



THE GAME

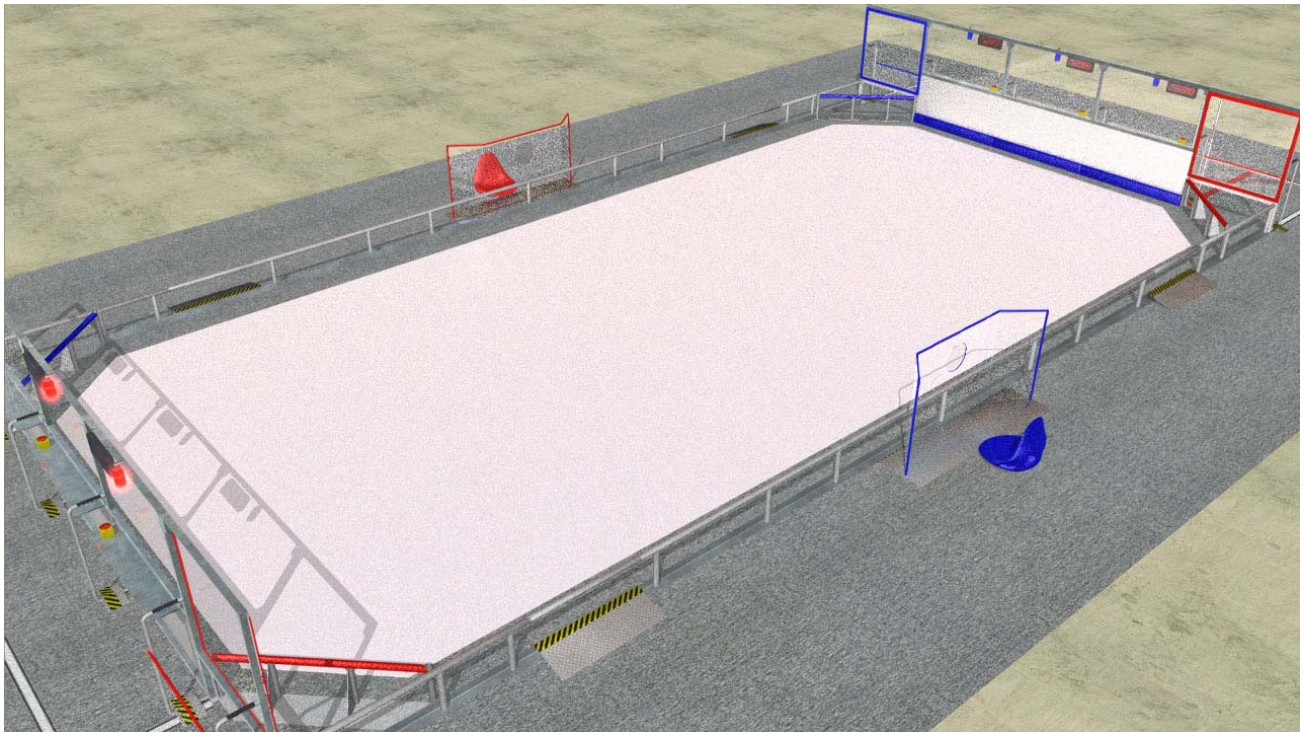
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7 THE GAME

7.1 GAME OVERVIEW

Lunacy is a game played on a field known as the CRATER (illustrated in the figure below). Two ALLIANCES, one red and one blue, composed of three *FIRST* Robotics Competition (FRC) teams each, compete in each MATCH. The object of the game is to attain a higher score than your opponent by placing the GAME PIECES in the TRAILERS hitched to the opposing ALLIANCE'S ROBOTS.



Note: The illustrations in this section of the manual are for a general visual understanding of the Lunacy arena only. Please refer to the official drawings for exact dimensions and construction details.

7.1.1 Match Format

A MATCH is 2 minutes and 15 seconds long. An AUTONOMOUS PERIOD starts each MATCH in which the ROBOTS are controlled by pre-programmed instructions. The AUTONOMOUS PERIOD is followed by the TELEOPERATED PERIOD during which the PILOTS assume control of the robot. The ROBOTS continue to play the game until the TELEOPERATED PERIOD is over.

