

## 5 MATCH PLAY

During each DESTINATION: DEEP SPACE Presented By The Boeing Company MATCH, two (2) ALLIANCES (an ALLIANCE is a cooperative of up to four (4) *FIRST*® Robotics Competition teams) play MATCHES, setup and executed per the details described below.

### 5.1 SETUP

#### 5.1.1 GAME PIECES

Twenty-four (24) of each GAME PIECE are staged on each side of the ARENA for each MATCH as follows:

- A. one (1) HATCH PANEL is loaded in each of the two (2) LOADING STATIONS,
- B. six (6) CARGO are staged in each of the two (2) DEPOTS,
- C. each of the three (3) teams may preload one (1) HATCH PANEL or one (1) CARGO in their ROBOT such that it is fully supported by that ROBOT, and
- D. remaining HATCH PANELS (quantity 19-22, depending on decisions made in C) and CARGO (quantity 9-12, depending on decisions made in C) are staged in the corresponding ALLIANCE STATIONS, split evenly (or off by one if an odd remainder) between the GAME PIECE Holders.

Additional GAME PIECES are staged as follows:

- E. One (1) CARGO is staged in each of the two (2) ALLIANCE WALL-facing CARGO SHIP BAYS
- F. Each team must prepopulate one (1) CARGO or one (1) Null HATCH PANEL (a HATCH PANEL marked with white tape and hardware installed to secure Null HATCH PANEL to the CARGO SHIP, see drawing GE-19244) in each of their two (2) designated CARGO SHIP BAYS (designated per the MATCH schedule and per Figure 5-2). Nonstaged Null HATCH PANELS and CARGO are excluded from MATCH play. If no team decision, the BAY will be populated with one (1) CARGO. If order placement of GAME PIECES matters to either or both ALLIANCES, the ALLIANCE must notify the Head REFEREE during setup for that MATCH. Upon notification, the Head REFEREE will require ALLIANCES alternate placement of all GAME PIECES. In a Qualification MATCH, GAME PIECES will be placed in the following order: Blue Station 1, Red Station 1, Blue Station 2, Red Station 2, Blue Station 3, Red Station 3. In a PLAYOFF MATCH, the same pattern is applied, but instead of Red ALLIANCE placing last, the higher seeded ALLIANCE (regardless of color) places last.



