

## 7 GAME RULES: ROBOTS

The 2022 FRC Game Manual implements updated methods for identifying rule numbers and recurring rules. See [Section 1.7 This Document & Its Conventions](#) for details.

### 7.1 ROBOT Restrictions

**G101 \*Dangerous ROBOTS: not allowed.** ROBOTS whose operation or design is dangerous or unsafe are not permitted.

*Violation: If before the MATCH, the offending ROBOT will not be allowed to participate in the MATCH. If during the MATCH, the offending ROBOT will be DISABLED.*

Examples include, but are not limited to:

- a. uncontrolled motion that cannot be stopped by the DRIVE TEAM,
- b. ROBOT parts “flailing” outside of the FIELD,
- c. ROBOTS dragging their battery, and
- d. ROBOTS that consistently extend beyond the FIELD.

**G102 \*ROBOTS, stay on the FIELD during the MATCH.** ROBOTS and anything they control, e.g. CARGO, may not contact anything outside the FIELD except for MOMENTARY incursions into the TERMINAL and MOMENTARY contact with the CHUTE.

*Violation: DISABLED.*

Please be conscious of REFEREES and FIELD STAFF working around the ARENA who may be in close proximity to your ROBOT.

**G103 \*Keep your BUMPERS low.** BUMPERS must be in the BUMPER ZONE (see R402) during the MATCH.

*Violation: FOUL. If REPEATED or greater than MOMENTARY, DISABLED.*

**G104 \*Keep your BUMPERS together.** BUMPERS may not fail such that a segment completely detaches, any side of a ROBOT’S FRAME PERIMETER is exposed, or the team number or ALLIANCE color are indeterminate.

*Violation: DISABLED.*

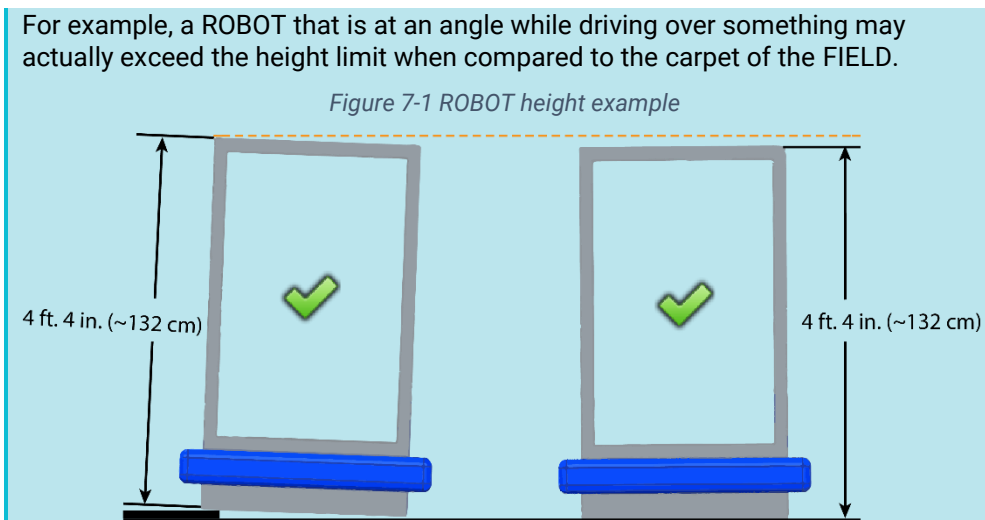
**G105 \*Keep it together.** ROBOTS may not intentionally detach or leave parts on the FIELD.

*Violation: RED CARD.*

**G106 Tall ROBOTS in HANGAR ZONE only.** ROBOT height, as measured when it’s resting normally on a flat floor, may not exceed the maximum STARTING CONFIGURATION height (4 ft. 4 in. (~132 cm)) unless any part of the ROBOT’S BUMPERS is in its HANGAR ZONE, in which case its height may not exceed 5 ft. 6 in. (~167 cm).