7.2 DEFINITIONS

ALLIANCE: A set of three FRC TEAMS that work together during a MATCH to play *Lunacy* against an opposing ALLIANCE. ALLIANCES are identified during the MATCH by their assigned color, either red or blue.

HERDING: Controlling the position and movement of a GAME PIECE while the GAME PIECE is not supported by any ROBOT (i.e. supported by the CRATER or other GAME PIECES). Both continuous and intermittent contact between the ROBOT and GAME PIECE are considered HERDING. (e.g. bumping, plowing or dribbling a GAME PIECE)

HITCHED: A TRAILER is HITCHED to a ROBOT when the TRAILER tongue is connected to the Trailer Hitch mounted on the ROBOT (as specified in Rule <R18>) and locked in place with the event-provided standard 1/4-inch COTS hitch pin.

MATCH: A single iteration of play in which ALLIANCES attempt to complete the goals of the *Lunacy* game during a competition.

PENALTY: A 10-point decrement in the ALLIANCE score assigned when a deserving violation of the game rules has been identified by a Referee.

POSSESSION: Controlling the position and movement of a GAME PIECE while the GAME PIECE is supported or captured by an ALLIANCE. A GAME PIECE shall be considered “supported” by a ROBOT if in the estimation of a reasonably astute observer the majority of the weight of the GAME PIECE is being borne by the ROBOT. A GAME PIECE shall be considered “captured” by a ROBOT if, as the ROBOT moves or changes orientation (e.g. backs up or spins in place), the GAME PIECE remains in approximately the same position relative to the ROBOT. Both the “supported” and “captured” conditions include the case where the GAME PIECE is also in contact with the floor.

SCORED: A GAME PIECE is SCORED when it is fully supported by the TRAILER or other GAME PIECES that have been SCORED.

TEAM: Four representatives from a registered FRC team that interact with their robot and their ALLIANCE partners to play *Lunacy*. The positions on the TEAM include:

COMMANDER: A student or adult mentor designated as the team coach and advisor during the MATCH and identified as the person wearing the designated "COMMANDER" pin or button. There is one COMMANDER per TEAM.

PILOT: A pre-college student team member responsible for operating and controlling the ROBOT. There are two PILOTS per TEAM.

PAYLOAD SPECIALIST: A pre-college student team member permitted to pass GAME PIECES into, and receive GAME PIECES from, the CRATER. There is one PAYLOAD SPECIALIST per TEAM.

7.3 RULES

7.3.1 Safety

<S01> If at any time a ROBOT'S operation or design is deemed unsafe, it will receive a PENALTY and be disabled for the remainder of the MATCH. If the safety violation is due to the ROBOT design, the Head Referee has the option to not allow the ROBOT back onto the FIELD until the design has been corrected. An example of unsafe operation would be uncontrolled motion that cannot be stopped by the PILOTS.

- <S02>** TEAM members may not directly contact any ROBOT at any time during the MATCH. Illegal contact will result in the TEAM being disqualified.
- <S03>** E-Stop - An Emergency Stop (E-Stop) button is located in each TEAM'S Player Station. Pressing an E-Stop button will cause the 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 score or duration. Any TEAM member or referee may press the E-Stop button.
- <S04>** Permitted ROBOTS - Any ROBOT used during a MATCH must be in compliance with all Robot Rules (as defined in Chapter 8). Any ROBOT in violation of a Robot Rule will automatically be assigned a PENALTY and may receive a Yellow Card, depending on the severity of the infraction.