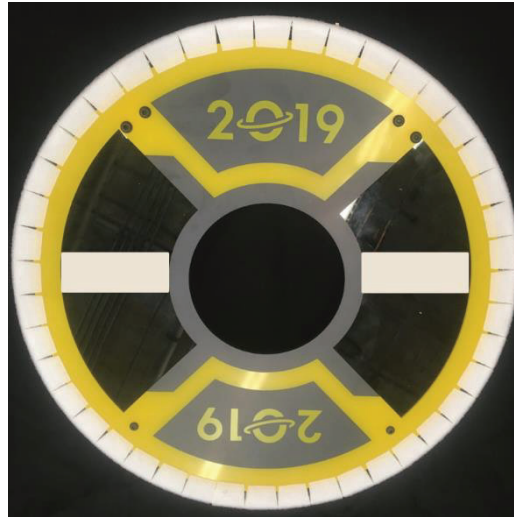


Figure 5-1 Null HATCH PANEL

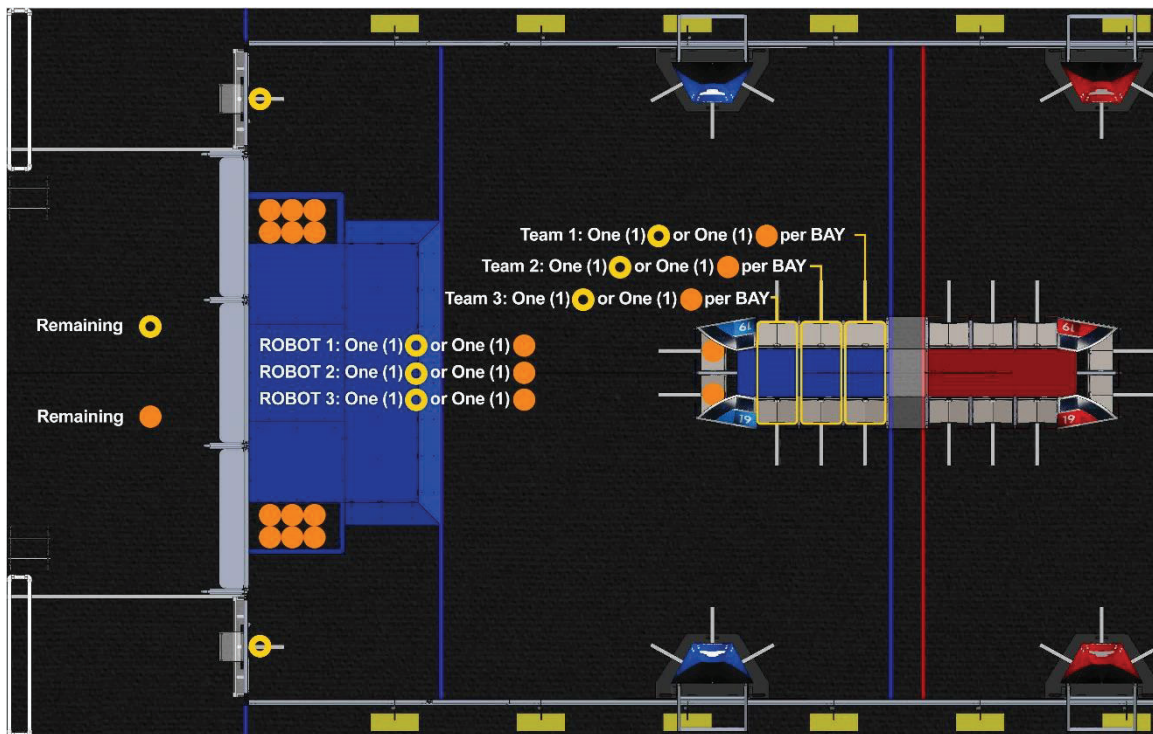



Figure 5-2 GAME PIECE staging (~1/2-FIELD shown)

### 5.1.2 ROBOTS

Teams stage their ROBOT on their HAB PLATFORM such that it is fully and only supported by HAB PLATFORM Levels 1 or 2.

If order placement of ROBOTS matters to either or both ALLIANCES, the ALLIANCE must notify the Head REFEREE during setup for that MATCH. Upon notification, the Head REFEREE will require





ALLIANCES alternate placement of all ROBOTS. In a Qualification MATCH, ROBOTS will be placed in the following order: Red Station 1 ROBOT, Blue Station 1 ROBOT, Red Station 2 ROBOT, Blue Station 2 ROBOT, Red Station 3 ROBOT, Blue Station 3 ROBOT. In a PLAYOFF MATCH, the same pattern is applied, but instead of Red ALLIANCE placing, the higher seeded ALLIANCE (regardless of color) will place last.

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### 5.1.3 HUMANS

DRIVERS, COACHES, and HUMAN PLAYERS stage between the STARTING LINES in their ALLIANCE STATION. TECHNICIANS stage in the event-designated area near the FIELD.

## 5.2 SANDSTORM PERIOD

The SANDSTORM PERIOD is a fifteen (15) second period at the start of each MATCH (T-minus 150s to T-minus 135s), during which the PLAYER STATION is blocked by the SANDSTORM. Teams have the option of their ROBOTS operating autonomously, driving blind, or using visual feedback provided by the ROBOT to navigate the FIELD.

## 5.3 SCORING

ALLIANCES are rewarded for accomplishing various actions throughout the course of a MATCH, including ROBOT movement while DRIVERS are blind, repairing their ROCKETS by installing HATCH PANELS, loading their space craft with CARGO, returning to their HAB PLATFORM, and winning or tying MATCHES.

Rewards are granted either via MATCH points (which contribute to the ALLIANCE'S MATCH score) or Ranking Points (which increase the measure used to rank teams in the Qualification tournament). Such actions, their criteria for completion, and their point values are listed in Table 5-1. Scores are assessed and updated shortly after the end of the SANDSTORM PERIOD and throughout the rest of the MATCH.

Except for the SANDSTORM bonuses, scores are based on the state of the FIELD when the ARENA timer displays zero. However, if GAME PIECES are in motion when the ARENA timer displays zero (0), GAME PIECE scores are assessed once they come to rest. Additionally, if a ROBOT is in motion when the ARENA timer displays zero (0) or moves immediately after becoming DISABLED, its score is evaluated five (5) seconds after the ARENA timer displays zero (0).

