SMART FIELD CONTROLLER

Presented by:

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ROBOTICS EDUCATION & COMPETITION FOUNDATION
SUMMIT
VEX ROBOTICS PROGRAMS

Chris Stewart

Senior Regional Support Manager

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Robotics Experience

21 Years of Robotics experience in multiple programs. 13 years of experience in VEX Robotics programs as a Coach, EP, and now with the RECF.

Event Experience

Hosted many Live Remote Skills events, In-person Qualifying events, and ERCs for both V5RC and VEX IQ.

Work Experience

Before joining the RECF full-time I was a teacher for 21 years. My most recent teaching job was Tech Ed and Project Lead The Way in Harrisburg South Dakota.

I have a passion for robotics and have been fortunate enough to find a job that combines my passions and skills, and where I work with and learn from a group of like-minded individuals.

As a Regional Support Manager, I manage the upper Midwest to include North Dakota, South Dakota, Minnesota, Wisconsin, and Michigan. I also assist with the JROTC programs.

Clinton Matlack

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Robotics Experience

Involved with VEX Robotics in Ohio for the past 15 years.

Event Experience

On the Kalahari Classic Signature Event & Ohio State Championship EP Team.

Work Experience

35 Years with the Delaware County Engineer's Office - Information Systems Manager.

Attended the RECF EP Summit for the past 3 years as an EP.

Volunteer Mentor - North Union Robotics, V5RC & VIQRC

Inspiring students, one robot at a time.

Introduction

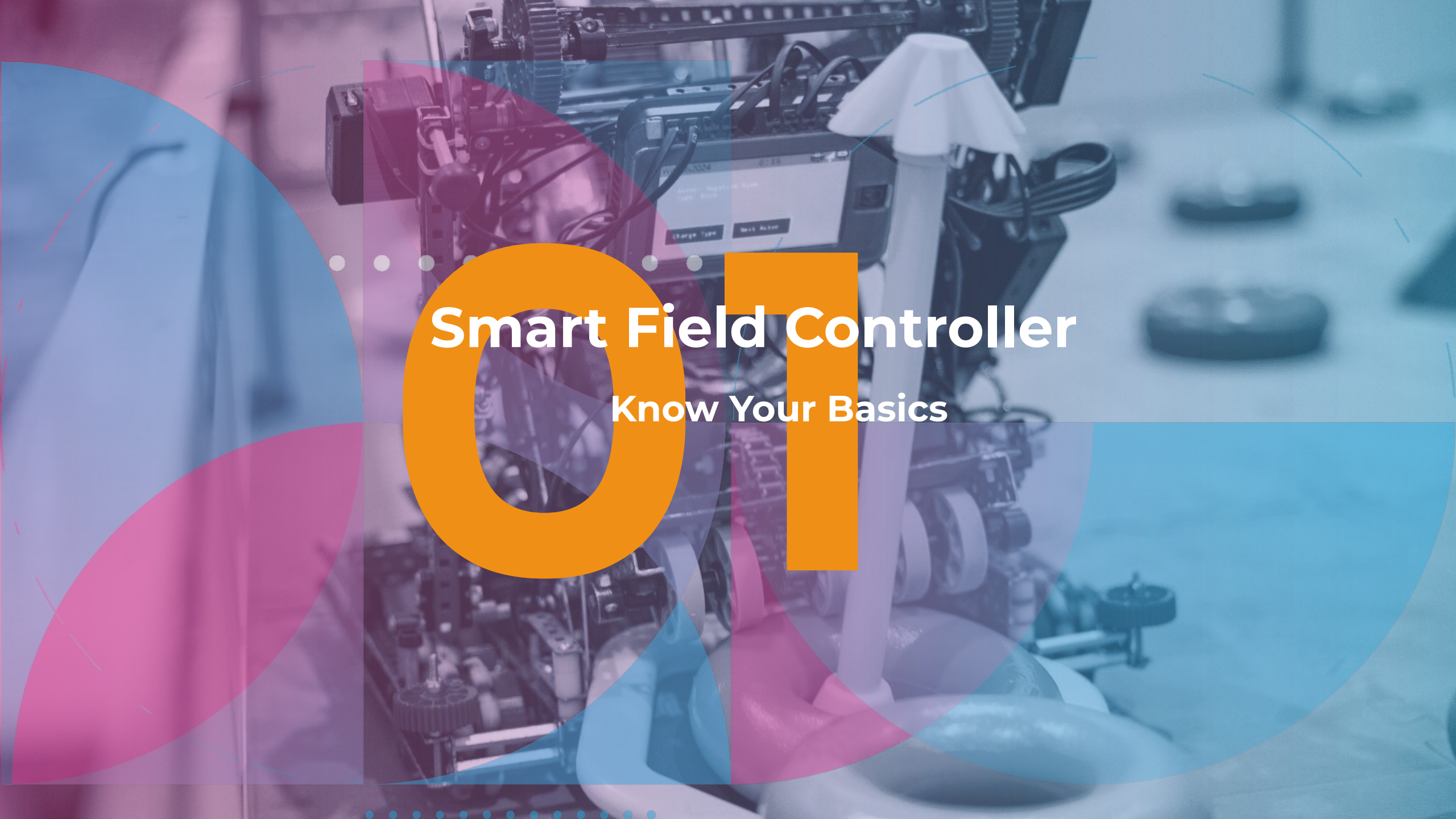
Mission & Vision

Mission

The Robotics Education & Competition Foundation’s global mission is to provide every educator with competition, education, and workforce readiness programs to increase student engagement in science, technology, engineering, math, and computer science.