7.3.2 Game Periods

- <G01>** AUTONOMOUS PERIOD - The AUTONOMOUS PERIOD is the 15-second period at the start of the MATCH. PILOT control of the ROBOT is not permitted at this time. During this period, the ROBOTS may react only to sensor inputs and commands programmed into the onboard control system. All ROBOT safety rules are still applicable during the AUTONOMOUS PERIOD. The AUTONOMOUS PERIOD ends when the arena timer displays zero seconds left in the period.
- <G02>** TELEOPERATED PERIOD – The TELEOPERATED PERIOD is the 2-minute period of game play immediately following the AUTONOMOUS PERIOD. At the beginning of the TELEOPERATED PERIOD the OPERATOR CONSOLE controls are activated and PILOTS may remotely control their ROBOTS. The PILOTS continue to teleoperate their ROBOTS for the remainder of the MATCH. The TELEOPERATED PERIOD ends when the arena timer displays zero seconds. This also indicates the end of the MATCH.

7.3.3 Scoring

- <G03>** ALLIANCE scores are determined by the number of GAME PIECES in the opposing ALLIANCE TRAILERS.
- <G04>** Each SCORED MOON ROCK is worth 2 points.
- <G05>** Each SCORED EMPTY CELL is worth 2 points.
- <G06>** Each SCORED SUPER CELL is worth 15 points.
- <G07>** Scores are determined based on the state of the GAME PIECES at the end of the MATCH. Scores will be assessed after all objects in motion when the arena timer displays zero seconds come to rest.
- A. The final score of a MATCH is the total of points assigned due to SCORED GAME PIECES, less any assigned PENALTIES.
 - B. If a TRAILER tips over, the points SCORED for that TRAILER at the time it was tipped will be preserved for the remainder of the MATCH.
- <G08>** Minimum Scores - The minimum score is 0 (zero) points. Even after adjustment for PENALTIES, there are no “negative scores.”