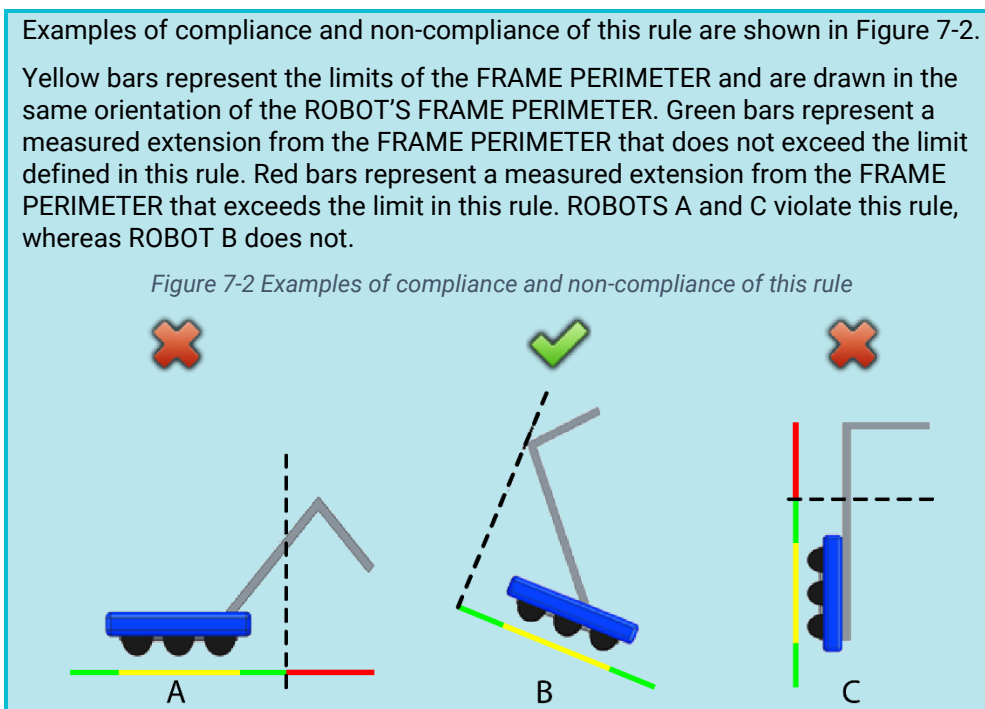
*Violation: FOUL. TECH FOUL if the over-extension blocks an opponent’s shot, scores a CARGO, or is the first thing that contacts CARGO exiting from an UPPER EXIT. If the over-extension enables HANGAR points, the ROBOT is no longer eligible for HANGAR points.*

This measurement is intended to be made as if the ROBOT is resting on a flat floor, not relative to the height of the ROBOT from the FIELD carpet.



**G107 Don't overextend yourself.** ROBOTS may not extend more than 16 in. (~40 cm) beyond their FRAME PERIMETER.

*Violation: FOUL. TECH FOUL if the over-extension blocks an opponent's shot, scores a CARGO, or is the first thing that contacts CARGO exiting from an UPPER EXIT. If the over-extension enables HANGAR points, the ROBOT is no longer eligible for HANGAR points.*



**G108 Not too high.** A ROBOT may not position itself such that any part of its BUMPERS is higher than the HIGH RUNG.

*Violation: ROBOT is ineligible for any HANGAR points.*

**G109 Avoid the PURPLE PLANE.** ROBOTS may never extend beyond the PURPLE PLANE.

*Violation: DISABLED.*

## 7.2 ROBOT to ROBOT Interaction

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**G201** **\*Don't expect to gain by doing others harm.** Strategies clearly aimed at forcing the opponent ALLIANCE to violate a rule are not in the spirit of *FIRST* Robotics Competition and not allowed. Rule violations forced in this manner will not result in an assignment of a penalty to the targeted ALLIANCE.

*Violation: FOUL. If REPEATED, TECH FOUL.*

G201 does not apply for strategies consistent with standard gameplay, for example a red ALLIANCE ROBOT in their HANGAR ZONE in the final 30 seconds of the MATCH contacts a blue ALLIANCE ROBOT.

G201 requires an intentional act with limited or no opportunity for the team being acted on to avoid the penalty, such as:

- a. forcing the opposing ROBOT to have greater-than-MOMENTARY CONTROL of 3 CARGO or
- b. a ROBOT raising an extension to touch their MID RUNG as an opponent is about hit them with no intention to actually climb

**G202** **\*There's a 5-count on PINS.** ROBOTS may not PIN an opponent's ROBOT for more than 5 seconds. A ROBOT is PINNING if it is preventing the movement of an opponent ROBOT by contact, either direct or transitive (such as against a FIELD element). A ROBOT is considered PINNED until the ROBOTS have separated by at least 6 ft. (~183 cm) from each other or either ROBOT has moved 6 ft. from where the PIN initiated, whichever comes first. The PINNING ROBOT(S) must then wait for at least 3 seconds before attempting to PIN the same ROBOT again.

*Violation: FOUL, plus an additional TECH FOUL for every 5 seconds in which the situation is not corrected.*

A team's desired direction of travel is not a consideration when determining if a ROBOT is PINNED.

**G203** **\*Don't collude with your partners to shut down major parts of game play.** 2 or more ROBOTS that appear to a REFEREE to be working together may not isolate or close off any major element of MATCH play.