Vision

We see a future where every student designs and innovates as part of a team, overcomes failure, perseveres, and emerges confident in their ability to meet global challenges.



01

Smart Field Controller

Know Your Basics

Know your Cables! (not to scale)

VGA

HDMI

USB-B

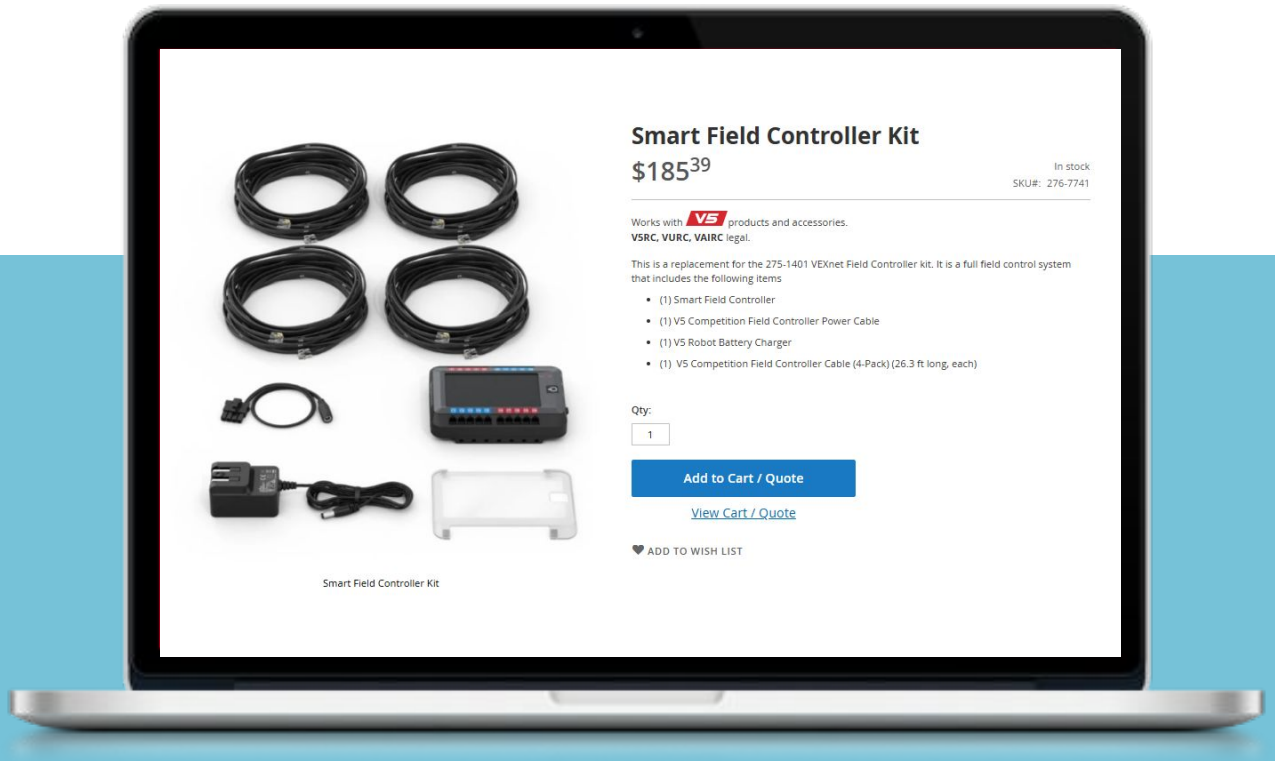
Ethernet

Micro-USB

V5 Smart Cable

Adapters

Adapters



V5 Smart Field Controller Kit

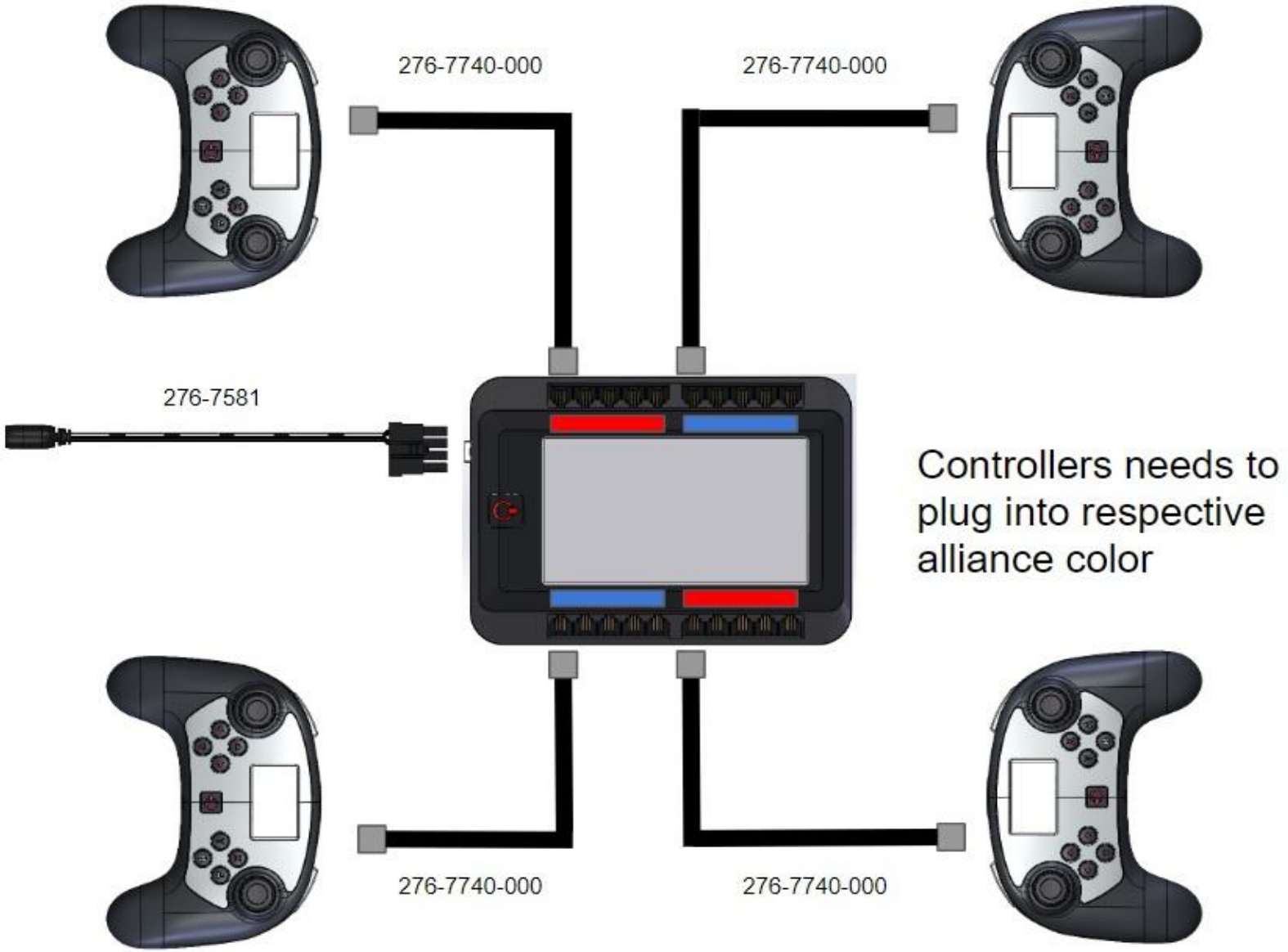
CONTROLLER KIT

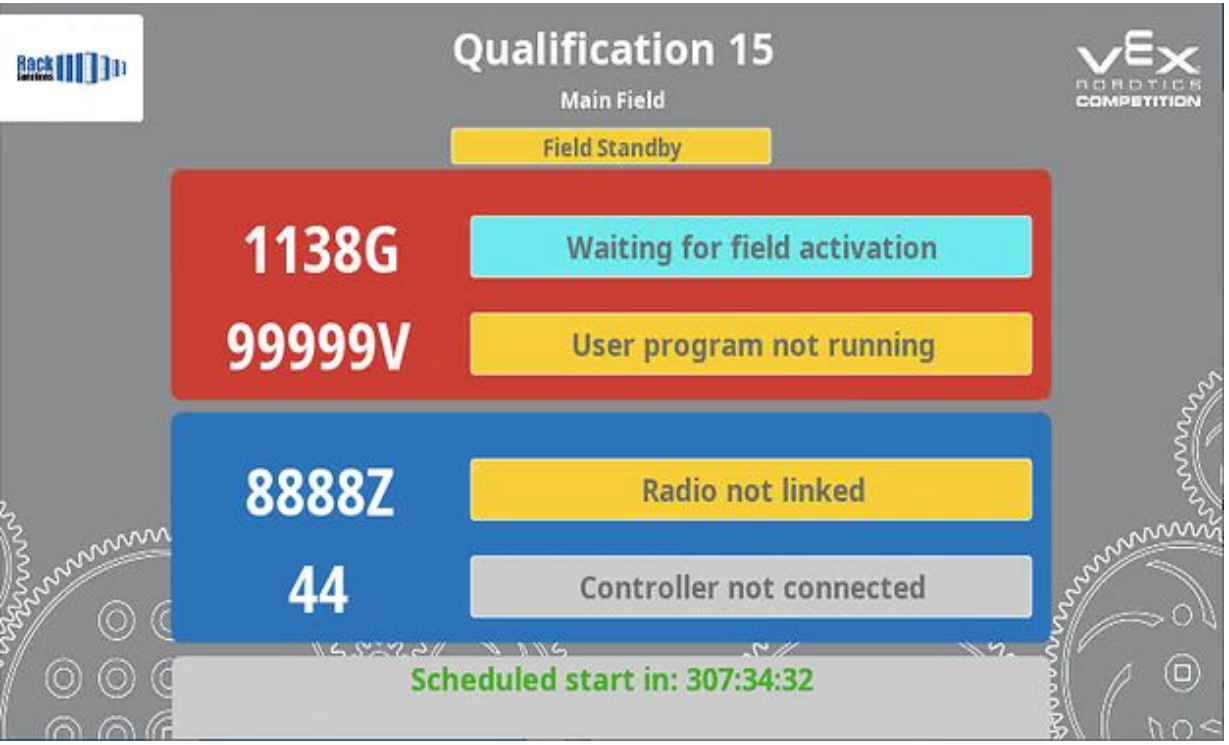
Works with V5 products and accessories. V5RC, VURC, VAIRC legal.