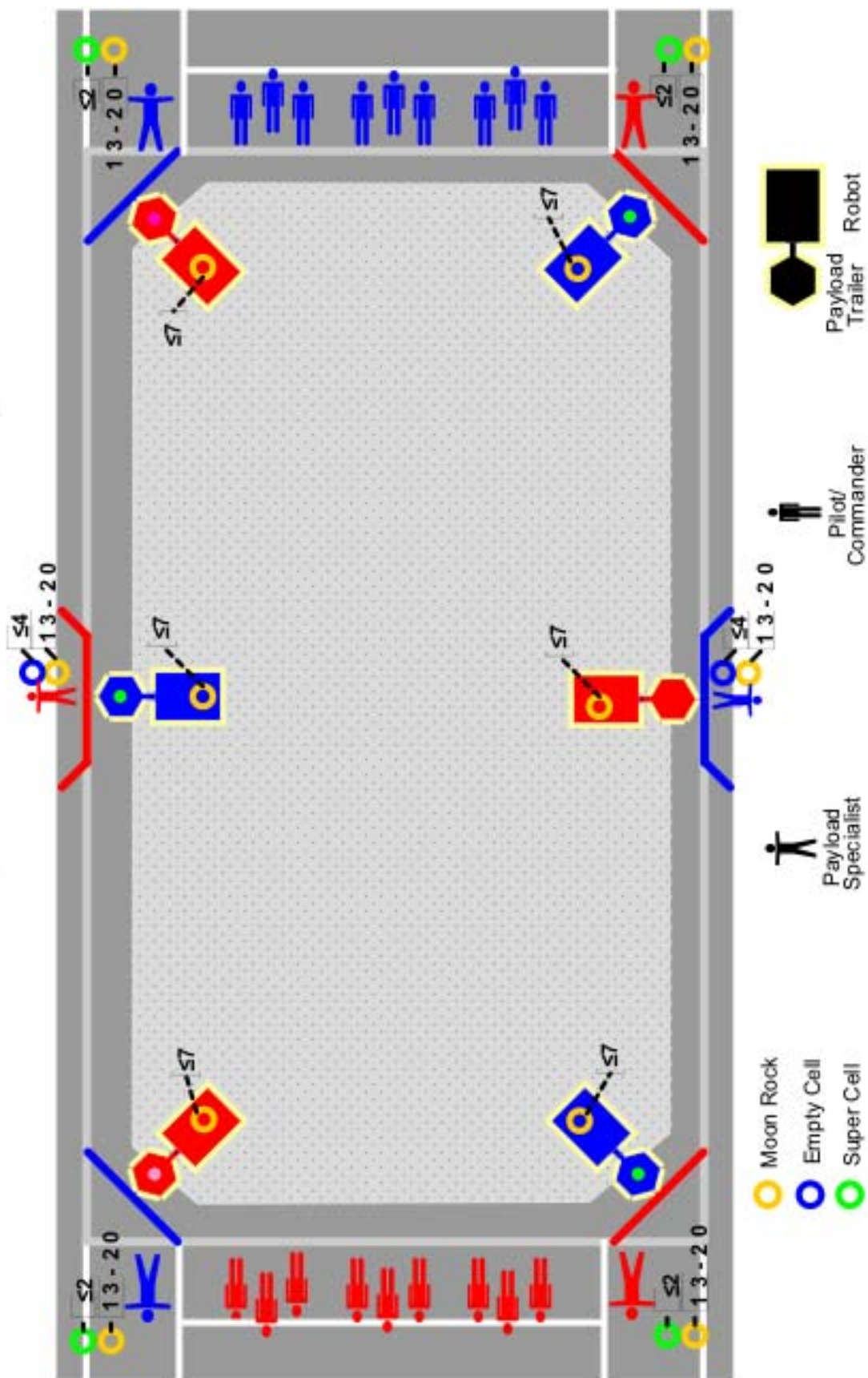
7.3.4 Game Play

7.3.4.1 Starting Conditions

- <G09>** TEAM Starting Positions – Prior to the MATCH, the COMMANDER and PILOTS from each TEAM are stationed behind the PLAYERS LINE, and facing their PLAYERS STATION. The PAYLOAD SPECIALIST is stationed in either of the FUELING STATIONS belonging to the ALLIANCE, or seated in the OUTPOST belonging to the ALLIANCE. The seat belt in each OUTPOST must be snugly fastened around the PAYLOAD SPECIALIST seated in this location. The determination of where the PAYLOAD SPECIALIST is stationed among these three possible locations is negotiated within the ALLIANCE before the start of the MATCH.
- <G10>** ROBOT Starting Positions – Prior to the MATCH, each TEAM negotiates within their ALLIANCE to select one of the three LAUNCH PADS of the ALLIANCE. Each ROBOT is then HITCHED to the TRAILER assigned to the selected LAUNCH PAD. The ROBOT and TRAILER are then placed entirely within the LAUNCH PAD, and positioned such that the TRAILER is in contact with the AIRLOCK or guard rail (as appropriate).
- <G11>** MOON ROCK Starting Positions – Each TEAM is provided with twenty (20) MOON ROCKS prior to the MATCH. The TEAM may place up to seven (7) of the MOON ROCKS in or on the TEAM ROBOT prior to the MATCH. These MOON ROCKS must be completely supported by the ROBOT – they can not be placed on the CRATER floor. The remaining MOON ROCKS are retained by the PAYLOAD SPECIALIST for that TEAM, to be used during the MATCH (containers will be provided at each PAYLOAD SPECIALIST location to temporarily store GAME PIECES).
- <G12>** EMPTY CELL Starting Positions – Prior to the MATCH, four (4) EMPTY CELLS (as modified, if necessary, by Rule <G14>) will be located on the CELL RACK in each OUTPOST. After the start of the MATCH, they are available for use by the PAYLOAD SPECIALIST positioned in the OUTPOST.
- <G13>** SUPER CELL Starting Positions – Prior to the MATCH, two (2) SUPER CELLS (as modified, if necessary, by Rule <G14>) will be located just outside the ARENA and adjacent to each FUELING STATION. From this location, the SUPER CELLS will be swapped for EMPTY CELLS when the conditions described in Rule <G22> are satisfied. After being placed into play, they are available for use by the PAYLOAD SPECIALIST positioned in the FUELING STATION.
- <G14>** CELL Count Modification – If the assigned ALLIANCE score, before penalties, for the last non-surrogate MATCH played by the TEAM was more than twice (2x) the opposing ALLIANCE score, before penalties, then one EMPTY CELL or SUPER CELL will be withheld from the initial set of GAME PIECES made available to the PAYLOAD SPECIALIST for the TEAM. If the assigned ALLIANCE score, before penalties, for the last non-surrogate MATCH played by the TEAM was more than triple (3x) the opposing ALLIANCE score, before penalties, then a second EMPTY CELL or SUPER CELL will be withheld from the initial set of GAME PIECES made available to the PAYLOAD SPECIALIST for the TEAM.

