

# FIRST Technical Advisor Manual

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## Overview

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### Job Description

The *FIRST* Technical Advisor (FTA) is the lead technical volunteer, an advocate for teams, and an advisor to the Head Referee. The FTA role is a key volunteer position that requires great people skills. An FTA's time is primarily spent providing technical support to students setting up their robots for a match. Additional duties include managing technical volunteers, setting up and tearing down the robot fields, overseeing inspection, performing field maintenance, and providing technical support for the FTC Live scoring system.

Requirements	
Technical	High
Physical	Medium
Administrative	High
Communication	High
Pre-event Training	High

### Time Commitment

FTA training and certification for a new volunteer may take 2-4 hours. Most *FIRST* Tech Challenge events are whole-day events, 8-12 hours. In addition, plan for one to three hours for set-up and teardown of the field. A maximum of 19 hours for a new FTA volunteer.

### Attire

- Comfortable closed-toe, closed-heel shoes, much of the day will involve standing and walking.
- ANSI Z87.1 certified safety glasses are required in the pit and competition areas.
- As one of the event leaders, comfortable professional wear is encouraged.

### Training and Certification

Volunteers must create an account on [www.firstinspires.org](http://www.firstinspires.org) and apply to the role. If you apply to an event role requiring training and certification, the 'Roles Missing Certification' section will appear on your Volunteer Dashboard. Click on 'Review Outstanding Tasks', then click the 'Resolve' button. This will take you directly to the training site. Alternately, you may also click on the 'Trainings/Certification' button on the top right of the screen. If you have applied for a role but have not received access to the training, please email [FTCTrainingSupport@firstinspires.org](mailto:FTCTrainingSupport@firstinspires.org). A separate confirmation of the role assignment will come later.

FTA should speak to the Event Director/Field Supervisor to find out what additional requirements, such as meetings before the event or run-throughs of the space before the event are required.

All Volunteers are expected to read and comply with the [Volunteer Handbook](#).

## Roles and Responsibilities

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**FIRST is fun for all.** The most important role of a volunteer is to provide a safe, fun and welcoming environment to all *FIRST* participants. When executing the duties of your role, always make decisions with the team experience in mind. Ask for help from event leadership if you feel your required duties conflict with the best team experience.

### Prerequisites for FTA

A well-rounded FTA needs to have the following knowledge/skills:

- Soft skills to communicate with teams and volunteers.
- In-depth knowledge of the *FIRST* Tech Challenge Android-based control system.
- Experience with the TETRIX® and REV Robotics® design systems.
- Familiarity with the *FIRST* Tech Challenge Live scoring system.
- Experience with devices running the Android operating system.
- Experience/familiarity with computers, especially those running the Windows® 7 or higher operating system.
- Experience with Wi-Fi and Wi-Fi Direct networking.
- Ability to use deductive reasoning to solve technical problems; and
- Ability to repair damage to the fields.

### Reporting Structure

In addition to reporting to and working with the Field Supervisor, the FTA will work with Control System Advisor (CSA) and the Wi-Fi Technical Advisor (WTA) volunteers. The FTA will assume the responsibilities of the CSA and/or WTA if these volunteer roles are not staffed. The CSA's responsibility is to provide complimentary, in-depth technical support to teams at an event. If an FTA is working with a team and encounters a technical issue that requires in-depth troubleshooting, then the FTA should direct the team to visit the CSA for more extensive technical support.

The WTA's responsibility is to conduct a pre-competition Wi-Fi site survey and monitor, police, and troubleshoot the wireless environment during an event. If an FTA suspects interference or malicious activity on the wireless spectrum that can disrupt an event, then the FTA should consult the WTA to troubleshoot and resolve the issue. FTA should report their findings to the Head Referee and Field Supervisor.

## Before the Event

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*FIRST* Tech Challenge competitions squeeze a lot of activity into one day. One of the keys to running a smooth and successful event is for teams and volunteers to show up prepared. Teams spend countless hours preparing for competition day, and we ask our volunteers to prepare too. It is important that prior to the event, the FTA reviews the FTA Manual, watches the pre-recorded FTA training video, and reads the supporting documents listed in the checklist below. These training materials will help FTAs to pass the required headquarters administered FTA certification test.

The training materials provide the technical knowledge needed to keep a competition running smoothly and FTA responsibilities at an event. Scheduled monthly key role discussion calls provide an opportunity to ask questions and share ideas and feedback with other FTAs. Learning ahead of time will go a long way towards keeping the event running smoothly and on time.

Mastering the *FIRST* Tech Challenge technology requires specialized study. The robot electronics and behaviors are unique to the *FIRST* Tech Challenge program and completing the pre-competition checklist below will help the FTA prepare for their highly visible volunteer role and help assure a fun and successful competition day. The underlined document names are hyperlinks to public documents on the *FIRST* Tech Challenge website. The remaining documents are stored in BlueVolt, a learning management system (LMS) and in the [FTC Resource Library](#).

Outlined below are responsibilities an FTA has before the event day. Make sure to check with the Event Director to see if they need help setting up before the event.

