

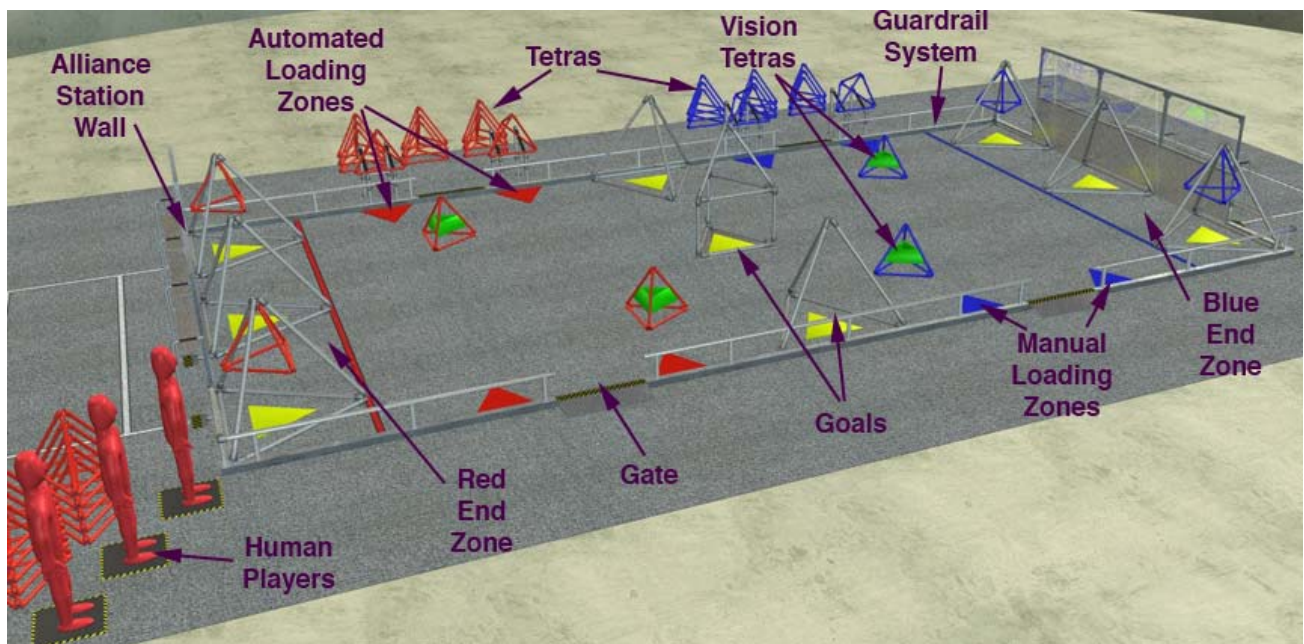
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4 THE GAME

4.1 GAME OVERVIEW

TRIPLE PLAY: *Triple Play* is played on a field initially set up as illustrated in the figures below. Two alliances – one “red” and one “blue” – composed of three teams each compete in each match. The object of the game is to attain a higher score than your opponent alliance by placing tetras on or into goals, getting three goals in a row capped with tetras, and/or having all three robots on an alliance in their end zone at the end of the match. The point values for each of those actions are explained below.



Note: The illustrations in this section of the manual are for a general visual understanding of the field and game only. Teams should refer to the drawings for exact dimensions and field construction.

