

How to Watch the 2024 FIRST “Crescendo” Robotics Game

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This guide explains the basic flow of the FIRST “Crescendo” Robotics Game to a VIP, family member or visitor who is new to the game. It suggests what to watch on the field and tells why Robots are doing what they are doing. Scoring is explained with examples and predictions.

It is best to read this while you watch a Match, either live or recorded. Live Matches can be seen at <https://www.twitch.tv/firstinspires1> (and similar URLs with higher numbers). Past Matches can be watched at <https://www.thebluealliance.com/events>. (Pick a past event and choose the tab for the “Results”. Click the little circle with a triangle arrow inside next to the Match you want to watch. Click the “Play” arrow in the middle of the video picture. To show the video in full screen, click the square box in the lower right-hand corner.)

The theme story this year is that the Game Field represents a musical concert with 2 competing bands. The Robots cycle back and forth to opposite ends of the field picking up orange colored rings called “Notes” from their “Source” and place them into their “Amp” and “Speaker”. Defense will play a role to block Robots from moving around the field. At the end of the Match, the Robots will try to climb onto their “Stage” in the middle of their half of the Game Field which is simulated by grabbing a swinging chain and lifting themselves off the floor.

For each Qualification Match, random groups of three Robots are assigned to either a “Red” temporary Alliance or a “Blue” temporary Alliance. Scoring is for the Alliance as a whole; scores are not tracked for each individual Robot. Since each 3-Team Alliance is randomly assigned there can be a great deal of luck involved in having either strong or weak partners or opponents. Before each Match, a preview screen is displayed to the audience showing the Alliance colors, Team numbers and names and their current Ranking position (#1 being best).

3 ... 2 ... 1 ... CRESCENDO !!!

The Robots start out parked in their “Robot Starting Zone” in front of their Student Drivers. In the beginning 15-second Autonomous Period (Auto), at the sound of the Calvary Charge, the Robots move independently, performing pre-programmed motions and tasks.

For each Robot that simply moves out of its Robot Starting Zone as defined by the black tape on the carpet, that Alliance scores 2 points (called a “Leave”).

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Each Robot can start with a single Note in its possession which it can score in its Amp or Speaker which are nearby. During the Auto period, scoring each Note into the Speaker is worth 5 points and scoring each Note into the Amp is worth 2 points (easier because it is lower).

During Auto, Robots are not allowed to interact with Robots or Notes on the other side of the Center Line. The better Robots will be able to pick up 2 or 3 additional Notes from the floor and score them before the 15-second Auto Period expires. The best Robots will carefully approach the Center Line and pick up additional Notes to score. Rules limit each Robot to controlling only 1 Note at a time.

The Game Field area is very crowded so there must be careful pre-Match planning to decide where and when each Robot is moving. Great Teams will have a dozen or more pre-programmed Auto patterns. Some Teams might only have a single Auto program so they might need to turn it off and just sit still for the entire Auto period or simply drive forward to score the 2 Leave points.

To allow for more freedom of movement, most Teams built their Robot short enough (2 feet 4 ¼ inches) to be able to drive under the hanging chains of the Stage. In any case, the maximum allowable height of all Robots and their extended arms is 4 feet. In addition, Robots are not permitted to extend any part to the side more than 1 foot beyond their frame perimeter.

ACTION DURING THE MATCH

At the end of the 15-second Autonomous Period, you will hear a buzzer and 3 bells and see the Student Drivers step forward to the manual controls to begin the 2-minute-15-second TeleOp period during which the Students remotely operate the Robots.

Students will drive their Robot around the field, collecting a maximum of 1 Note at a time and scoring them into their Amp and Speaker. At the start of the TeleOp period, the Amp is only worth 1 point for each Note and the Speaker is worth 2 points for each Note. But 2 options are now available that make the game more complicated and exciting.

For the first 45 seconds of TeleOp, both Alliances can earn the Coopertition Bonus which requires pre-planning between the 2 Alliances. There are 2 steps. First, there needs to be a Note in both Amps. Then the 2 Human Players at the 2 Alliance Amps need to press their Coopertition buttons. This does not affect the points score immediately, but it creates advantages explained below.