- Read this manual and complete all the checklists. Bring it to the competition for the technical element references it provides.
- Read the [Control System Troubleshooting Guide](#), which explains how to troubleshoot common problems with the *FIRST* Tech Challenge Android-based control system. An electronic or printed copy of this guide will be helpful on competition day for the technical element references it provides.
- Read the [Wi-Fi Technical Advisor Guide](#) before the event if you will also cover this important volunteer role.
- Read the *FIRST* Tech Challenge [WiFi Event Guide](#) and [Wireless Event Checklist](#)
- Read the [Control System Advisor Manual](#) in the event you will also cover this important volunteer role.
- Read the *FIRST* Tech Challenge [Robot Wiring Guide](#)
- Watch the FTA Training video in BlueVolt.
- Watch the *FIRST* Tech Challenge [REV Electronics Tutorials](#), and check out the [REV Control System Docs](#), [REV Driver](#) and [Control Hub](#) videos.
- Read the [Scorekeeper Manual](#) and [FTC Scoring Event Administrator Guide](#), which prepares the FTA to provide technical assistance to the Scorekeeper. You may find it beneficial to attend the Scorekeeper's training teleconference or listen to a recording of an earlier teleconference.
- Watch the [FIRST Tech Challenge Game Animation/Video](#). Focus on understanding what the teams are trying to accomplish during a match and the names of the field elements.
- Download the [Competition Manual](#) paying special attention to *Competition Day Outline* to become familiar with the competition terminology and structure. It would be beneficial to also read the robot construction rules and learn the competition rules.
- Read the [Field Supervisor Manual](#) if you will also be serving in that capacity; otherwise, a general perusal of that manual will be helpful.
- Participate in the monthly FTA Discussion Calls or listen to their recordings. The call schedule will be available in the *FIRST* Technical Advisor folder in BlueVolt, which can be accessed after applying for the role of FTA.
- Pass the online FTA Certification test.

The FTA should perform the following tasks prior to every event:

- Read the *FIRST* Tech Advisor Discussion Forum located on the FTC Forum subforum <https://ftc-community.firstinspires.org>. This is a discussion forum where volunteers can ask questions or share tips and best practices with one another. *FIRST* staff will respond to posts and share tips and important technical information in this forum.
- Verify the technical volunteer staffing levels with the Volunteer Coordinator or Event Director. Each field should have one FTA and one FTA Assistant. An FTA Assistant Floater is recommended and can support up to two fields. All events should have at least one CSA to provide in-depth technical support to teams. Large events should have several CSAs. Large events such as a championship tournament should have a WTA to oversee the wireless spectrum during the event.
- Verify with the Volunteer Coordinator that the Lead Robot Inspector and the Lead Field Inspector have the necessary materials and volunteer staffing for the event.
- A week prior to the event, check the [Scorekeeper Github repo](#) page to see if there are any updates to the FTC Live scoring system.
- The WTA or CSA should conduct a wireless survey of the venue to make sure the wireless environment is clear and that there are no Wi-Fi suppressors operating in the venue. The FTA will perform this task if a WTA or CSA is not available. Coordinate this activity and share the results with the Event Director. Use one or more pairs of Android devices to measure the ping time in different areas of the venue and on different Wi-Fi channels of the spectrum.
- Select preliminary Wi-Fi channels for the robot Wi-Fi communications, the *FIRST* Tech Challenge Live Scoring System, and any other Wi-Fi Access Points needed to run the event based on the Wi-Fi site survey of the venue. Share the channel recommendations with the Event Director and the Lead Field Inspector.

## Set-up

Competition setup generally occurs on the day before the competition. Setting up the arena and testing the wireless environment normally takes two to three hours for a single field event and three to four hours for a two-field event. The FTA will work with the Field Supervisor (FS) and volunteers to set up the arena field(s) and the practice field(s). It is helpful to have a robot and control system, or at least a pair of Android devices running the *FIRST* Tech Challenge apps (*FIRST* Tech Challenge Driver Station app and *FIRST* Tech Challenge Robot Controller app) to test the wireless environment on the field. Once the arena is set up, the FS will verify that the fields are set up as instructed by the [Field Assembly Guide](#).

- Be sure to have all passwords of the computers or devices being used, if applicable.
- The Android-based robot control system does not require any centralized control infrastructure. Teams will bring their own driver stations and robot controllers to the event. However, if a WTA or CSA is not available, the FTA should do a wireless survey, conduct wireless tests, and select candidate Wi-Fi channel(s) for teams to use during match play. This helps to avoid troubleshooting wireless issues immediately before an event. Available QR codes for Wi-Fi assignment can be obtained by the Scorekeeper through FTC Live.
- Collaborate with the Scorekeeper to set up the Audience and Field Displays.
- The Scorekeeper is usually responsible for setting up and testing the scoring computer and the real-time scoring system devices for scoring Referee, inspectors, FTA, and other users. The FTA should verify with the Scorekeeper that FTC Live is set up.

- The FTA needs to have a printed copy of the scoring tablet passwords. Request this from the Scorekeeper.
- Feel free to use the tech support telephone number in [Useful Links and Information](#) to contact the on-call technical support person if there are any problems with the setup or the wireless spectrum on event day.

## Event Day

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### Report Time

The Event Director or Volunteer Coordinator will confirm the time you should arrive typically via email the week before the event. In most cases arrive an hour or two before the event opens. When you arrive onsite check-in with the Volunteer Coordinator and report to the Field Supervisor.

### Event Day for the FIRST Technical Advisor

Arrive early; the FTA should be one of the first volunteers to arrive on the event day.

- Verify that the reserved wireless channels for the competition fields are clear and that low ping times are observed for a test robot controller-driver station pair operating on these channels. The WTA or CSA will perform this task if the event staffs these volunteer roles.
- Verify that the Lead Robot Inspector and Lead Field Inspector are good to go before the scheduled start of inspection. Periodically visit these volunteers while inspections are underway.
- Meet with the CSAs, WTAs, and FTA Assistants to confirm their activity plans for the event.
- Assist with field inspection of the robots.
- Meet with the Head Referee prior to the opening ceremony to discuss the flow of match-to-match activities, the FTA's triage protocol for pre-match robot setup, in-match issues, and post-match discovery. Assure the Head Referee that you will provide timely assistance to teams and that you will make the difficult call to start a match with a non-functioning robot after the recommended triage and remediation steps in the Control System Troubleshooting Guide have been performed. Sharing the FTA's triage protocol with the Head Referee will help the competition day run smoother.
- Sometimes the Head Referee will ask the FTA to speak during the Driver's Meeting.
- Attend the opening ceremonies and be prepared to start the first match directly following the ceremony.
- The remainder of the day will be spent overseeing the technical volunteers around the arena assuring that the Wi-Fi channels are free from interference and performing robot triage. The WTA and/or the CSA will assist with monitoring the Wi-Fi channels if these volunteer roles are staffed.
- Unexpected robot behavior will happen during the competition. It is the FTA's responsibility to determine if a robot issue or an external issue like wireless interference caused the unexpected behavior. More detail is provided in the [Dealing with Team Issues/Concerns](#) section of this manual.