4.2 THE GAME

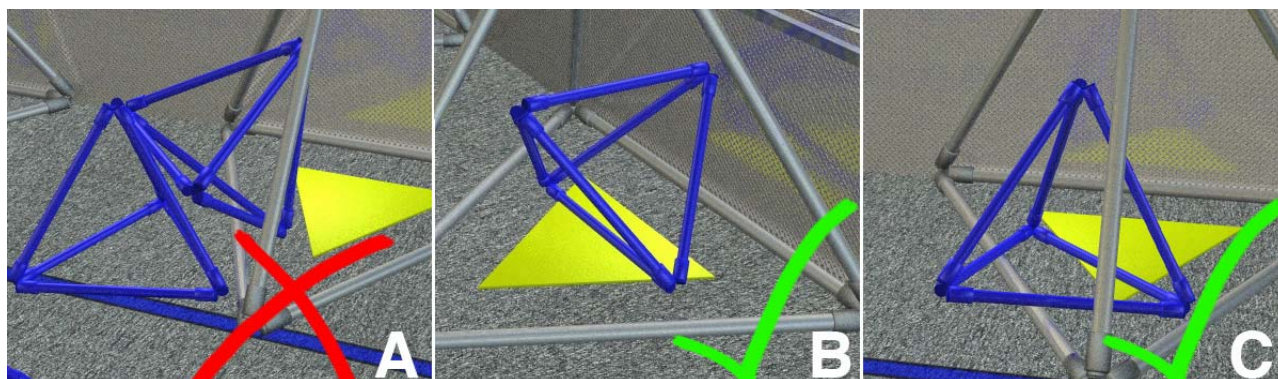
4.2.1 Definitions

AUTONOMOUS PERIOD - A 15-second period at the beginning of the match in which the ROBOTS operate and react only to sensor inputs and to commands programmed by the team into the onboard robot control system. Human control of the ROBOT is not permitted during this time. During this period, ROBOTS may perform any activities that would be permissible when operated under human control. All ROBOT operation and safety rules applicable during the operator control period are also applicable during this period.

CENTER GOAL – The GOAL in the center of the playing field

COACH – A student or adult mentor designated as the team advisor during the match and identified as the person wearing a “COACH” pin.

CONTAINED – a TETRA is **CONTAINED** in a **GOAL** if some part of the TETRA is within the three-dimensional space defined by the edges of the **GOAL**, and it is not touching the carpet outside the frame of the **GOAL**, and not touching a **ROBOT** of the same alliance, and not **SUPPORTED** by any TETRAS that are not also **CONTAINED** in the **GOAL**.



In Example A, the tetra is NOT “Contained,” as it is leaning on another tetra that is outside the goal. In Example B, the tetra IS “Contained,” as it is touching the floor inside the carpet and leaning against the diamond plate of the Alliance Station Wall (which is permitted). In Example C, the tetra IS “Contained,” as it is touching only the floor inside the goal and the goal itself, and is not touching the carpet outside the goal (it is held off the floor by the structure of the goal)

DRIVER – A pre-college student team member responsible for operating and controlling the **ROBOT**.

END ZONE – The area at each end of the field behind the taped line of that alliance’s color. The borders of the **END ZONE** are defined by the taped line, the polycarbonate walls of the sides of the playing field and the diamond plate wall of the player station.

GOAL – Each of the nine field structures into or on top of which teams can place TETRAS.

HUMAN PLAYER – A pre-college student team member designated as the only team member permitted to introduce the tetras for their team into the field of play/to their robot.

HUMAN PLAYER ZONE – The designated area at the side of the field between the pressure pad sensors and the **LOADING ZONES**, where the **HUMAN PLAYERS** may move while loading TETRAS onto **ROBOTS**.

LOADING ZONE – The triangular colored area on the floor at the sides of the field where robots may receive and/or retrieve TETRAS that are introduced into the game.

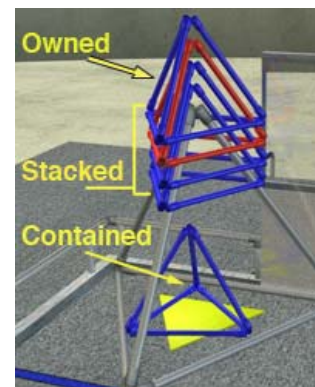
OWNING A GOAL – A **GOAL** is **OWNED** by an alliance if the alliance color corresponds to the last **STACKED TETRA** placed on the goal. If there are no **TETRAS STACKED** on the **GOAL**, the color of the highest **TETRA CONTAINED** in a goal will determine which alliance **OWNS** the **GOAL**. If all **CONTAINED TETRAS** are at the same height, the alliance with a majority of the **CONTAINED TETRAS** will **OWN** the goal.

ROBOT – Anything (which has passed inspection) that a team places on the field prior to the start of a match.

ROW – a configuration of three **GOALS** that are **OWNED** by the same alliance that are aligned in a straight line.

SCORED – A **TETRA** is **SCORED** when it is **CONTAINED** within a **GOAL** or **STACKED** on top of a **GOAL**.

STACKED – A **TETRA** is **STACKED** when it is placed on top of a **GOAL** or on top of another **STACKED TETRA**. To be considered **STACKED**, the **TETRA** must be properly seated on the subordinate **GOAL** or



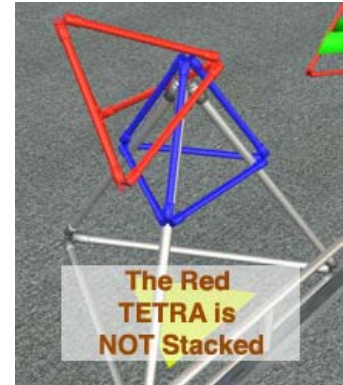
TETRA such that all four apex connectors are within six inches of the SUPPORTING structure. Due to the GOAL and TETRA geometries, a TETRA may occasionally not completely “seat” on the GOAL or subordinate TETRA, and remain precariously positioned on top of the structure. Such TETRAS are not considered STACKED. A TETRA is not considered STACKED if it is touching a ROBOT of the same alliance.