Lunacy

Initial Game Layout



<G15> ROBOT Alignment Devices - Alignment devices (templates, tape measures, laser pointers, etc.) that are not part of the ROBOT may not be used to assist with positioning the ROBOT. TEAMS that use external alignment devices to position their ROBOT will have their ROBOT arbitrarily repositioned before the start of the MATCH.

<G16> ROBOT Size - Each ROBOT shall not exceed the maximum weight or volume specified in Rule <R11>. The Head Referee may call for an inspector's recertification of the ROBOT size and weight prior to the start of any MATCH. ROBOTS determined to be in violation prior to the start of a MATCH will be prohibited from participating in the MATCH. Any ROBOT determined to be in violation during a MATCH will be assigned a PENALTY and will receive a YELLOW CARD (see Rule <S04>).

<G17> Field Equipment - Other than the GAME PIECES, TRAILERS, and competing ROBOTS, no other items shall be placed on the FIELD prior to, or during, the MATCH.

7.3.4.2 Penalties

<G18> Causing PENALTIES – The actions of an ALLIANCE shall not cause an opposing ALLIANCE to break a rule and thus incur penalties. Any rule violations committed by the affected ALLIANCE shall be excused, and no penalties will be assigned.

<G19> ALLIANCE PENALTIES - Unless otherwise noted, all PENALTIES assigned by referees are applied to the entire ALLIANCE.

7.3.4.3 Handling GAME PIECES

<G20> Handling MOON ROCKS – MOON ROCKS are the primary GAME PIECE used to SCORE in the TRAILERS of the opposing ALLIANCE.

A. MOON ROCKS can be SCORED by ROBOTS or PAYLOAD SPECIALISTS.

B. PAYLOAD SPECIALISTS can enter MOON ROCKS into play by launching them over the Alliance Station Wall, launching them over/through the OUTPOST shield, or using the provided tongs to pass them backwards through the FUELING PORT/AIRLOCK. MOON ROCKS can not enter the CRATER by being thrown around the end of the Alliance Station Wall. A violation will cause a PENALTY to be assigned.

C. MOON ROCKS can be recycled to the PAYLOAD SPECIALISTS by passing them over/through the AIRLOCK and through the FUELING PORT in the Alliance Station Wall, or by passing them through the port in the OUTPOST shield. MOON ROCKS can not be recycled to the PAYLOAD SPECIALISTS via any other paths (e.g. over the OUTPOST shield or Alliance Station Wall). A violation will cause a PENALTY to be assigned.

<G21> Introducing EMPTY CELLS – EMPTY CELLS enter the CRATER when the PAYLOAD SPECIALIST passes the EMPTY CELL through the payload port in the OUTPOST shield, or over the Alliance Station Wall from the FUELING STATION. EMPTY CELLS shall not enter the CRATER through any other means (e.g. an EMPTY CELL can not be thrown over the OUTPOST shield and into the CRATER). A violation will cause a PENALTY to be assigned.

<G22> Exchanging EMPTY CELLS - When an EMPTY CELL exits the CRATER via a FUELING PORT, it is retrieved by the PAYLOAD SPECIALIST and stored on the CELL RACK. During the last 20 seconds of the MATCH, each EMPTY CELL in the FUELING STATION may be exchanged for a SUPER CELL. Once an EMPTY CELL has been exchanged for a SUPER CELL, it can not re-enter play. Violations will result in a PENALTY.

