

Qualification Match Schedule								
Matches Per Team		10	Event Name					
Time	Description	Match	Blue 1	Blue 2	Blue 3	Red 1	Red 2	Red 3
Thu 2:30	Qualification 1	1	1	2	3	4	5	6
Thu 2:37	Qualification 2	2	7	8	9	10	11*	12
Thu 2:44	Qualification 3	3	13	14	15*	16	17	18

ALLIANCE Red or Blue

DRIVER STATION number 1, 2, or 3

MATCH Start Time

MATCH Type

MATCH Number

Asterisk (\*) indicates SURROGATE MATCH

## SECTION 11.4 MEASUREMENT

**T401 \*Freeze, ROBOT.** During the period when the ARENA is open for measurement, ROBOTS can be enabled, but cannot move (i.e. neither the ROBOT, nor anything on the ROBOT, can move) **may neither drive, extend outside their frame perimeter**, nor can they interact with (e.g. score, push, pickup, etc.) CARGO, the HUB, the HANGAR, or other FIELD elements.

*Violation: Verbal warning. If subsequent violations at any point during the event or egregious YELLOW CARD.*

### SECTION 11.8.1.4 AWARDS

In many ways, the team's experience in being selected for awards, especially the Chairman's Award, the Engineering Inspiration Award, and the Rookie All Star Award **(which is optional for District Championship events)**, is beyond measure, and could not be fully captured in its entirety by any points-based system.

### SECTION 11.8.2 DISTRICT CHAMPIONSHIP ELIGIBILITY

Table 11-8 2022 District Championship Capacities

District Championship	Capacity
Michigan State Championship	200 <b>160</b>

## SECTION 12 GLOSSARY

Term	Definition
<b>CONTROL</b>	the state of a CARGO if any of the following are true: A. the CARGO is fully supported by the ROBOT, B. the CARGO travels across the FIELD such that when the ROBOT changes direction, C. the CARGO travels with the ROBOT, the ROBOT is holding CARGO against a FIELD element in attempt to guard or shield it, or D. the ROBOT is preventing a CARGO from leaving a LOWER EXIT.