*Violation: TECH FOUL, plus an additional TECH FOUL for every 5 seconds in which the situation is not corrected.*

Examples of violations of this rule include, but are not limited to:

- a. fully blocking all access to either TERMINAL,
- b. shutting down access to all opponents' CARGO,
- c. quarantining all opponents to a small area of the FIELD, and
- d. blocking all access to the opponents' HANGAR.

A single ROBOT blocking access to a particular area of the FIELD is not a violation of this rule.

2 ROBOTS independently playing defense on 2 opponent ROBOTS is not a violation of this rule.

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Note, G204, G205, and G206 are mutually exclusive. A single ROBOT to ROBOT interaction which violates more than 1 of these rules results in the most punitive penalty, and only the most punitive penalty, being assessed.

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**G204 \*Stay out of other ROBOTS.** A ROBOT may not use a COMPONENT outside its FRAME PERIMETER (except its BUMPERS) to initiate contact with an opponent ROBOT inside the vertical projection of that opponent ROBOT'S FRAME PERIMETER. Contact with an opponent in an opening of their BUMPERS is an exception to this rule.

*Violation: FOUL.*

For the purposes of G204, "initiate contact" requires movement towards an opponent ROBOT.

In a collision, it's possible for both ROBOTS to initiate contact.

**G205 \*This isn't combat robotics.** A ROBOT may not damage or functionally impair an opponent ROBOT in either of the following ways:

- A. deliberately, as perceived by a REFEREE.
- B. regardless of intent, by initiating contact inside the vertical projection of an opponent ROBOT'S FRAME PERIMETER. Contact between the ROBOT'S BUMPERS or COMPONENTS inside the ROBOT'S FRAME PERIMETER and COMPONENTS inside an opening of an opponent's BUMPERS is an exception to this rule.

*Violation: TECH FOUL and YELLOW CARD. If opponent ROBOT is unable to drive, TECH FOUL and RED CARD*

FIRST Robotics Competition can be a full-contact competition and may include rigorous game play. While this rule aims to limit severe damage to ROBOTS, teams should design their ROBOTS to be robust.

The exception in G205-B effectively means that ROBOTS with BUMPER gaps are at their own risk regarding damaging contact in these areas.

Examples of violations of this rule include, but are not limited to:

- a. A ROBOT leaves an arm extended, spins around to change course, and unintentionally hits and damages a COMPONENT inside the FRAME PERIMETER of a nearby opponent ROBOT.
- b. A ROBOT, in the process of trying to quickly reverse direction, tips up on a single pair of wheels, lands atop an opponent ROBOT, and damages a COMPONENT inside that opponent's FRAME PERIMETER.
- c. A ROBOT high-speed rams and/or repeatedly smashes an opponent ROBOT and causes damage. The REFEREE infers that the ROBOT was deliberately trying to damage the opponent's ROBOT.

Examples of functionally impairing another ROBOT include, but are not limited to:

- d. opening an opponent's relief valve such that the opponent's air pressure drops and
- e. powering off an opponent's ROBOT (this example also clearly results in a RED CARD because the ROBOT is no longer able to drive).

At the conclusion of the MATCH, the Head REFEREE may elect to visually inspect a ROBOT to confirm violations of G205 made during a MATCH and remove the violation if the damage cannot be verified.

For the purposes of G205, "initiating contact" requires movement towards an opponent ROBOT.

In a collision, it's possible for both ROBOTS to initiate contact.

**G206 \*Don't tip or entangle.** A ROBOT may not deliberately, as perceived by a REFEREE, attach to, tip, or entangle with an opponent ROBOT.

*Violation: TECH FOUL and YELLOW CARD. If CONTINUOUS or opponent ROBOT is unable to drive, TECH FOUL and RED CARD.*

Examples of violations of this rule include, but are not limited to:

- a. using a wedge-like MECHANISM to tip over opponent ROBOTS,
- b. making BUMPER-to-BUMPER contact with an opponent ROBOT that is attempting to right itself after previously falling over and causing them to fall over again, and
- c. causing an opponent ROBOT to tip over by contacting the ROBOT after it starts to tip if, in the judgement of the REFEREE, that contact could have been avoided.

Tipping as an unintended consequence of normal ROBOT to ROBOT interaction, as perceived by the REFEREE, is not a violation of G206.

**G207 Let them shoot.** A ROBOT may not contact (either directly or transitively through CARGO and regardless of who initiates contact) an opponent ROBOT whose BUMPERS are contacting their LAUNCH PAD.

*Violation: FOUL.*

**G208 Let them climb.** A ROBOT may not contact (either directly or transitively through CARGO and regardless of who initiates contact)

- A. an opponent ROBOT contacting their MID, HIGH, and/or TRAVERSAL RUNGS or
- B. an opponent ROBOT whose BUMPERS are at least partially in their HANGAR ZONE during the final 30 seconds of the MATCH.