This is a replacement for the 275-1401 VEXnet Field Controller kit.
It is a full field control system that includes the following items

- (1) Smart Field Controller
- (1) V5 Competition Field Controller Power Cable
- (1) V5 Robot Battery Charger
- (1) V5 Competition Field Controller Cable (4-Pack) (26.3 ft long, each)

VEX Smart Field Controller





VEX Smart Field Controller

- Uses a V5 Brain to connect robots to the field
- Field Display will show robot and field status & schedule time
  - Useful for troubleshooting
  - Staying on schedule

Field Queue Display

The V5 Smart Field Controller offers more information about the condition of the field and robots for the upcoming match.

V5 Smart Field Queue

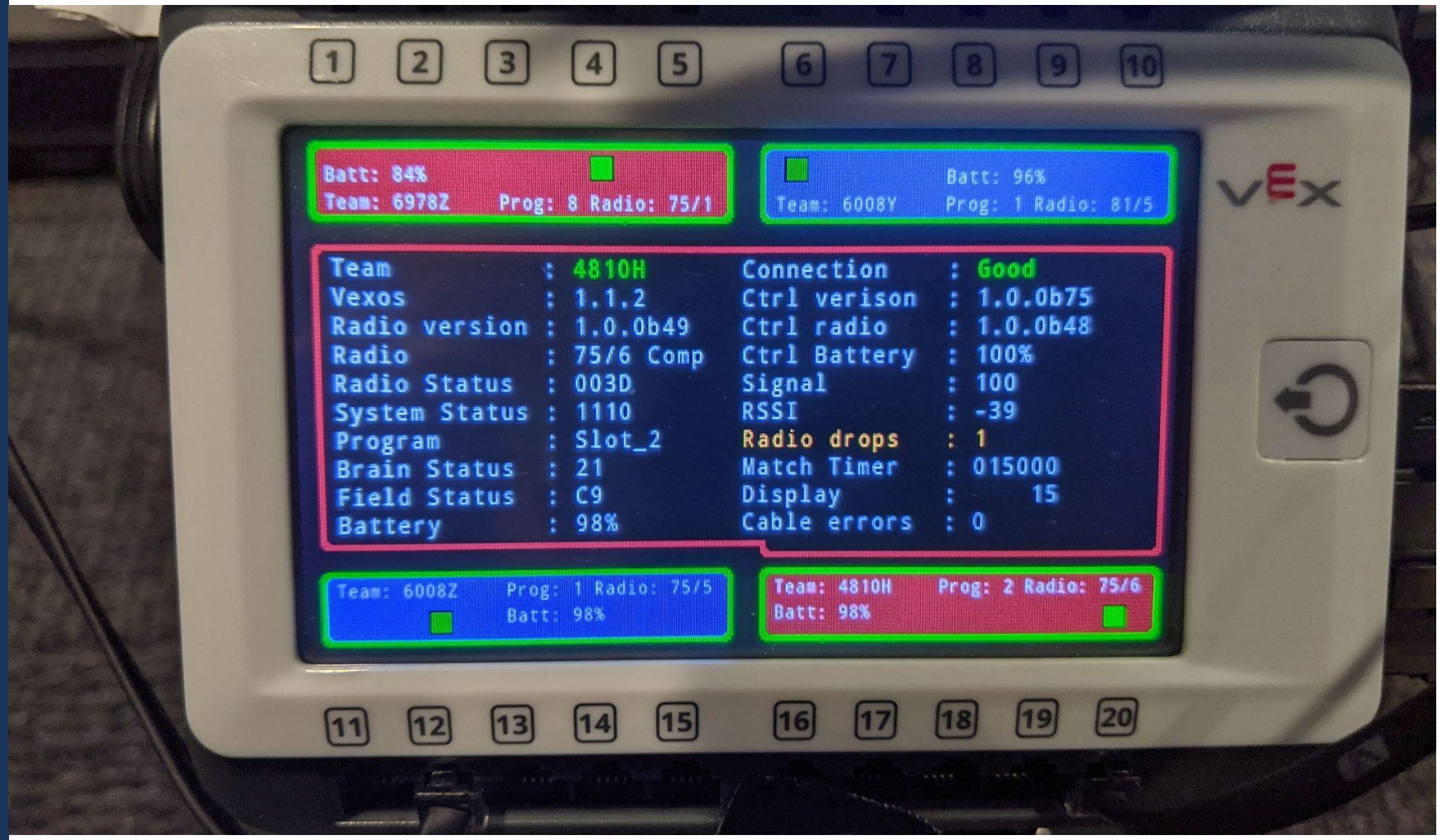
Field Queue Display

Legacy Field Queue

Useful Data

V5 Field Control

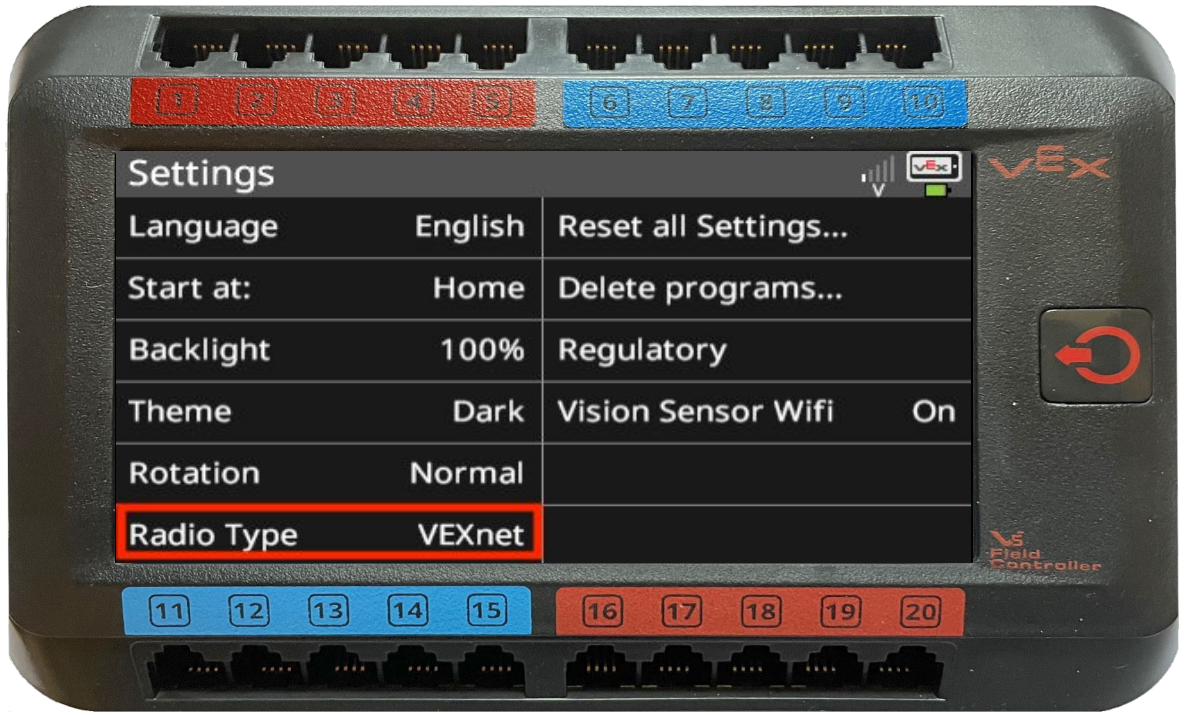
- Match Timer (Auton & Driver)
- Team # & Robot Battery %
- Program Running / Slot
- Connection Quality
- VEX OS Version
- Radio Drops