### Required Event Day Equipment & Document List for the FIRST Technical Advisor

- Safety glasses are required.
- Closed-toe and closed-back comfortable shoes (that will not damage the field) are required.



- Small battery-powered flashlight or headlamp.
- Multifunction Voltmeter/Ammeter/Ohmmeter with probes.
- A pair of *FIRST* Tech Challenge approved Android devices.
  - Current *FIRST* Tech Challenge driver station app installed on one device.
  - Current *FIRST* Tech Challenge robot controller app installed on the other device.
  - Wi-Fi Analyzer app (Available from the Google Play Store) installed on driver station device.
- USB FLASH drive with current *FIRST* Tech Challenge apps (driver station, robot controller).
- Hardcopy or electronic copy of the FTA Manual.
- Hardcopy or electronic copy of the Control System Troubleshooting Guide.
- Hardcopy or electronic copy of the Wi-Fi Event Checklist.

### Schedule Mindset

A valued measure of event quality is starting and finishing on time. Attendees plan their day based on the published schedule. Ending significantly late affects travel plans, may interfere with the tone of the event, bus driver duty-time limits, disrupt teams' post-event meals and celebrations, etc.

Robotics competitions are complex to run, and there are many opportunities for schedule slowdowns, including robot malfunctions, post-match scoring and penalty discussions, tardy teams, etc. How does an FTA manage the occasional need to spend extra time helping teams overcome a technical challenge?

The FTA's mindset should be schedule aware, not schedule driven. Occasionally delaying a match to assure that all four robots participate is usually worth the impact on the schedule. The recommended goal for the competition area volunteers is to stay within +/- one match of the published match schedule. If the matches run +/- two matches, it is time to look for ways to speed up or slow down matches, so the tournament returns to a rhythm of +/- one match. Using this as a guide, the FTA is empowered with the flexibility to take extra time to help a team, and their robot prepares for a match.

### FTA and Head Referee Match Workflow

*FIRST* Tech Challenge implemented the concept of arena ownership by the Field Supervisor/FTA and Head Referee during the match workflow timeline. The key volunteer that owns the arena is responsible for everything that occurs in it. Specifying which key volunteer oversees the arena and how field ownership transitions between these volunteers improves workflow efficiency. The recommended arena ownership timeline is as follows:

1. The Head Referee owns the arena starting when the FTA signals to the Head Referee that the drive teams and their robots are ready to start the match and ending when the Referee crew signals to drive teams that they may remove their robots from the arena. For example, the Head Referee owns the arena during the following activities:
  - a) Verifying robot physical setup in the arena.
  - b) Informing drive teams that they may no longer touch their driver stations until the match starts.
  - c) Autonomous period.
  - d) Transition between the Autonomous and Teleoperated periods.
  - e) Teleoperated period.
  - f) Post-match score certification, if applicable.



- g) Signaling drive teams to remove their robots from the field.
- 2. If there is no Field Supervisor, then the FTA owns the field at all other times. For example, the FTA owns the field during the following activities:
  - a) Field reset.
  - b) Robot set up and removal on the field by the drive teams.

Before qualification matches start, the FTA should meet with the Head Referee to confirm they will work together across the match workflow timeline. The Head Referee should be familiar with the field ownership concept because it is described in the Referee manual.

### **Pre-Match Responsibilities for the *FIRST* Technical Advisor**

The FTA and the *FIRST* Technical Advisor Assistant (FTAA) are responsible for verifying that the drive teams and their robots are ready for the start of all matches. FTAs and FTAA's should feel free to stand on the field while drive teams are setting up their robots. This is the best location to assess status, provide immediate assistance, and project a clear visual indication that the FTA/FTAA has not released the field to the Referee crew. As a team advocate, the FTA/FTAA should aid drive teams that are having technical difficulties and assure that a reasonable amount of time is devoted to performing the triage and remediation steps recommended in the Control System Troubleshooting Guide. Most control system set up problems can be resolved in two minutes or less. In extreme cases, a few extra minutes are required to power cycle the Android devices. If the recommended repair steps in the Control System Troubleshooting Guide and power cycling the Android devices do not solve the problem, the FTA will have to make the difficult decision to start the match with a non-functional robot.

Here is a step-by-step guide to the recommended pre-match FTA/FTAA activities:

- 1. Perform repairs and adjustments to the field, as needed.
- 2. After drive teams arrive at the field, the FTA and FTAA will:
  - a. Focus on helping one alliance per FTA/FTAA and provide, as needed, support to the other alliance robots when appropriate.
  - b. Welcome the drive teams to the field from a position on the field floor.
  - c. Drive teams may perform the optional robot wiggle test on their own.
  - d. Observe robot set up, gently redirect drive teams to the task at hand if they are distracted and help when necessary. If the drive teams are setting up without issue, use your free time to give the robot a quick inspection to help the team have a successful match.
  - e. Look for entanglement issues or disconnected wires.
  - f. Confirm that the REV Expansion Hub and REV Control Hub status LEDs have a blink pattern indicating that they are ready for the start of a match.
  - g. When applicable to the game, confirm that the drive team has preloaded the allowed scoring element(s).
  - h. Remind the drive teams to untangle their driver station cables, as appropriate.
- 3. Observe the following information on the driver station Android device after the drive team is finished setting up their robot.