For the purposes of assessing SANDSTORM and HAB Climb Bonuses described in Table 5-1, a ROBOT is considered to have started from, or climbed to, a HAB Level if:

1. the ROBOT'S BUMPERS are fully above the Level's platform and
2. the ROBOT is only supported by:
  - surfaces of the HAB PLATFORM at or above that Level (including transitively through a GAME PIECE),
  - ALLIANCE WALL, and/or
  - another ROBOT which has climbed to that HAB Level or higher

SANDSTORM and HAB Climb Bonuses are evaluated and scored by human REFEREES. Teams are encouraged to make sure that it's obvious and unambiguous that a ROBOT is not being supported by anything below that Level.



Table 5-1 DESTINATION: DEEP SPACE scoring opportunities

Award	Awarded for...	Value
<b>SANDSTORM Bonus 1</b>	each ROBOT whose BUMPERS fully cross the HAB LINE during the SANDSTORM PERIOD. Value corresponds to the Level from which the ROBOT started.	3
<b>SANDSTORM Bonus 2</b>		6
<b>HATCH PANEL</b>	each HATCH PANEL (excluding Null HATCH PANELS) attached to a ROCKET or CARGO SHIP such that it is fully supported by that ROCKET or CARGO SHIP and via the hook/loop tape (contact by an opponent ROBOT does not count as “support” and does not negate a scored HATCH PANEL). No more than one HATCH PANEL per HATCH will be counted.	2
<b>CARGO</b>	each CARGO partially or completely (regardless of inflation state) in a BAY with a Null HATCH PANEL or scored HATCH PANEL and not in contact with a ROBOT from that ROCKET/CARGO SHIP’S ALLIANCE. No more than one CARGO per BAY will be counted.	3
<b>HAB Climb Bonus: Level 1</b>	each ROBOT which has climbed their HAB PLATFORM (value corresponds to the Level to which the ROBOT has climbed). A ROBOT whose BUMPERS haven’t fully crossed their HAB LINE to leave their HAB ZONE at any point during the MATCH isn’t eligible.	3
<b>HAB Climb Bonus: Level 2</b>		6
<b>HAB Climb Bonus: Level 3</b>		12
<b>HAB Docking</b>	earning at least fifteen (15) HAB Climb Bonus points.	1 Ranking Point
<b>One (1) Complete ROCKET</b>	completing at least one (1) ROCKET with six (6) scored HATCH PANELS and six (6) scored CARGO	1 Ranking Point
<b>Tie</b>	Completing a MATCH with the same number of points as your opponent.	1 Ranking Point
<b>Win</b>	Completing a MATCH with more points than your opponent.	2 Ranking Points

An ALLIANCE can earn up to four (4) Ranking Points (RP) per Qualification MATCH, as described in Table 5-1. There are no RP, or comparable point bonuses, in Playoff MATCHES.

## 5.4 RULE VIOLATIONS

Upon a rule violation, one or more of the penalties listed in Table 5-2 will be assessed.



Table 5-2 DESTINATION: DEEP SPACE rule violations

Penalty	Description
<b>FOUL</b>	a credit of three (3) points towards the opponent's total score
<b>TECH FOUL</b>	a credit of ten (10) points toward the opponent's total score
<b>YELLOW CARD</b>	a warning issued by the Head REFEREE for egregious ROBOT or team member behavior or rule violations. A subsequent YELLOW CARD within the same tournament phase will lead to a RED CARD.
<b>RED CARD</b>	a penalty assessed for egregious ROBOT or team member behavior or rule violations which results in a team being DISQUALIFIED for the MATCH.
<b>DISABLED</b>	ROBOT is commanded to deactivate all outputs, rendering the ROBOT inoperable for the remainder of the MATCH.
<b>DISQUALIFIED</b>	the state of a team in which they receive zero (0) MATCH points and zero (0) Ranking Points in a Qualification MATCH or causes their ALLIANCE to receive zero (0) MATCH points in a Playoff MATCH

Several rule violations escalate if the REFEREE determines an action was “strategic.” While there’s no official *FIRST* Robotics Competition definition of strategic, generally it’s meant to apply to rule violations that the REFEREE believes are designed or planned to serve a particular purpose or advantage to the ALLIANCE.

Some rule violations escalate if the REFEREE determines an action was “repeated.” While there’s no official *FIRST* Robotics Competition definition of repeated, it’s meant to apply to rule violations that occur more than once within a MATCH.