<G23> SUPER CELL scoring – During the last 20 seconds of the MATCH, the PAYLOAD SPECIALIST may enter a SUPER CELL into play by removing it from the CELL RACK. They may then enter it into the CRATER, either over the Alliance Station Wall or through the FUELING PORT. A ROBOT or PAYLOAD SPECIALIST can SCORE any SUPER CELL that has been entered in play. If a SUPER CELL is removed from the CELL RACK before the last 20 seconds of the MATCH, then two (2) PENALTIES will be assigned to the offending ALLIANCE: under such conditions, the SUPER CELL may still be entered into play and subsequently SCORED.

<G24> Handling EMPTY CELLS – EMPTY CELLS are typically used as “exchange units” to obtain SUPER CELLS (see Rule <G22>). Alternately, they may be SCORED in a manner similar to MOON ROCKS.

- A. ROBOTS may be in POSSESSION of a maximum of one EMPTY CELL, or may HERD a maximum of one EMPTY CELL at one time. A ROBOT may not be in POSSESSION and HERD EMPTY CELLS at the same time. A violation will cause a PENALTY to be assigned.
- B. EMPTY CELLS can be SCORED by ROBOTS or PAYLOAD SPECIALISTS.
- C. EMPTY CELLS can be recycled to the PAYLOAD SPECIALISTS by passing them over/through the AIRLOCK and through the FUELING PORT in the Alliance Station Wall, or by passing them through the port in the OUTPOST shield. EMPTY CELLS can not be recycled to the PAYLOAD SPECIALISTS via any other paths (e.g. over the OUTPOST shield or Alliance Station Wall). A violation will cause a PENALTY to be assigned

<G25> GAME PIECE Out of Bounds - GAME PIECES that leave the CRATER or FUELING STATIONS will be placed back in play at the earliest safe opportunity. The GAME PIECE will be placed back in the CRATER or FUELING STATION at the approximate location where it exited.

<G25.1> De-scoring GAME PIECES – Once a GAME PIECE has been SCORED, it may not be intentionally de-scored (e.g. removed from the TRAILER). De-scoring a GAME PIECE will cause a PENALTY to be assigned. At the end of the match, any intentionally de-scored GAME PIECES will be considered SCORED as originally placed. GAME PIECES that are knocked free from tenuous placements as a result of normal game interactions (e.g. a GAME PIECE on top of a pile of MOON ROCKS that completely fill a TRAILER falls off when the TRAILER is bumped) will not be penalized.

7.3.5 Robot Operations

7.3.5.1 Robot Out Of Bounds

<G26> ROBOT out of Bounds - Any ROBOT that touches any surface outside of the FIELD boundary during the TELEOPERATED PERIOD will be disabled for the remainder of the period. No PENALTY will be assigned.

<G27> Grace Period after AUTONOMOUS - If a ROBOT should unintentionally touch any surface outside of the FIELD boundary during the AUTONOMOUS PERIOD, it will have a 10 second "grace period" to right itself and return to the FIELD at the beginning of the TELEOPERATED PERIOD. If the ROBOT is unable to right itself within the grace period, it will be disabled for the remainder of the MATCH. If at any time the Head Referee should determine that the attempts to recover from the situation constitute unsafe operations, Rule <S01> will take precedence.

<G28> Alliance Station Wall - ROBOTS may not extend/cross over the Alliance Station Wall for any reason. If a violation of this rule occurs a PENALTY will be assigned and the ROBOT may be disabled.

7.3.5.2 Robot Actions

<G29> Arena Interaction –ROBOTS may push or react against any elements of the ARENA, provided there is no damage or disruption of the ARENA elements. With the exception of a ROBOT towing a TRAILER, ROBOTS may not grab, grasp, grapple, or attach to any ARENA structure. If a ROBOT violates this rule, the TEAM will be given one warning. If the referee determines that the TEAM is disregarding the warning, their ROBOT will be disabled for the remainder of the MATCH. ROBOTS that become entangled in the ARENA elements will not be freed until after the MATCH has finished, unless the entanglement represents a safety hazard.