SUPPORTED – If the “supporting object” is removed, the TETRA would not remain SCORED or STACKED.

TEAM ZONE – the region behind the player station wall where the DRIVERS and COACH stand during the match.

TETRA – Tetrahedral scoring object for the game. TETRAS are colored red or blue, and correspond to the alliance of the same color.

VISION TETRA – A specially marked TETRA with a colored band that is easily identified by the vision system.



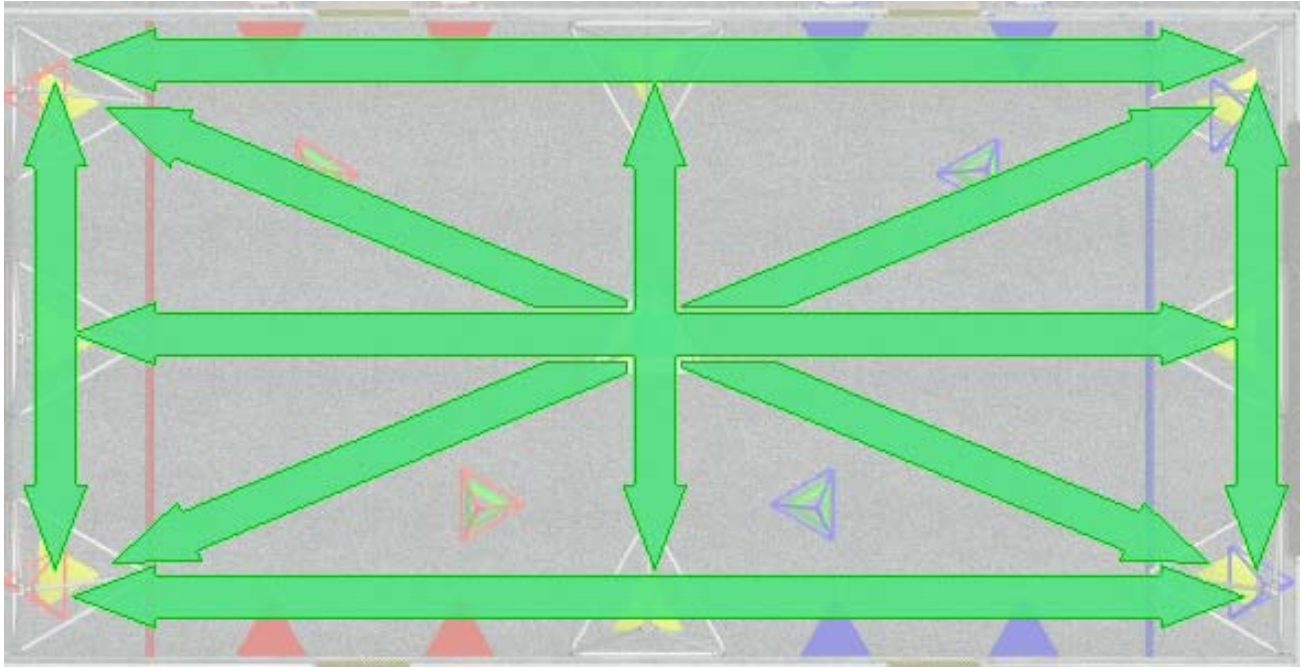
4.2.2 Match Format

A match is 2 minutes and 15 seconds long. At the start of the match, all HUMAN PLAYERS, DRIVERS and COACHES must stand behind the Team Zone Starting Line, 3 feet away from their Driver’s Station. An AUTONOMOUS PERIOD starts the match and lasts 15 seconds. Following the AUTONOMOUS PERIOD, the Driver Station controls will be activated and DRIVERS may remotely control and operate their ROBOTS for the final 2 minutes of the match. Note that there may be a very short pause between the AUTONOMOUS PERIOD and the start of teleoperated play, as the Driver Station controls are activated and the referees determine the VISION TETRA placement and award bonus TETRAS.