The second option is for an Alliance to place 2 Notes in their Amp and then press the “Amplify” button on the top of their Amp. Then for the next 10 seconds, any Notes scored in the Speaker will earn 5 points instead of the normal, un-amplified 2 points. During the 10-second Amplification period, the word “Amplified” is displayed on the Audience Display next to the Team numbers together with a countdown clock. Notes placed in the Amp cannot be used for both the Coopertition Bonus and the Amplification option. On top of the Amp, there are 2 lights. The Alliance-colored stacked light indicates the number of Notes available to be used for either option. The amber-colored light indicates the progress of earning the Coopertition Bonus.

To help Robots find and align with the different locations of elements, there are 16 “April tag” signs posted around the Game Field with unique black and white patterns. Robots with a camera can recognize these and guide their movements.

If a Robot is not good at picking up or scoring Notes, they will typically be playing defense where they will try to inhibit the opponent Robots from getting Notes and scoring. There are “safe” areas where a Robot is not allowed to be contacted. These include the Amp Zone where Robots are scoring Notes, the Source Zone where Robots are getting Notes, the Stage Zone (in the last 20 seconds of the Match) and while touching the colored panel at the bottom of the Stage leg nearest the Speaker (called the “Podium”).

Notice that some Robots pick up Notes on one side and shoot from the opposite side. Other Robots pick up Notes and shoot them from the same end. This is more efficient when picking up Notes from the floor around the Speaker since they don’t need to turn around to shoot.

If you hear the sound of a foghorn that means the Match has been stopped due to a failure of the field’s timing, scoring or control system.

WHO IS WINNING ?

During the Match, you can see the real-time scores on the Audience Display: The number of the current Qualification Match is shown at the top of the scoring box at the bottom of the Audience

Display along with the number of the final Match (like the “6” and “87” in: “Qualification 6 of 87”). The 3 Team numbers in each Alliance are shown next to the scores. If a Team number has a yellow background that means they have received a yellow card warning for breaking important rules. If they have another serious rule-breaking Match, they will advance to a red card and not get any credit for Alliance points in that Match. The time left in the Match is shown in the center.

END GAME

When 20 seconds remain in the Match, you will hear the sound of a guitar riff. Robots can continue scoring Notes, but many will start to move toward 1 of the 3 sides of their Stage to grab the chain which can swing back and forth. Each Robot that pulls itself off the floor and remains there 5 seconds after the end of the Match is called “OnStage” and earns 3 points. It is a tight fit, but up to 3 Robots can hang from 1 chain. If 2 or more Robots hang from the same chain, it is called a “Harmony” and scores 2 extra points. Any Robot whose bumpers are fully inside their Stage border, but not hanging from a chain, earns 1 point (called “Park”).

Above each of the 3 Stages and their April tag is a small slot called the “Trap”. Placing a Note down into a Trap earns the Alliance 5 points each. Usually this is done while hanging and centered on the chain. So this does not happen very often.

In addition to the 45 Notes stored at their “Source” loading station at the far end of the Field, each Alliance has 3 “High Notes” which can only be used in the last 20 seconds of the Match. These look like regular Notes but have 3 bands of white tape wrapped around them. They cannot be scored like regular Notes. Instead, the Human Player on each Alliance is allowed to throw the High Notes attempting to land them on one of the 3 short vertical pipes (called “Microphones”) on top of the Stages. If a High Note lands on a Microphone that is above a Robot that is OnStage, it is called “SpotLit” or “Spotlighted” and earns an extra point. This is very rare.

After 2 minutes and 30 seconds, the Match ends with a Buzzer. You might see a ref waving his arm to count 5 seconds at which point they determine if any Robot has descended to the floor.

Expect the average Match score to be about 40 to 50. Winning scores will typically be 60 to 70 points. High scores in the Playoffs can reach 130.

The real-time scoring shown during the Match is not official. It does not include the End Game points. Some penalties for fouls are not added into the displayed scores until after the Match is over. The display changes after the Match to show the official winning Alliance, each Team’s new Ranking position, the Alliance points for each category and icons for each earned Ranking Point. If the Coopertition Bonus was achieved, there will be a small yellow square showing a hand shake.