<G30> Arena Damage - Any ROBOT that has damaged any part of the ARENA, TRAILERS, or GAME PIECES, may be disabled if the Head Referee determines that further damage is likely to occur. The TEAM may be required to take corrective action (such as eliminating sharp edges, removing the damaging MECHANISM, and/or re-inspection) before the ROBOT will be allowed to compete in subsequent MATCHES.

<G31> Disabled ROBOTS and PENALTIES – If a ROBOT becomes incapacitated (e.g. the ROBOT overturns and can not be righted, the battery falls out, etc.), it may be completely disabled by pressing the E-Stop Button in the corresponding Player Station. ROBOTS that are disabled in this manner can not incur further PENALTIES.

<G32> ROBOT to ROBOT Interaction - Strategies aimed solely at the destruction, damage, tipping over, or entanglement of ROBOTS or TRAILERS are not in the spirit of the FRC and are not allowed. In all cases involving ROBOT-to-ROBOT or ROBOT-to-TRAILER contact, the TEAM may receive a PENALTY and/or their ROBOT may be disqualified if the interaction is inappropriate or excessive. However, it is noted that *Lunacy* is a highly interactive game. Robust construction of ROBOTS will be very important in this high-speed competition. ROBOTS should be designed to withstand the contact that will occur during the MATCH. Appropriate contact is allowed under the following guidelines:

- A. High speed accidental collisions may occur during the MATCH, and are an expected part of the game.
- B. Contact within the BUMPER ZONE is generally acceptable.

- C. If a portion of the BUMPER PERIMETER polygon is unprotected by BUMPERS, any contact by another ROBOT within the unprotected region (including the vertical projection of the unprotected region) will be considered incidental contact and will not be penalized.
- D. Contact with a tilted or tipped ROBOT outside the BUMPER ZONE (particularly by the BUMPERS of the contacting ROBOT) will generally be considered incidental contact and will not be penalized.
- E. Contact outside of the BUMPER ZONE is not acceptable, and will result in a PENALTY. The offending ROBOT may be disqualified from the MATCH if the offense is particularly egregious or if it results in substantial damage to another ROBOT.
- F. A ROBOT may not attach to and/or climb onto a ROBOT or TRAILER. Doing so will be interpreted as an attempt to damage an opposing ROBOT, and will be penalized as such.
- G. Use of any sloped or angled feature of the ROBOT as a wedge to overturn an opposing ROBOT or TRAILER is explicitly prohibited, and will be assigned a PENALTY.

<G33> ROBOT Entanglement – Entangled ROBOTS will be disabled if attempts to disengage are causing damage or a dangerous situation. If it is determined that a ROBOT intentionally entangles an opposing ROBOT, the offending ROBOT will be disqualified. If, due to loose cables, hoses, cords, etc., a ROBOT unintentionally but routinely entangles another ROBOT as a result of normal game interaction, the ROBOT may be disqualified. The TEAM will be required to repair the entangling elements before the ROBOT will be permitted to participate in subsequent MATCHES.

<G34> Detaching MECHANISMS - ROBOTS may not intentionally detach parts or leave multiple MECHANISMS on the FIELD. Violations will result in a PENALTY for each incident. If an intentionally detached COMPONENT or MECHANISM significantly impedes MATCH play, the offending ROBOT will be disqualified from the MATCH.

<G35> TRAILER attachment - ROBOTS must not intentionally detach from their assigned TRAILER. A violation will result in disqualification from the MATCH. If the TRAILER is unintentionally detached from the ROBOT, the ROBOT will be disabled for the remainder of the MATCH.

<G36> ARENA Reset - ROBOTS must be designed to permit the release and removal of any GAME PIECES and the TRAILER from the ROBOT without being powered up after a MATCH. If a ROBOT violates this rule, the offending TEAM will be warned and requested to modify the ROBOT. If the modification is not made, the ROBOT may not be permitted to compete in future MATCHES.