4.3 RULES

4.3.1 Scoring

- <C01> A TETRA is worth 1 point if CONTAINED in any GOAL and 3 points if STACKED on any GOAL at the end of the match, for the alliance of the corresponding color.
- <C02> Any ROW of three GOALS OWNED by the same alliance at the conclusion of the match is worth 10 points for the alliance. There are eight possible ROWS.



<C03> All three ROBOTS of the same alliance in their designated END ZONE at the conclusion of a match is worth 10 points to the alliance. A ROBOT is not considered in the END ZONE if it is touching the field outside the defined END ZONE border. The tape line designating the END ZONE border is considered “in” the END ZONE.

4.3.2 Safety

<S01> If at any time the ROBOT operation is deemed unsafe, by the determination of the referees, the ROBOT will be disabled for the remainder of the match.

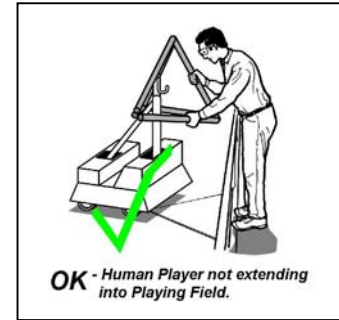
<S02> If a ROBOT goes out-of-bounds (outside the playing field) to the point where it has to apply force to any out-of-bounds surface to rejoin play, its control system will be disabled and the ROBOT will be disabled for the remainder of the match. If the infraction occurs during the AUTONOMOUS PERIOD, the ROBOT will be disabled for the remainder of the AUTONOMOUS PERIOD. For this purpose, the tetra loading structure is considered part of the playing field and may be contacted by the ROBOT.

<S03> If a ROBOT violates Rule <S02> during the AUTONOMOUS PERIOD and is disabled, it will be re-enabled after the AUTONOMOUS PERIOD for 10 seconds. During this “grace period” the DRIVERS may command the ROBOT to correct the situation that caused the <S02> violation. If successful then the ROBOT may resume normal play. If not successful after 10 seconds, the Rule <S02> violation will be determined to be persistent, and the ROBOT will be disabled for the remainder of the match. At all times during the “grace period,” spectator and field staff safety will be the primary concern. If at any time the referee should determine that the attempts to recover from the <S02> violation constitute unsafe operations, Rule <S01> will take precedence.

<S04> Three Emergency Stop (E-Stop) buttons are located in each alliance station, one for each team. Pressing an E-Stop button will cause the corresponding team’s ROBOT to be disabled for the remainder of the match. The E-Stop buttons are intended for remote shut down during a match in the event of safety hazards and will not otherwise affect match scoring or duration.

<S05> A ROBOT may not impede the placement of TETRAS on the loading structures or the hand-off of a TETRA by a HUMAN PLAYER to a ROBOT. No HUMAN PLAYER or field attendant may be accosted by a ROBOT while placing TETRAS. Violations will result immediate disabling of the offending ROBOT, and disqualification of the alliance.

<S06> While loading a TETRA on to a ROBOT in the LOADING ZONE, the HUMAN PLAYER may touch only the outside edge of the Playing Field border. The HUMAN PLAYER may reach across the Playing Field border while holding a TETRA solely for the purpose of loading it on a ROBOT that has been disabled. The HUMAN PLAYER may not extend any part of their bodies across the Playing Field border at any other time. Violating this rule will result in the disabling of the team's ROBOT for the remainder of the match.



<S07> HUMAN PLAYERS may not directly contact the ROBOT at any time during the match. The ROBOT and the HUMAN PLAYER have a shared responsibility to avoid contact. Violating this rule will result in the disabling of the team's ROBOT for the remainder of the match.

<S08> HUMAN PLAYERS may only pass TETRAS to their team's ROBOT when the ROBOT is in the LOADING ZONE and disabled. HUMAN PLAYERS are not allowed to pass TETRAS to, or interact with, ROBOTS of another team, even if on the same alliance. Violating this rule will result in the disabling of both the HUMAN PLAYER team's ROBOT and the receiving team's ROBOT.