OVERALL GOAL

The goal during the 2 days of 60 to 90 Qualification Matches is to achieve top Ranking by earning Ranking Points (RPs). These will be used to determine which Teams get to choose their partners for a Double Elimination Tournament (Playoffs). Winning a Match earns every Team on that Alliance 2 RPs. All 6 Teams get 1 RP in the unlikely case of a tie score. There are 2 additional RPs available to each Alliance in every Match:

The first is called the Melody Ranking Point. It is earned when an Alliance gets at least 18 Amp & Speaker Notes (not points). To make it more attainable, this threshold is reduced from 18 to 15 Notes if the 2 Alliances earn the “Coopertition Bonus” as described above. About 35% of the Alliances will earn this RP. The Coopertition Bonus does not count as an RP itself but the average number of Matches where the Coopertition Bonus was earned is used as the tiebreaker for the overall Ranking after the Teams are sorted by their average number of Ranking Points per Match. This is the 2nd advantage of earning the Coopertition Bonus.

The second possible RP is called the “Ensemble”. This is earned if the Alliance scores at least 10 Stage points and gets 2 Robots to earn the OnStage points in the End Game of each Match. Included in the Stage points are the Park (1), OnStage (3) (4 if SpotLit), Harmony (2) and Trap (5). The Melody RP is more frequently earned than the Ensemble RP. In most cases, if an Alliance earns the Ensemble RP they will also earn the Melody RP. About 27% of the Alliances will earn the Ensemble RP. Every Team in the Alliance earns each of these 2 additional RPs regardless of which Robots actually do the needed tasks.

A Team can be on the Winning Alliance and still go down in Rank. This is because a win only earns a Team 2 RPs (Ranking Points) which are averaged into the existing total RPs a Team has earned in all its Matches so far. Other Teams that were previously Ranked lower might have gotten 3 or 4 RPs in more Matches, giving them a higher average number of RPs per Match.

About 10% of all Matches will have an Alliance that earns all 4 of the Ranking Points. This is called a “Unicorn”. Even the losing Alliance can earn 2 RPs for the Melody RP and the Ensemble RP.

PENALTIES FOR BAD ROBOT BEHAVIOR

A few General rules: A Robot can't reach into another Robot. A Robot can't pin an opponent for more than 5 seconds. Referees will point to the offending Robot and wave their other arm with a flag counting the 5 seconds and then either wave it off, if the pin is released, or wave their flag vigorously for a Foul. Each Robot can only control 1 Note at a time. No Robot is allowed to damage another Robot or the Game Field. Breaking a rule results in a 2-point Foul being called by the referees who wave the red or blue ends of their flags. More serious fouls, called Technical Fouls, result in a 5-point penalty which Referees indicate by making an “X” with crossed arms. Penalty points are added to the opponent's score.

DOUBLE ELIMINATION TOURNAMENT (PLAYOFFS)

After all the randomly assigned Qualification Matches have been played, the 8 highest Ranked Teams get priority to pick partners for the Elimination Tournament (Playoffs). In the likely case of a tie Ranking between 2 or more Teams with the same average RPs (Ranking Score), the tiebreaker is the average Coopertition Bonus Points. This puts an increased importance on earning the Coopertition Bonuses. If there is still a tie, then the tied Teams are sorted by the average earned Match Points not including penalties, then the average Auto Points, then the average Stage Points. In the unlikely event there is still a tie, the tied Teams are randomly sorted.

The #1 Ranked Team becomes the #1 Alliance Captain who gets to pick their 1st partner, then #2 picks a partner and so on down to #8. Then #8 gets to immediately pick a 2nd partner, then #7 and so on back up to #1. This is called the serpentine “Alliance Selection”. Note that #1 gets to pick both 1st and 16th. This serves to give all Teams a chance of winning. At a Regional, this results in 24 Teams being in the Playoffs. The only rule is that if a Team “declines” to be picked they cannot be picked by another Alliance Captain. But if they are one of the top 8 Alliance Captains, they can still pick other Teams as partners to form their own Alliance. When an Alliance Captain picks one of the other top 8 Teams, the next highest Ranked unpicked Team moves up to become the #8 Alliance Captain. At one extreme if the first 7 Alliance Captains pick the other top 14 Ranked Teams, then the 15th Ranked Team would become the #8 Alliance Captain. Or if the #9 Ranked Team declines to be picked and none of the other top 8 Teams are picked they will not move up to #8 and since no Team can pick #9 they will not be in the Playoff Tournament.

In the Playoffs, an Alliance must lose twice to be eliminated. The Playoffs have a special pattern that avoids an Alliance having to play against the same Alliance twice in a row. There is an Upper Bracket with Alliances who have won every Playoff Match and a Lower Bracket for Alliances who have lost once. The 2 Alliances who make it to the Finals compete in a best-2-out-of-3 format.