For the early matches, explain the items you are checking to the drive team. In later matches, most drive teams will have learned to perform these checks themselves, enabling them to correct issues before an FTA/FTAA finds them.

- a. Confirm that the driver station is wirelessly connected to the robot controller.
  - b. Confirm that the gamepads are registered in the driver station app.
  - c. Check ping times.
  - d. Verify that the robot's main power is turned on.
  - e. If the robot is participating in the match, verify that an OpMode is selected, and the initialization routine is executed.
  - f. Verify that the thirty second stop timer is engaged if the drive team is running an Autonomous Op Mode.
4. Signal your FTA/FTAA partner when your alliance's robots are ready to start the match.

*\*These FTA/FTAA pre-match setup activities help drive teams to have a successful match and they can be performed within the desired match-to-match cycle times.*

### Robot Wiggle Test (Optional)

Teams may, at their discretion, perform a robot wiggle test during robot pre-match set up to verify that the drive team is able to control their robot. Identifying problems before the start of a match period allows the FTA/FTAA to perform triage on the robot before starting the period of play.

During pre-match setup, the robot wiggle test is performed by teams on the field by running a teleoperated OpMode and using a gamepad to slightly move a servo (recommended) or DC motor. Controlled servo or DC motor motion confirms that the driver station is communicating with the robot controller Android device and the controller subsystem is operational. After a successful wiggle test, the drive team sets up their robot as usual for the autonomous period. The robot wiggle test is not a coordinated test with all the teams participating together; drive teams may perform the test as part of their normal set up procedure.

### Robot Triage

Once there is an issue on the field, the FTA/FTAA's role is to find out the problem and figure out the cause. An FTA/FTAA is like an investigative reporter, finding the facts before concluding, and then acting on what is found out. The [Control System Troubleshooting Guide](#) describes unexpected robot behaviors and their telling characteristics for proper diagnosis. This should help you learn more about the common problems and how to solve them. When problems arise, the FTA/FTAA should gather information by using the following guidelines:

#### **Before the start of Autonomous the FIRST Technical Advisor may:**

- Talk with members of the affected drive team.
- Recommend corrective action to the drive team.
- With permission, touch the team's robot, gamepad controllers, etc.
- Check the status of the robot by visual inspection of the robot, the robot controller, and the driver station.

### **Transition from Autonomous to Teleoperated periods:**

Unexpected robot behavior may occur during the Autonomous period. The behavior could be caused by team error, robot interaction with other robots or field elements, or by events not the team's responsibility. Problems caused by team error, or interaction with robots or field elements will not be repaired until the robot is released to the team after the conclusion of the match (i.e., end of the teleoperated period.) Examples of problems caused by team error are:

- Loose power wires.
- Loose or disconnected cables.
- Broken chain or tread.
- Low or dead battery.

The FTA and team should not repair the problems listed above, any other team-created issue, or robot interaction issues during the transition between the autonomous and teleoperated periods.

[Competition Manual](#) rules regarding match phases address the autonomous to teleoperated period transition.

### **During autonomous or teleoperated periods the *FIRST* Technical Advisor and FTAA may:**

- Talk with members of the affected drive team.
- Recommend corrective action to the drive team.
- With permission, touch the driver station.
- Check the status of the robot on the team's driver station display.
- Look at the robot while remaining outside the field walls.
- Turn off robot power if the robot has lost communication with its driver station and is at risk of burning out a motor or causing damage to the field or other robots. Perform this action only if it can be done safely.

### **During autonomous or teleoperated periods the *FIRST* Technical Advisor and FTAA may NOT:**

- Enter the field.
- Touch a robot, unless the robot is out of control of the driver station and is likely to cause damage to the field, people, other robots, or itself. This action should be performed only if it can be done safely.

Exceptions to entering the field occur during dangerous conditions on the field, such as a robot on fire or a robot that has lost communication with the driver station and it is a danger to teams, volunteers, spectators, itself, other robots, or field elements, etc.

Robot triage is limited to what the FTA can see on the driver station display, observe about the robot, and see on the robot controller display or log files. Consult the Control System Troubleshooting Guide for details on how to use these tools to troubleshoot a problematic robot.

The FTA may need to investigate unexpected robot behavior at the end of a match while robots are on the field. Robots that lose the communication link with their respective driver station may continue to move after the conclusion of the match. When this occurs, turn off the robot's main power switch as soon as possible, to avoid damaging robots or the field elements. When entering the field, be careful not to affect match scoring by moving robots and scoring elements.

## Android Device Software Settings Viewer

The Field Inspection Self-Inspection code is integrated into the driver station and robot controller apps. This feature displays the status of all the required Android device software settings on a single screen. This enables an FTA/FTAA to quickly check the status of the software settings that are important to the successful operation of a *FIRST* Tech Challenge robot. The software inspection function is accessible from the dropdown menu in the driver station and robot controller apps. The driver station can remotely view the robot controller's software inspection status while the two Android devices are connected.

## Disabled Robot

A robot that breaks down, is uncontrollable, damages the field, or is a safety hazard should be declared "disabled" and remain parked for the remainder of the match. This type of unexpected robot behavior is a clear signal that the FTA should visually investigate the robot's symptoms, help the drive team, and then report the findings to the Head Referee, as soon as possible. The Head Referee is responsible for the final determination to declare a robot disabled because of the impact on scoring and penalties.

## Match Replays

The most important role of the FTA is correctly diagnosing the problem and working with the Head Referee to determine if the issue will cause the match to be replayed. Matches should be replayed if the issue or malfunction can be absolutely traced back to excessive wireless interference. Issues caused by the team's robot do not warrant a match replay.