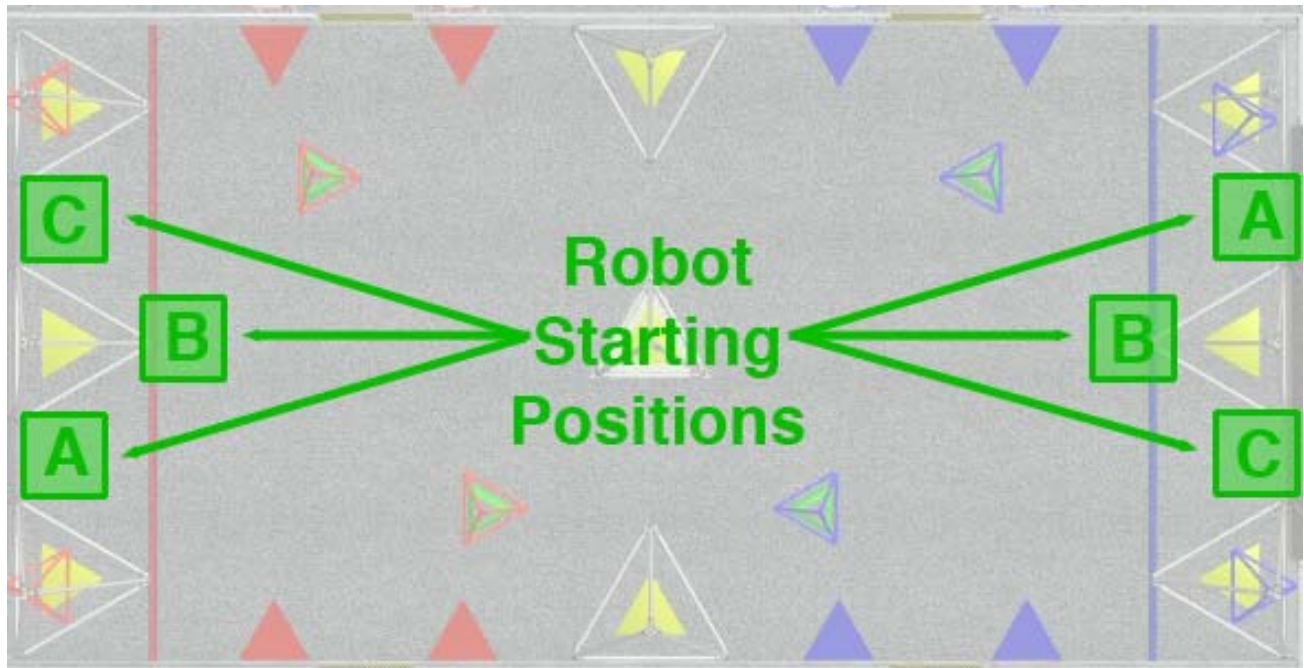
<S09> A referee may disable a ROBOT that has damaged the playing field, carpet, barriers or another ROBOT if the referee feels that further damage is likely to occur. The referees may require a corrective action, such as eliminating a sharp edge, before the ROBOT will be allowed to compete in subsequent matches. Repeat offenses will result in that team being disqualified from further participation in the competition event.

<S10> HUMAN PLAYERS may only occupy the pressure pad sensor assigned to their team. Standing on or activating the pressure pad sensor of another team will result in immediate disabling and disqualification of the offending team.

4.3.3 General Match Rules (GM)

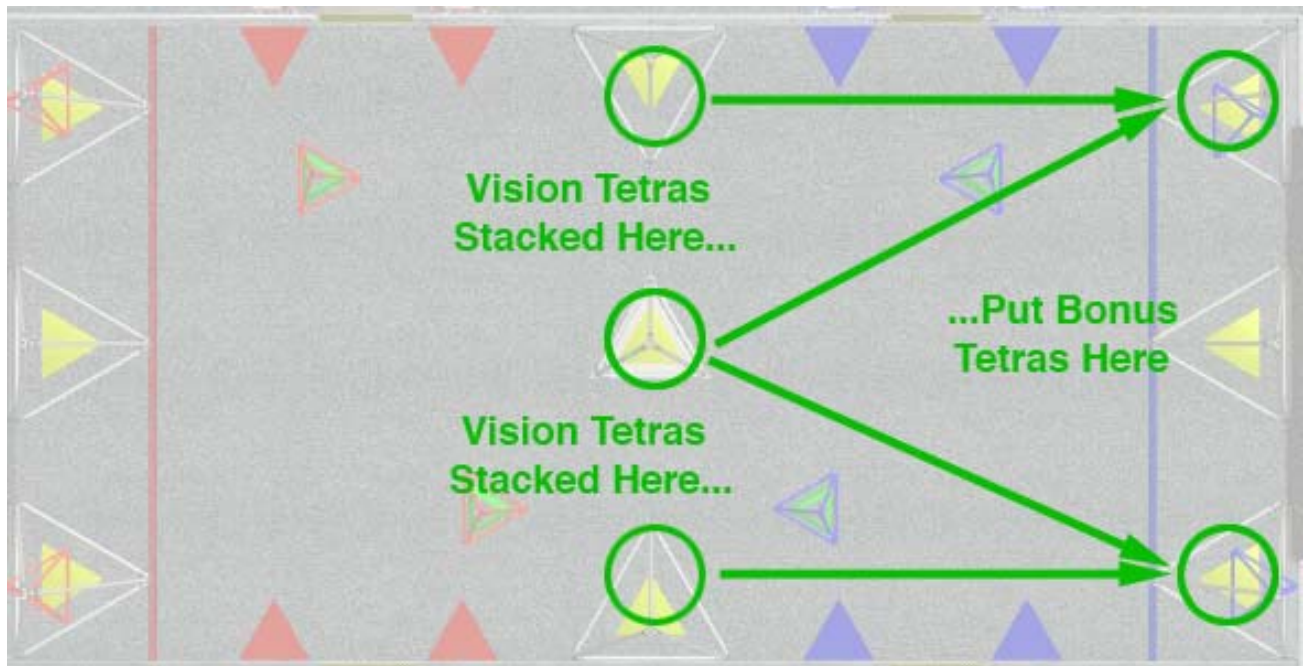
<G01> At the beginning of a match, each ROBOT must not exceed a volume of 28 inches by 38 inches by 60 inches tall. An offending robot will be removed from the match at the Head Referee's discretion.