Settings to check

V5 Field Control

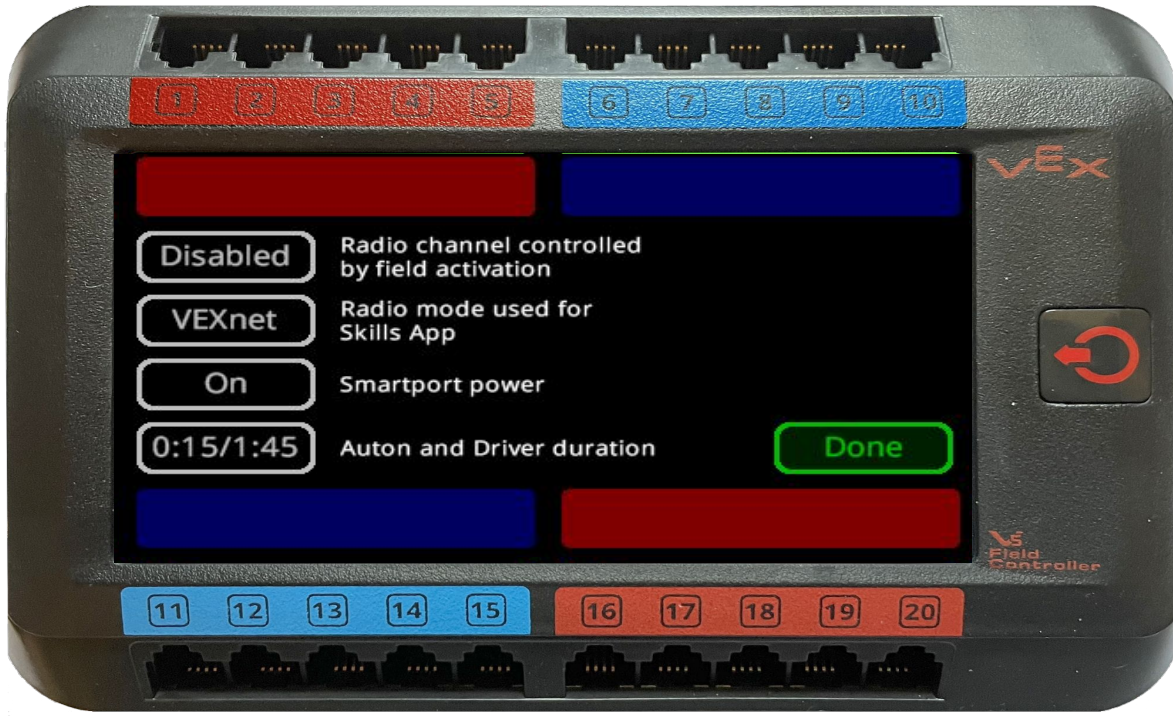
- Two different settings screens
  - First is out on the main screen
- Language: Make sure it is set correctly
- Radio Type: VEXnet
- Reset all Settings: if something is acting up and you are unsure what.



Settings to check

V5 Field Control

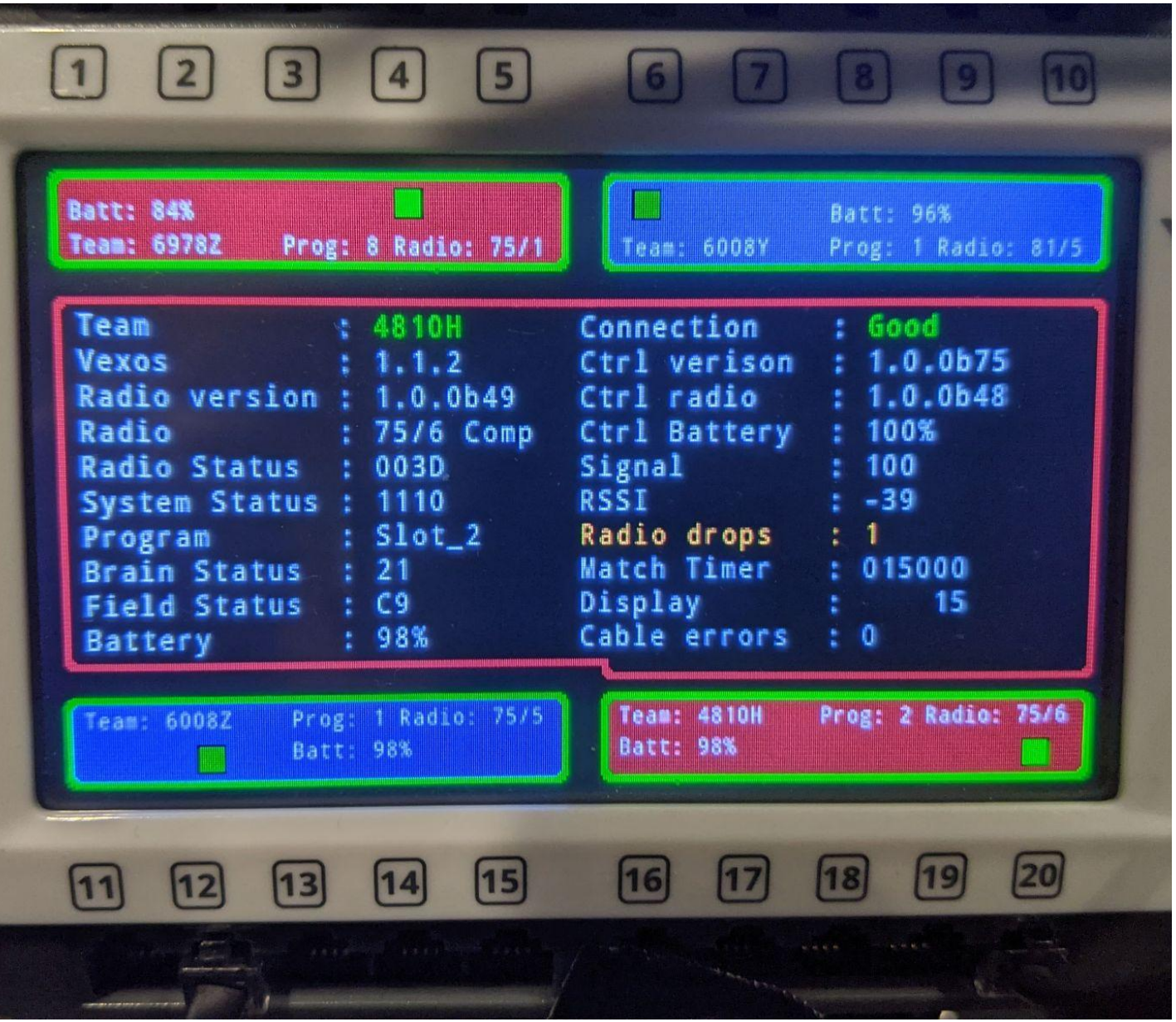
- Two different settings screens
  - The second is on the splash screen as the program starts.
- Radio Channel Controlled by Field Activation. More important for larger events. Most events can leave this disabled.
- Radio Mode: Should be set on VEXnet.
- Smartport Power: This sends power to the attached team controllers. It’s recommended to turn this off
- Auton and Driver Duration: Be sure this is set for the proper times for your event.