## 5.5 DRIVE TEAM

A DRIVE TEAM is a set of up to five (5) people from the same *FIRST* Robotics Competition team responsible for team performance for a specific MATCH. There are four (4) specific roles on a DRIVE TEAM which ALLIANCES can use to assist ROBOTS with DESTINATION: DEEP SPACE.

The intent of the definition of DRIVE TEAM and DRIVE TEAM related rules is that, barring extenuating circumstances, the DRIVE TEAM consists of people who arrived at the event affiliated with that team and are responsible for their team’s and ROBOT’S performance at the event (this means a person may be affiliated with more than one (1) team). The intent is not to allow teams to “adopt” members of other teams for strategic advantage for the loaning team, borrowing team, and/or their ALLIANCE (e.g. an Alliance Captain believes one of their DRIVERS has more experience than a DRIVER on their 1st pick, and the teams agree the 1st pick team will “adopt” that DRIVER and make them a member of their DRIVER TEAM for Playoffs).

The definition isn’t stricter for two main reasons. First, to avoid additional bureaucratic burden on teams and event volunteers (e.g. requiring that teams submit official rosters that queuing must check before allowing a DRIVE TEAM in to the ARENA). Second, to provide space for exceptional circumstances that give teams the opportunity to display Gracious Professionalism (e.g. a bus is delayed, a COACH has no DRIVERS, and their pit neighbors agree to help by loaning student DRIVERS as temporary members of the team until their bus arrives).



Table 5-3 DRIVE TEAM roles

Role	Description	Max./ DRIVE TEAM	Criteria
<b>COACH</b>	a guide or advisor	1	Pre-college student or adult mentor Must wear “COACH” button
<b>DRIVER</b>	an operator and controller of the ROBOT	3	Pre-college student Must wear one (1) of the three (3) “DRIVE TEAM” buttons
<b>HUMAN PLAYER</b>	a GAME PIECE manager		
<b>TECHNICIAN</b>	a resource for ROBOT troubleshooting, setup, and removal from the FIELD	1	Pre-college student Must wear “TECHNICIAN” button

The TECHNICIAN provides teams with a technical resource for pre-MATCH setup, ROBOT connectivity, OPERATOR CONSOLE troubleshooting, and post-MATCH removal of the ROBOT. Some pre-MATCH responsibilities for the TECHNICIAN may include, but are not limited to:

- location of the ROBOT radio, its power connection, and understanding of its indicator lights
- location of the roboRIO and understanding of its indicator lights
- username and password for the OPERATOR CONSOLE
- restarting the DRIVER Station and Dashboard software on the OPERATOR CONSOLE
- changing the bandwidth utilization (e.g. camera resolution, frame rate, etc.)
- changing a battery
- charging pneumatics

While the TECHNICIAN may be the primary technical member of the DRIVE TEAM, all members of the DRIVE TEAM are encouraged to have knowledge of the basic functionality of the ROBOT, such as the location and operation of the main circuit breaker, connecting and resetting joysticks or gamepads from the OPERATOR CONSOLE, and removing the ROBOT from the HAB PLATFORM.

## 5.6 OTHER LOGISTICS

GAME PIECES that leave the FIELD are placed back into the FIELD approximately at the point of exit by FIELD STAFF (REFEREES, FTAS, or other staff working around the FIELD) at the earliest safe opportunity.

Note that ROBOTS may not deliberately cause GAME PIECES to leave the FIELD (see G7).

An ARENA FAULT will not be called for MATCHES that accidentally begin with an incorrect number of, incorrectly positioned, or damaged GAME PIECES. Damaged GAME PIECES will not be replaced until the next FIELD reset period. DRIVE TEAMS should alert the FIELD STAFF to any missing or damaged GAME PIECES prior to the start of the MATCH.

Once the MATCH is over and the Head REFEREE determines that the FIELD is safe for FIELD STAFF and DRIVE TEAMS, they or their designee will change the LED lights to green and DRIVE TEAMS may retrieve their ROBOT in accordance with S2.

In addition to the two (2) minutes and thirty (30) seconds of game play, each MATCH also has pre- and post-MATCH time for setup and reset of the ARENA. During ARENA reset, the ARENA is cleared of ROBOTS and OPERATOR CONSOLES from the MATCH that just ended. The ROBOTS and





OPERATOR CONSOLES for the subsequent MATCH are loaded into the ARENA by DRIVE TEAMS at this time. FIELD STAFF also use this time to reset ARENA elements and GAME PIECES.