Since the match replay is oftentimes what the teams are most concerned about, the FTA needs to be on hand to explain the situation to the teams, including why the problem happened and how they can fix it for the next match. Review the [Competition Manual](#) for specifics of match replay rules.

## Non-Allowed Wi-Fi Communication

The [Competition Manual](#) addresses "non-allowed Wi-Fi communication." It is important for the FTA to read and understand wireless rules and how to interpret potential violations.

## Rule Interpretation

The Head Referee will work with the FTA, CSA, and WTA to determine the cause of any unallowed Wi-Fi communications and to determine if the rule has been violated. Locating the source is an important step when notified of a possible violation of this rule. There are times when an audience member could inadvertently violate this rule, without knowledge or intent to cause harm. It is important for the FTA, WTA, CSA, and the Head Referee to evaluate the situation and conclude whether the interference was intentional. The final determination to disqualify a team or not will rest with the Head Referee with the guidance of *FIRST* headquarters staff if the Head Referee's recommendation is to disqualify the offending team.

## Robot Controller Hosted Development Tools

The FTC Blocks Programming tool and OnBot Java Programming tool let teams use a web browser to edit their op modes directly on the robot controller. The robot controller hosts the tool, and it requires that a team connect their laptop to the robot controller's Wi-Fi network. This Wi-Fi network is the *same* wireless network that the driver station uses to communicate with the robot controller. The use of

these tools does not violate the rules in the Competition Manual. This is done in the pit area, and not the arena area.

### FTC Event Management System

A couple of days before events, Scorekeepers/FTC Scoring event admin are responsible for working with the Program Delivery Partner (PDP) for event configuration in FTC Scoring, setting up, testing, and operating the FTC Live scoring software for traditional/hybrid events. This may also be the responsibility of the Event Director, Field Supervisor or FTA. The FTC Live scoring software **MUST** be pre-loaded with teams, leagues (when applicable) and other event configuration information. Review the transfer of the data from FTC Scoring (cloud) to FTC Live in the [Scorekeeper](#) section on the website. This transfer should happen within three days prior to the event. Test the software systems and logins at least a week prior to the competition. The scoring system should be tested again during load-in and the morning of the competition. The FTA should verify that the lead Scorekeeper successfully completed these pre-competition tests, and that the system is good to go the morning of the competition. The Scorekeeper(s) may encounter issues during the competition requiring the FTA's assistance. Prepare for competition day by reading the [Scorekeeper Manual and Event Admin Scoring System Guide](#). A few days prior to the event, go to the [Github Scorekeeper Repo](#) to download the FTC Live setup wizard, if needed, and to review recent "Release Notes." If FTC Live is already on the local event laptop updates to FTC Live version releases will happen when you re-open the app. You may have to contact the region's PDP or FTC Scoring event admin for the "event key" to transfer event data prior to the event start date.

### Dealing with Team Issues/Concerns

FTAs and FTAA's will encounter a variety of issues on and around the competition field. A few common scenarios are described below:

#### Unexpected Robot Behavior:

One of the FTA's responsibilities is to determine if unexpected robot behavior is caused by a problem with the Android-based control system, robot, or the Wi-Fi environment. Notify the Head Referee and the affected team(s) once the source of the problem is identified. When robot error is the cause of the unexpected match behavior, it is important that the FTA or FTAA explain to the drive team exactly what caused the problem and if time permits, suggest a course of action to fix the robot. Spending a few minutes helping a team will make a huge difference in the team's event experience. It is best to identify the source of the problem, share your findings with the team, listen to the team's feedback, and then move on to the next match. If the team needs additional troubleshooting help, direct them to the event's CSA if one is available or recommend that the team seek help from veteran teams in the pit area.

#### Competition rule violation:

Example: A student member of the drive team is not wearing safety glasses in the competition area.

Making eye contact with the student, smiling, and tapping a finger to your safety glasses is a friendly and effective way to keep the student safe and in compliance with the rules. Non-verbal cues are a great alternative to using an elevated voice that can be heard over a noisy environment.

**Repairing a robot in the arena area:**

A drive team is making last minute repairs to their robot in the queue or on the field:

Quietly observe the action to assess the situation before asking the least busy student about their robot's status. As an advocate for teams in need, offer your assistance and advise the drive team on how much time is available before they need to leave the queue or be prepared to start the match. Be as generous as possible with their allowed repair time. Teams put a large amount of time and effort into building their robot to play just five or six matches at an event. Remember, the match schedule is a guide, not a guarantee. Balancing the needs of a team with a broken robot with the goal of running an event on time is a common dilemma for an FTA.

**Distracted drive team during pre-match set up:**

A drive team is strategizing with their alliance partner when they should be setting up their robot for a match.

Move close to the drive team to get their attention and gently guide them towards setting up their robot for the match. After the robot is ready for the match, suggest that a better time for planning the alliance's match strategy is while they are in the pit area or queue.

There will probably be a scoring dispute or a field issue that a team may have during your event. The FTA's job is a factfinder and robot repair expert, not a person to answer feedback and take complaints. There are ways to present your issues to a team that helps them to solve their issue or accept a ruling that can make your life easier and make the team feel that you are truly there to help them solve their problem. Simply listening to a team's issue is often what is needed to smooth over a situation.

**Common questions asked by teams and suggested responses:**

**Q1:** Why aren't you going to replay that match?

**A1:** *There are only certain situations that warrant replaying a match. Unless we can prove that it was a field fault or Wi-Fi interference, we cannot replay a match.*

**Q2:** Why did you replay a match for someone else, but not us?

**A2:** *Explain the team's situation versus the other situation. How were they different?*

**Q3:** Why won't you fix that score? We have video (or photographs) to prove the score is wrong! (This is not a question for the FTA to answer. Scoring questions should always be deferred to the Head Referee).