*Violation: The contacted opponent ROBOT is awarded TRAVERSAL RUNG HANGAR points at the end of the MATCH.*

**G209 Don't climb on each other.** A ROBOT may not be fully supported by a partner ROBOT.

*Violation: TECH FOUL. If violation occurs while either ROBOT is in contact with their HANGAR, neither ROBOT is eligible for HANGAR points.*

**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 CARGO still in its staged location on the opposite side of the FIELD nor an opponent ROBOT.

*Violation: TECH FOUL*

## 7.3 FIELD Interaction

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**G301 Be careful what you interact with.** ROBOTS and OPERATOR CONSOLES are prohibited from the following actions with regards to interaction with ARENA elements. Items A-C exclude CARGO. Items A-E exclude RUNGS.

- A. grabbing,
- B. grasping,

- C. attaching to (including the use of a vacuum or hook fastener to anchor to the FIELD carpet and excluding use of the DRIVER STATION hook-and-loop tape, plugging in to the provided power outlet, and plugging the provided Ethernet cable into the OPERATOR CONSOLE),
- D. becoming entangled with,
- E. suspending from, and
- F. damaging.

*Violation: MATCH won't start until the situation is corrected. If during a MATCH, TECH FOUL. If during a MATCH and REPEATED or longer than MOMENTARY, YELLOW CARD. If offense is via a ROBOT and the Head REFEREE determines that further damage is likely to occur, offending ROBOT will be DISABLED. Corrective action (such as eliminating sharp edges, removing the damaging MECHANISM, and/or re-inspection) may be required before the ROBOT will be allowed to compete in subsequent MATCHES.*

CARGO is expected to undergo a reasonable amount of wear and tear as they are handled by ROBOTS, such as scratching or marking. Gouging, popping, tearing off pieces, or routinely marking CARGO are violations of this rule.

- G302 LOWER EXITS are off limits.** ROBOTS may not reach into or straddle the LOWER EXIT. MOMENTARY reaching into and/or MOMENTARY straddling of the LOWER EXIT are exceptions to this rule.

*Violation: TECH FOUL. If CONTINUOUS or REPEATED, YELLOW CARD.*

## 7.4 CARGO

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- G401 \*Keep CARGO in bounds.** ROBOTS may not eject opponent CARGO from the FIELD other than through the TERMINAL (either directly or by bouncing off a FIELD element or other ROBOT).

*Violation: FOUL per CARGO.*

- G402 \*CARGO: use as directed.** ROBOTS may neither deliberately use CARGO in an attempt to ease or amplify the challenge associated with FIELD elements nor deliberately strand opponent CARGO on top of a HANGAR or HUB.

*Violation: TECH FOUL per CARGO.*

Examples include, but are not limited to:

- a. shooting CARGO at ROBOTS and
- b. corralling CARGO in the opponents' HANGAR ZONE to clog/congest it.

- G403 2 CARGO max.** ROBOTS may not have greater-than-MOMENTARY CONTROL of more than 2 CARGO at a time, either directly or transitively through other objects.

A ROBOT is in CONTROL of CARGO if:

- A. the CARGO is fully supported by the ROBOT,
- B. the CARGO travels across the FIELD such that when the ROBOT changes direction, the CARGO travels with the ROBOT,
- C. 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.

*Violation: FOUL per additional CARGO. If egregious, YELLOW CARD.*

Egregious examples include but are not limited to the following:

- a. simultaneous CONTROL of 5 CARGO
- b. CONTINUOUS CONTROL of 3 or more CARGO
- c. frequent CONTROL of 3 or more CARGO (an approximate count for frequent in this context is if this rule is violated more than 3 times in a MATCH)

**G404 Don't hoard opposing CARGO.** A ROBOT may not restrict access to more than 3 opposing ALLIANCE CARGO except during the final 30 seconds of the MATCH.

*Violation: FOUL, plus an additional TECH FOUL for every 5 seconds in which the situation is not corrected.*

Examples of restricting access to CARGO includes, but are not limited to,

- a. holding 2 opposing ALLIANCE CARGO within your ROBOT and blocking an opponent from getting to 2 more opposing ALLIANCE CARGO cornered behind your ROBOT, or
- b. using HANGAR contact protection afforded per G208-A to prevent an opponent from legally reaching 4 opposing ALLIANCE CARGO cornered in the back of your HANGAR.

In a scenario where a ROBOT is PINNING (per G202), REFEREES are instructed to disregard this rule so they can focus on the PINNING.

**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.

*Violation: FOUL per CARGO.*

It is important to design your ROBOT to mitigate the chance your ROBOT could inadvertently or unintentionally catch CARGO as it leaves an UPPER EXIT.