<G02> At the beginning of the match, the three alliance ROBOTS must be placed in one of the three starting positions located immediately in front of their alliance station. One starting position is located at the apex of the GOAL in the middle of the alliance station wall. The ROBOT in this starting position must touch the "riser" pipe at the front of the GOAL structure. The other starting positions are located in the "pocket" between the middle GOAL and the GOALS to either side. The ROBOTS in these starting positions must be entirely inside the alliance END ZONE, must not touch the GOALS, and must touch the alliance station wall. ROBOTS may be positioned to start in any alliance starting position, but the DRIVER and COACH must set up under their team number. At the beginning of the match, no part of any robot may extend into the three-dimensional volume defined by the outer edges of the GOALS. Alignment devices (templates, tape measures, lasers, etc.) that are not part of the ROBOT may not be used to assist with positioning the robot.



- <G03> Each team shall include one HUMAN PLAYER, two DRIVERS, and one COACH.
- <G04> At the discretion of the alliance, one (and only one) TETRA may be in the possession of one ROBOT in each alliance at the beginning of the match. The TETRA must be completely SUPPORTED by the ROBOT, not in contact with either the floor or any field element, and the ROBOT – including any MECHANISMS designed to hold the TETRA – must still satisfy the volume starting constraints specified in <G01>.
- <G05> The VISION TETRAS will be placed on the field by field attendants after the ROBOTS have been positioned. The locations of the VISION TETRAS will be determined by random selection from a set of 8 possible starting locations (as identified on the “2005 Field Lines and Layout” drawing). ROBOTS may not be repositioned or manipulated in any manner after the VISION TETRAS have been placed on the field.
- <G06> No team member may pass the Starting Line in their TEAM ZONE until the conclusion of the AUTONOMOUS PERIOD. All team members must stay within their alliance’s designated TEAM ZONE during the match. If a team member passes the Starting Line before the autonomous period ends, except to save their controls from a violent collision of a robot into the diamond plate, or leaves their TEAM ZONE during the match, the team will be assessed a 10 point penalty. If a HUMAN PLAYER leaves the HUMAN PLAYER ZONE at any time during the match for any reason other than personal safety, the team will be assessed a 10 point penalty. However, if such actions are deemed by the referee to be so serious to have affected the outcome of the match, the team may be disabled and disqualified.
- <G07> Team members may not touch any TETRAS during the AUTONOMOUS PERIOD. HUMAN PLAYERS may use any TETRAS in the Team Zone once the AUTONOMOUS PERIOD ends. If a TETRA is touched during the autonomous period, the team will be assessed a 10-point penalty.
- <G08> At the start of the match, HUMAN PLAYERS must stand on designated pressure pad sensors to one side of the field. The ROBOT for each team will be enabled only while the HUMAN PLAYER remains on the pressure pad. If the HUMAN PLAYER steps off the pressure pad, the corresponding ROBOT is temporarily disabled until the HUMAN PLAYER returns to the pad. The HUMAN PLAYER must place their feet on the sensor to activate it. Placing objects on the sensor to activate it is not permitted.