**A3:** *Direct the team to the question box so that they can discuss this issue with the Head Referee. Note that Referees cannot accept video replay. Referees have final gameplay and scoring authority during the Competition. Their rulings are final. The Referees will not review any recorded match replays or photographs.*

**Q4:** Why don't you fix/cleanup the wireless environment? It is obvious that the wireless environment is disruptive and causing disconnects.

**A4:** *We have been monitoring the field's wireless channel throughout the day and then state the relevant facts about the wireless environment for the competition.*

**Q5:** The scoring Referee incorrectly recorded our match scoring performance. What should we do?

**A5:** *Suggest that a team representative stand in the Referee Question Box to discuss this issue with the Head Referee.*

### Team Interaction and Support

When interacting with teams please always consider the team's perspective. The teams have put significant time and effort into preparing for this event and may be feeling stressed about everything working out as they have planned. Today is a big deal for the team and we are here to help!

While it is our job to help guide the teams to a successful event, it is their responsibility to follow the rules and be on time for judging and matches.

If you feel there is an issue with an individual or individuals from a team that warrants specific intervention beyond just a kind reminder, please ensure the correct stakeholders for the team are aware. Here is an acceptable process when working with a student or team who you need to change their behavior:

The ABCs of Managing Team Behaviors	
<b><u>A</u>sk for an Adult</b>	Do not directly reprimand a student one-on-one without an adult from their team present. Ask the student to bring an adult responsible for the team to meet you before discussing the concerns at hand.
<b><u>B</u>e aware of the Environment</b>	Is the environment conducive for the feedback you are about to give? Is it loud in the area where you are? Are there other teams around that may hear the reprimand? Moving the conversation to a quieter, more private space as needed can be helpful.
<b>(Offer a) <u>C</u>lear Explanation</b>	Explain the concern to the team and offer clear examples of the concerning behavior.
<b><u>D</u>iscuss any Questions</b>	Offer the opportunity for students and adults to ask clarifying questions
<b><u>E</u>xplain Next Steps</b>	Outline with the students and adults what the next steps are if the issue is not corrected. Certain behaviors may include the risk of yellow cards

**Note:** the only person at an event who can give an official warning or issue a yellow/red card is the Head Referee. Please refer these more severe issues to the Head Referee and notify the PDP.

Be cautious about passing on any negative feedback about any teams directly to the Judges or Judge Advisor (JA), because it is not possible to know all the contributing factors around such a complaint or observation. If there are issues which are repeated or egregious, follow the [FIRST Reporting Portal](#) process and inform the PDP. The Judge Advisor may seek feedback from the Event Director to determine if there is any relevant information to provide the Judges for their evaluation process.



Teams may only be completely disqualified from awards consideration for rare egregious actions and only with approval from *FIRST* HQ. The Event Director and/or JA needs to call the on-call number to discuss the issue.

## End of the Day

At the end of the day, walk away from the event knowing you have done your absolute best to be an exemplary role model and ensure that the competition was fair for all teams. These are the ultimate goals of the *FIRST* Technical Advisor position.

## Season Changes and Topics for Emphasis

### Electronic Inspection Checklists and Team Status Tracking

Automated inspection checklists and team status tracking are available in *FIRST* Tech Challenge Live. Inspectors can use tablets or computers connected to the scoring system network to complete the inspection checklists and track team inspection status. See the Scorekeeper documentation for the complete details.

### FTA Notes

The FTC Live scoring software has an optional FTA user role to be used on a tablet to take notes on specific teams throughout the event. Please refer to the Scorekeeper Guide Appendix on FTA Notes.

### OpMode Initialization

Pre-Match execution of the OpMode initialization code is required for robots participating in the match.

### Robot Sensor Calibration

Teams require a brief period on each of the competition fields to calibrate their robot's sensors under competition lighting conditions. Events may specify a window of time for sensor calibration, or teams may have extra time during Field Inspection to collect sensor calibration data. The Event Director and Lead Field Inspector will select the time for robot sensor calibration.

### Disable Robots

Before the match begins, the FTA may make the determination that a robot is officially disabled and may give the drive team permission to remove their disabled robot from the field.

### Question Box

Teams may use the question box to ask the FTA questions in addition to asking the Head Referee questions.

## Emergencies

The PDP, Event Director and the event site host organization are responsible for having safety and security plans in place for each event. Included in the plan should be topics such as:

- A map of all the emergency exits.
- Knowledge of where on-site medical support is located.
- Shelter in place plans in the case of severe weather.

- Evacuation plans

Teams should have their own safety plans before attending the event. *FIRST* provides a few resources to help teams plan including:

- [Team Member Safety at Events](#)
- [Preparing to Safely Attend a \*FIRST\* Event](#)

Two important links to have handy are the issue reporting link and Youth Protection Policy pages:

#### Report a Concern



[www.firstinspires.org/report](http://www.firstinspires.org/report)

#### Youth Protection Policy



[www.firstinspires.org/ypp](http://www.firstinspires.org/ypp)

#### Lost Children

*FIRST* Tech Challenge events can be very hectic, and it can be easy for a child to get lost amongst the shuffle of a busy event. Ensure you have a plan prior to the event in the instance of a lost child.

In some cases, the team roster will list Coach phone numbers which can be used to reunite team members, in some regions they collect “Day-of” cell phone numbers from each team at check-in. Coordinate your plan with your program delivery partner.

Code Adam Guidelines ([www.missingkids.com/CodeAdam](http://www.missingkids.com/CodeAdam)) are also a great resource.

#### Medical Incident Reporting

Event volunteers are not responsible for diagnosing students, handing out medication, or first aid equipment. You and other event volunteers should refer medical issues and emergencies to a medical professional on site, such as an EMT. If an incident or illness occurs at an event, the Event Director, pit administrator, or another trained delegate should do the following:

- Call 911 if there is any question that the injured person/persons require medical attention.
- Respond to the scene immediately. Bring a clipboard, pen, or a tablet to complete the incident report on the [FIRST Reporting Portal](#).
- Complete the incident report for the injured party.