7.3.6 Team Member Actions

<G37> TEAM Members In ARENA – Each ALLIANCE shall have no more than the four designated members of each of the three participating TEAMS in the arena during a MATCH. Any ALLIANCE with additional personnel in the ARENA will be assigned a PENALTY, and the additional personnel must leave the area before the MATCH can proceed.

- <G38>** TEAM Positions During AUTONOMOUS PERIOD – During the AUTONOMOUS PERIOD, the PILOTS and COMMANDER must stand behind the PLAYERS LINE within their ALLIANCE ZONE. Any control devices worn or held by the PILOTS must be disconnected from the OPERATOR CONSOLE, and not connected until after the AUTONOMOUS PERIOD. During the AUTONOMOUS PERIOD, the PAYLOAD SPECIALIST must stay within one of the OUTPOSTS or FUELING STATIONS (either local or remote). Each violation (stepping outside the designated area, or stepping across the PLAYERS LINE) will result in a PENALTY. Exceptions will be made in cases involving personal or OPERATOR CONSOLE safety.
- <G39>** TEAM Positions During TELEOPERATED PERIOD - During the TELEOPERATED PERIOD, the PILOTS and the COMMANDER may travel anywhere within the ALLIANCE ZONE (note that the ALLIANCE ZONE includes the local FUELING STATION). The PAYLOAD SPECIALIST must remain within the FUELING STATION to which they are assigned for the entire MATCH. The PAYLOAD SPECIALIST stationed in the OUTPOST must remain in the OUTPOST seat during the entire MATCH (note that if the PAYLOAD SPECIALIST in the OUTPOST unbuckles the seat belt or stands up in this location, it may be considered a violation of <S01>). Each violation (stepping outside the designated area, or stepping across the PLAYERS LINE) will result in a PENALTY. Exceptions will be made in cases involving TEAM member safety.
- <G40>** GAME PIECE Interaction – With the exception of PAYLOAD SPECIALISTS, no TEAM member may manipulate GAME PIECES at any time during the MATCH. Violations will result in a PENALTY.
- A. At the start of the MATCH, the PAYLOAD SPECIALIST shall not be in possession of any GAME PIECE. Violations will result in a PENALTY.
 - B. At any time after the start of the MATCH, a PAYLOAD SPECIALIST may enter a GAME PIECE into play (e.g. launch a MOON ROCK into the CRATER or pass an EMPTY CELL through the port in the OUTPOST shield to a ROBOT).
 - C. PAYLOAD SPECIALISTS retrieving GAME PIECES passed from the CRATER through the AIRLOCK / FUELING PORT must use the provided tongs to pick up the GAME PIECE from the floor. Failure to do so will cause a PENALTY to be assessed.
 - D. The PAYLOAD SPECIALISTS is permitted to reach through the FUELING PORT with the provided tongs to manipulate GAME PIECES in the “dead space” between the AIRLOCK and the FUELING PORT. However, any contact with a ROBOT while doing so will be considered a violation of Rule <S02>.
- <G41>** PILOTS Operating ROBOTS - During a MATCH, the OPERATOR CONSOLE shall be operated solely by the PILOTS. Any operation of the OPERATOR CONSOLE by other than the designated PILOTS will result in the ROBOT being disabled and the offending TEAM being disqualified from the MATCH.
- <G42>** Respect and professional demeanor - *FIRST* competitions promote respect and professional demeanor. In the event that any TEAM members in the arena are uncivil towards competition personnel or other TEAMS, the TEAM may be disqualified from the MATCH. This rule applies to TEAMS at all times while in the ARENA (including before and after the MATCH). TEAMS will not receive MATCH PENALTIES for actions off-field, however event personnel will hold them accountable for their off-field actions.

7.3.7 Referee Interactions

- <G43>** REFEREE Discussions - Any discussions regarding calls, rules, scores, or penalties must be between a pre-college student member of the TEAM and the Head Referee.
- <G44>** Information Sources - When making a ruling, the Head Referee may receive input from other sources, particularly Game Design Committee members, *FIRST* personnel, and technical staff that may be present at an event. However, the Head Referee's decision is final (refer to Rule <T03>).