- <G09> Prior to the match, a TETRA will be placed inside each of the GOALS at the corners of the field, such that it is hanging from the apex of the GOAL. If the TETRA is displaced from its hanging position by any ROBOT during the AUTONOMOUS PERIOD, it will be entered into play and/or SCORED like any other TETRA. If the TETRA is not displaced from its hanging position by the end of the AUTONOMOUS PERIOD, it will be removed from the field by field personnel at the earliest safe opportunity.
- <G10> If during the AUTONOMOUS PERIOD a VISION TETRA is STACKED on a GOAL located on the edge of the field, a bonus TETRA will be STACKED on the nearest corner GOAL in the alliance END ZONE. If during the AUTONOMOUS PERIOD a VISION TETRA is STACKED on the CENTER GOAL, a bonus TETRA will be placed on both corner GOALS in the alliance END ZONE. All bonus TETRAS will be STACKED on the GOALS by field attendants at the earliest safe opportunity after the end of the AUTONOMOUS PERIOD. Once the AUTONOMOUS PERIOD ends, all VISION TETRAS are treated and SCORED as regular TETRAS for the remainder of the match.



This illustrates where bonus tetras are placed at the end of the autonomous period if Vision Tetras are successfully stacked on the goals at the middle of the field. Bonus placements for the red alliance are shown; blue alliance placements are similar.

- <G11> In addition to the VISION TETRAS placed on the field prior to the start of the match, ROBOTS may retrieve additional TETRAS at the LOADING ZONES and introduce them into the game. ROBOTS may retrieve TETRAS from the “automated” LOADING ZONE at any time during the match. ROBOTS may receive TETRAS from the HUMAN PLAYER in the “manual” LOADING ZONE at any time after the AUTONOMOUS PERIOD has concluded.
- <G12> The purpose of the LOADING ZONE is to allow ROBOTS to quickly and safely receive TETRAS without interference while HUMAN PLAYERS and/or field attendants are in close proximity, and then return to play. The LOADING ZONE is not intended to serve as a “perpetual safety zone” to prevent interaction with opponent ROBOTS for the entire match. Tethers, tape measures, long extension arms, and other devices intended to contact the LOADING ZONE to maintain the “non-interference constraint” defined in <G15> while the ROBOT drives around the remainder of the field are against the spirit of the rule and will not be permitted. Such devices must be removed before the ROBOT will be permitted to play in the match.

- <G13> Following the AUTONOMOUS PERIOD, HUMAN PLAYERS may deliver TETRAS to their team's ROBOT when the ROBOT enters the LOADING ZONE on their side of the field (i.e. the "manual" LOADING ZONE). Once the ROBOT is in the LOADING ZONE, the HUMAN PLAYER may step off the pressure pad sensor and safely approach the LOADING ZONE with a TETRA. While the ROBOT is disabled the HUMAN PLAYER may place the TETRA on or in the ROBOT, or any ROBOT mechanism designed to grasp the TETRAS. The HUMAN PLAYER must then return to the pressure pad sensor before the ROBOT will be re-enabled and resume play. The DRIVER and HUMAN PLAYER have a shared responsibility to ensure that the ROBOT has entered the LOADING ZONE. If a HUMAN PLAYER loads a TETRA onto a ROBOT that is not in the LOADING ZONE, a 10-point penalty will be assessed, and the TETRA will not be SCORED.
- <G14> Field attendants will place TETRAS on the Tetra Loading Stations on the side of the field opposite the HUMAN PLAYERS (ie. the "automated" LOADING ZONE). At any time, a ROBOT may enter the corresponding LOADING ZONE, retrieve the TETRA from the Loading Station, and enter it into play. The HUMAN PLAYER does not have to leave the pressure pad sensor during this operation. When the TETRA is removed from the Loading Station and the ROBOT has left the LOADING ZONE, the field attendant will place a new TETRA on the Loading Station. Robots may not intentionally interfere with field attendant's efforts to place TETRAS on the Loading Stations.
- <G15> A ROBOT may not interfere with an opposing ROBOT while any part of the opposing ROBOT is touching its LOADING ZONE and the ROBOT is in the process of retrieving/receiving a TETRA. It is intended that TETRAS be introduced into play as rapidly as the alliance ROBOTS are able to retrieve and utilize them. Violations will result in a 30-point penalty (i.e. three 10-point penalty flags will be thrown) to the offending alliance.
- <G16> A ROBOT may occupy only one LOADING ZONE at a time. A violation will result in a 10-point penalty.
- <G17> A ROBOT that has received a TETRA may not collect another TETRA until it leaves and then re-enters the LOADING ZONE. A violation will result in a 10-point penalty, and the TETRA will not be SCORED.
- <G18> ROBOTS can remove or displace TETRAS CONTAINED in a goal, but cannot remove TETRAS STACKED on a goal. If an alliance ROBOT removes any STACKED TETRA of the opposing alliance, the TETRA will be SCORED (3 points) and the opposing alliance automatically OWNS the GOAL for the remainder of the match regardless of what color TETRAS are on the goal. There is no penalty for removing a TETRA that is precariously positioned on a GOAL or TETRA, but not fully STACKED.
- <G19> TETRAS that leave the playing field or team zone are considered out of play. These TETRAS will be placed on the off-field stacks of TETRAS used to supply the LOADING ZONES.
- <G20> ROBOTS may push or react against any elements of the field, provided there is no damage or disruption of the field elements. ROBOTS may not grab, grasp, grapple or attach to the GOALS or any other field structure. Robots may not extend under, lift up or tip over a GOAL. If a ROBOT violates this rule, the referee will give one warning. If the referee determines that the team is disregarding the warning, or the actions affect the outcome of the match, the team's ROBOT will be disabled for the remainder of the match. If a GOAL is tipped over, it is automatically OWNED by the opposing alliance for the remainder of the match.
- <G21> A ROBOT cannot pin (inhibit the movement of another ROBOT while in contact with one or more field elements) for more than 10 seconds. If a ROBOT has been pinned for 10 seconds, the team with the pinning ROBOT will be told by the referee to release the pinned ROBOT and back away approximately 3 feet. Once the pinning ROBOT has backed off by 3 feet, it may again attempt to pin its opponent and, if successful, the 10 second count starts over. If a referee determines this rule to be violated, a 10-point penalty flag will be thrown for each violation.