02

Smart Field Controller

Basic Troubleshooting



V5 Smart Field Control

V5 Inspection items

- <R15> Firmware must meet the minimum requirements from the game manual
- Use a Smart Field Controller during inspections to see their current VEX OS Version to compare
- Teams should have their team number coded into their V5 Brain
- <R26> Testing ™ Field Disconnect (Auton & Driver) do this using the digital switches in the Smart Field Controller

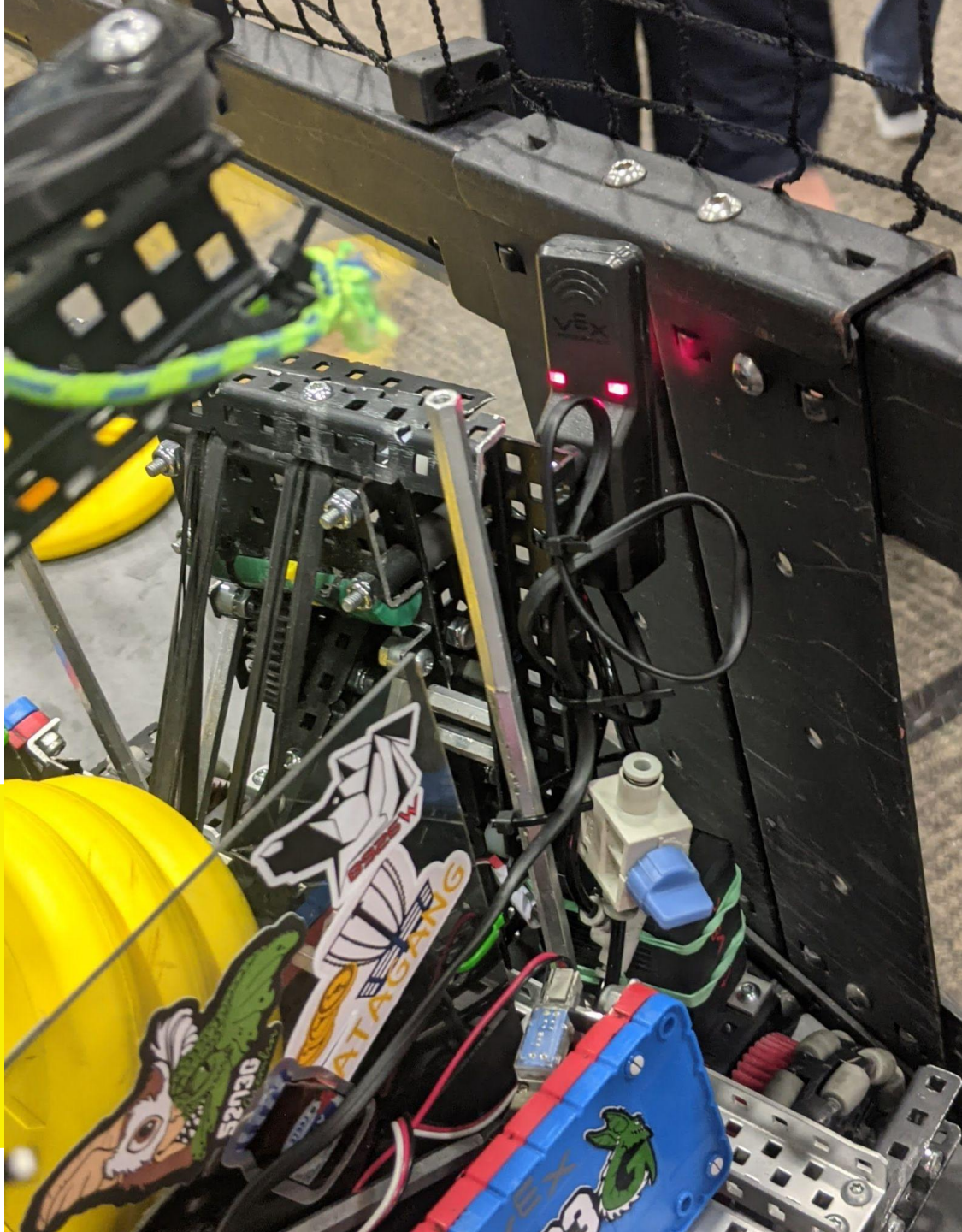
V5 Smart Field Control

Robot Radio Drops

- Many Radio Drops are robot issues, not field issues.
- Teams should carefully consider the placement of their radio.
    - If the radio is located where it is not protected it is susceptible to radio drops.
    - Radios should be protected, but not buried within the robot.

Mounting the V5 Robot Radio Best Practices

- Do not wrap the V5 Robot Radio in metal foil.
- The higher the mount location on the build, the better.
- Do not mount the V5 Robot Radio in a steel box.
- Keep the thinner part of the V5 Robot Radion away from other metal.



Match Errors, Field Issues, Replays, Oh My!

(Field Controllers should only be viewed by Referees and event personnel)