The Event Director or pit administration volunteers are responsible for completing incident reports. The incident reporting person should follow the best practices for incident reporting:

#### Best Practices for Incident Reporting

<b>Be Calm</b>	Anyone handling incident reporting should have a calm demeanor. They should be able to collect information and talk to witnesses without assessing fault
<b>Be Concise</b>	In all conversations with the injured, witnesses, spectators, and/or media always say "the incident is being investigated" without any further comment. It is not the job of the report collector to provide any opinions on the situation at hand.
<b>Be Risk Conscious</b>	Do not imply liability or any payment, as no one knows for sure until all the facts are collected.
<b>Be Prepared</b>	Those taking in incident reports should be able to communicate with the insurance company if necessary. They should also be aware of who they need to share incidents with, including the local Program Delivery Organization or the Event Director.

Although most incidents will not result in a claim, it is better to act on the side of caution and report them. Should an incident result in a claim after the event, the documents will be on file, complete with witnesses and a written report.

### Non-Medical Incident Reporting

Issues that are non-medical but are of a concern to a participant/participants should be reported. Anything that happens during an event that made a volunteer, team member or spectator feel uncomfortable or threatened should be addressed.

As appropriate and if you feel safe doing so, speak directly to the offending party and try to quickly and calmly defuse the immediate issue. Call the Event Director and/or the program delivery partner and inform them of the issue and seek assistance as needed with any immediate remediation of the issue.

Ensure all issues are reported in a timely manner using the [FIRST Reporting Portal](#). Have the participant select the correct category for their report:

- **Youth Protection Concern:** encompasses a wide variety of one-time or ongoing issues such as suspected abuse, bullying, harassment, discrimination, questionable behavior, or violation to the FIRST Code of Conduct. Must involve a youth participant otherwise use the 'other' category.
- **Other:** For issues which do not fall under the Medical or Youth Protection Concern Categories.

### Safety

An important priority for all volunteers is to observe their event areas to help promote a safe and orderly space for all the participants. It is likely that various volunteers and event participants will bring concerns to your attention, but you should also be proactive in identifying areas of concern.

Prioritize working with the teams to help identify and correct potential safety issues in the area. Please review the section about [Team Interaction and Support](#) for the best ways to work with teams on making changes.

### Safety Glasses and Closed Toe Shoes

All volunteers, teams, coaches/mentors, and spectators are required to have safety glasses and wear closed toe shoes while in the pit and competition areas. It is important to watch out for anyone entering

these areas without proper personal protective Equipment (PPE) and to ask them to put on proper PPE before entering. Some events will have volunteers staffed at the pit entrance with spare safety glasses to pass out. Other events may not have spares to provide.

### **Pit Spaces**

Specific rules governing what teams can have and do in their pit space are covered in the competition manual, but the Event Director may add additional restrictions which must be published before the event based on limitations set by the venue.

Common areas where teams need help to stay safe and within the rules:

- No open flames or sparks
- Power tools are permitted if they do not damage the venue.
- Aisles, walkways, and doors should be clear of obstructions.
- Teams may set up practice spaces if they are fully within their designated pit area.
- No structure may be taller than ten feet (10.')

## Important Tools

### Public Schedule

The program delivery partner or the Event Director should publish the public schedule of events before the event. This schedule will have a high-level overview of all the activities for the event. It is important that everyone at the event does their best to stay true to the public schedule so that teams and volunteers who have planned their day around these times have a good experience.

*Figure 1: Sample Public Schedule for a Typical FIRST Tech Challenge Event*

Time	Agenda
7:15am	Doors Open for Volunteers
8:00am	Doors Open for Teams
8:30am	Judging & Inspection Commences
10:35am	Inspection Deadline
10:40am	Opening Ceremony & Driver's Meeting
11:00am	Qualification Matches Commence
12:00am	Lunch Time
12:30pm	Qualification Matches Resume
3:15pm	Alliance Selection
3:45pm	Elimination Matches
5:30pm	Closing Ceremony, Awards and Advancement Announcement

On occasion things that happen out of the event's control may impact the schedule. In these cases, work closely with the Event Director to understand the updated agenda.

### Registered Teams List

A list of teams that are expected to participate at the event that have been checked in. These teams may include paid/unpaid teams expected to pay in a timely fashion.

### Volunteer Roster

A list from the Volunteer Coordinator or Event Director with the names of all volunteers. The FTA's interest is the other FTA/FTAs, CSA, WTA, and Scorekeeper names.

### Event Layout/Map

The program delivery partner and Event Director should publish a map of the venue before the event. In some cases, details on the map might not be available until the day of the event.

The Event Layout / Map should detail the following:

- Load-In Path
- Parking for Personal Vehicles and Busses
- Team Check-in
- Volunteer Check-in
- Competition Area
- Pit Area (May include the [Pit Map](#))

- Judging Room Locations (if applicable)
- Safety Details as available (Emergency Exits, AED, Shelter in Place Locations)

## Judging Schedule

Provided by the Event Director or Judge Advisor. Awareness of this schedule and how inspections are scheduled will allow the FTA to help inform teams if questions are asked. In most cases, a judging session takes precedence over an inspection appointment.

## Match Schedule

The match list will be generated the day of the event after the teams have been confirmed. This schedule will list which teams will play in which Alliance (Red or Blue) and a match start time see Figure 2. Some events will have more than one competition field and/or division, and each division will have its own schedule.