- <G22> During a match, the ROBOTS may be remotely operated only by the DRIVERS and/or by software running in the on-board control system. If a COACH touches his/her team's controls anytime during a match, the ROBOT will be disabled and the team disqualified.
- <G23> TETRAS may not be thrown by either ROBOTS or HUMAN PLAYERS. Violations will result in disabling of the ROBOT and disqualification of the team. TETRAS may be dropped vertically on to a GOAL.
- <G24> Robots may not intentionally detach parts, or leave multiple MECHANISMS on the field. Violations will result in a 10 point penalty. If a detached COMPONENT or MECHANISM is attached to a goal and prevents additional STACKING of TETRAS, the team will be disqualified.
- <G25> Strategies aimed solely at the destruction, damage, tipping over, or entanglement of ROBOTS are not in the spirit of FIRST Robotics Competition and are not allowed. However, Triple Play is a highly interactive contact game. Some tipping, entanglement, and damage may occur as a part of normal game play. If the tipping, entanglement, or damage occurs where it is not a part of normal game play, at the referee's discretion, the offending team/ROBOT may be disqualified from that match. Repeated offenses could result in a team/ROBOT being disqualified from the remainder of the Regional or Championship competition.

Examples of normal game play interaction include:

- Pushing low on another ROBOT.
- Blocking or pushing on a TETRA that is in possession of an opposing ROBOT.
- Establishing ROBOT position to block access to a GOAL by an opposing ROBOT.
- Using an arm or gripper to prevent an opposing ROBOT from placing a TETRA on a GOAL.

Examples of inappropriate robot interaction include:

- Pushing high on a robot and tipping it over.
- Using an arm or gripper to repeatedly strike an opposing ROBOT that is not in the process of placing a TETRA on a GOAL.
- Placing any part of your ROBOT under an opposing ROBOT, and then lifting to flip it over.
- Using an arm and gripper to pull a ROBOT by grabbing electrical cables, hoses, etc. or disabling a ROBOT by tearing out wires or hoses.
- Grasping or attaching to a TETRA that is in the possession of an opposing ROBOT, and using it to pull over the opposing ROBOT.
- Ramming another ROBOT at high speed.

<G26> If, due to its own loose cables, hoses, cordage, etc., a ROBOT unintentionally but routinely entangles another ROBOT as a result of normal game interaction, the head referee may at her or his discretion disqualify the offending ROBOT and require that the entangling device be repaired prior to the ROBOT'S next match.

4.3.4 Field Reset

ROBOTS must be designed to permit release and removal of any TETRAS from any grasping mechanism without requiring that the ROBOT be powered up after the match. At the discretion of the field manager, ROBOTS may be powered up and controlled via tether to collapse or reduce the height of the ROBOT to permit safe and/or rapid removal from the field and transport to the pits.