**Sample Event Schedule**

Teams: 11      Matches Per Team: 5      Matches: 14

Start	Match	Field	Red 1	Red 2	Blue 1	Blue 2
8:00 AM	Qualification 9	1	12758	11536	12494	11282
8:07 AM	Qualification 10	2	12329	12622	8089	12789*
8:14 AM	Qualification 11	1	7135	7078	11780	12758

Annotations:

- Total Number of TEAMS Competing (Points to Teams: 11)
- Total Matches per TEAM (Points to Matches Per Team: 5)
- ALLIANCE Red or Blue (Points to Blue 1 and Blue 2 columns)
- Total Number of MATCHES (Points to Matches: 14)
- Planned MATCH Start Time (Points to Start column)
- MATCH Type (Points to Match column)
- Field Assignment (Points to Field column)
- SURROGATE MATCH Indicator (Points to 12789\* in Blue 2 column)

Figure 2: Example Match Schedule

## Pit Map

Pit maps are typically provided by either the Event Director or by the Scorekeeper. Having a map of where each team is in the pit is key, as teams, parents or queuers might need to find. Below are two sample pit maps in Figure 3 and Figure 4:

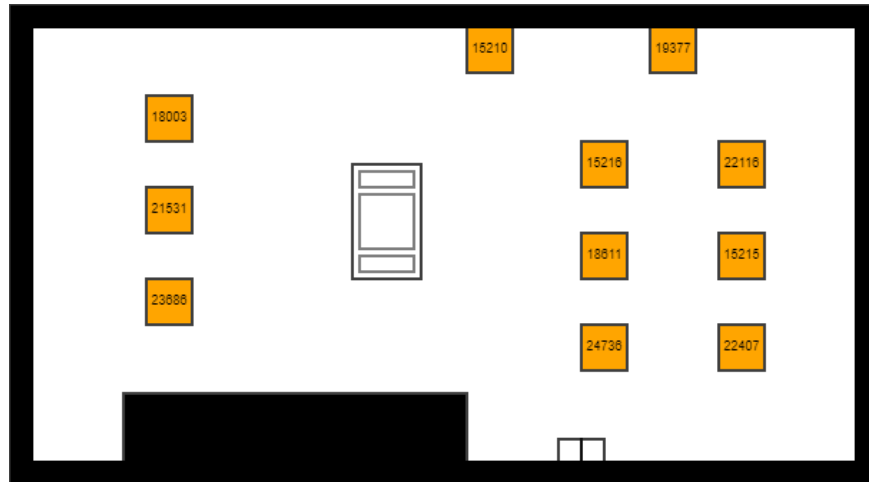


Figure 3: Example Pit Map for a small 12-team Qualifier Event

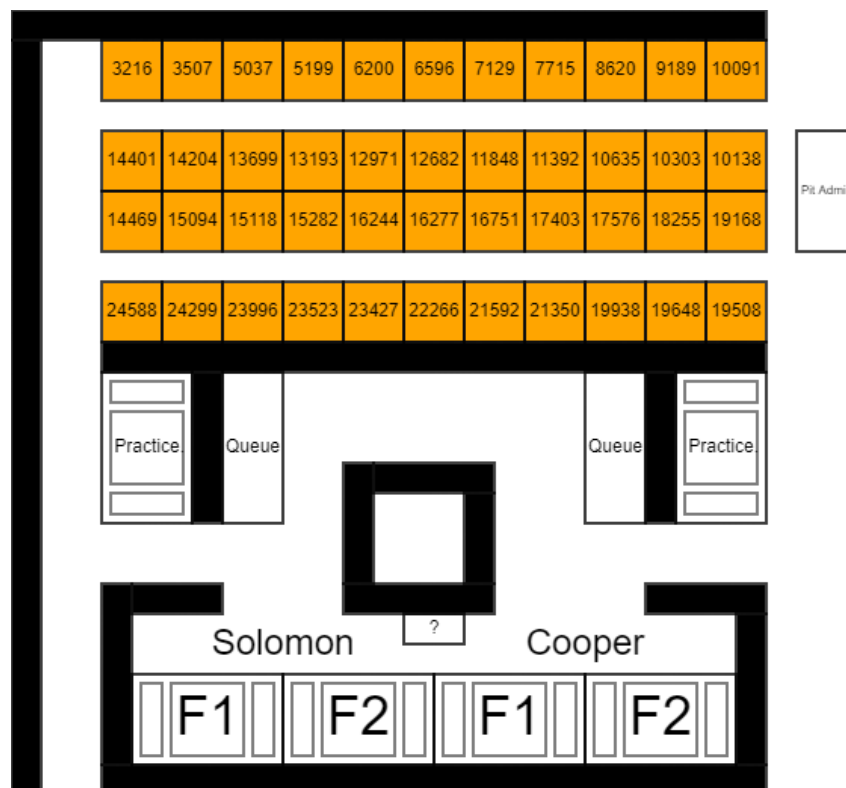


Figure 4: Example Pit Map for a Typical Regional Championship Event



## Useful Links and Information

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### On-Call Support Numbers

#### On-Call Support

These numbers are for volunteer support only. Teams should not use these numbers to call about rulings or technical assistance.

Administrative, Judge, Referee and Non-Technical Issues: (603)206-2412

Scoring System (FTC Live) or other Technical Issues: (603)206-2450  
Call or use the built-in chat feature on FTC Live

### Pre-Event Support

Mon – Fri 8:30am – 5:00pm Eastern Time (UTC-4 or UTC-5)  
Phone: (603)666-3906  
Email: [firsttechchallenge@firstinspires.org](mailto:firsttechchallenge@firstinspires.org)

### Program Resources



[FIRST Tech Challenge Website](#)



[Event Search](#)



[Game and Season Resources](#)



[FIRST Tech Challenge Blog](#)



[Volunteer Resources](#)



[Team Email Blasts](#)

### Feedback

We strive to create support materials that are the best they can be. If you have feedback about this manual, please email [firsttechchallenge@firstinspires.org](mailto:firsttechchallenge@firstinspires.org). Thank you!