It is not practical to monitor the Smart Field Controllers for errors 100% of the time. The primary use of logging the information is to allow for post analysis if there are any unusual situations that occur during a match. An example would be a situation where all 4 robots report in issues during autonomous or all 4 robots disconnect during the match. These kinds of things can factor in when considering a possible replay.

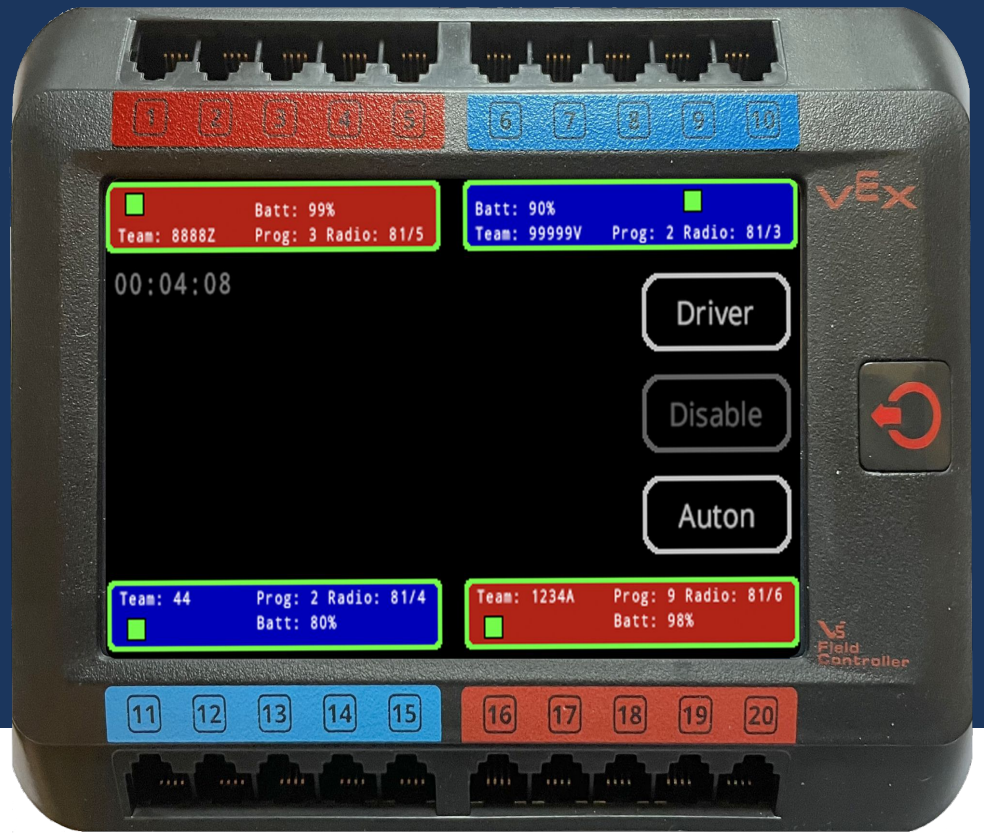
Conversely, if a student's robot does not move during a match but neither the Smart Field Controller, nor the Robot Brain show any errors, then the problem is most likely not the fault of the field control system, and the students robot/code may need to be investigated for possible issues.

REPLAYS ARE VERY RARE

Verify the V5 Brain is connected to TM

When Smart Field Controller is connected and communicating with Tournament Manager, Tournament Manager triggers the matches through the interaction of the TM Operator. The manual controls will be grayed out and you will see TM Connected in Green.

Verify the V5 Brain is connected to TM



If during the course of an event, TM loses connection with the Smart Field Controller, the manual controls will become active and matches can be run manually from the side of the field.

Typically, rebooting the Smart Field Controller and/or the device connected to it will solve this issue.

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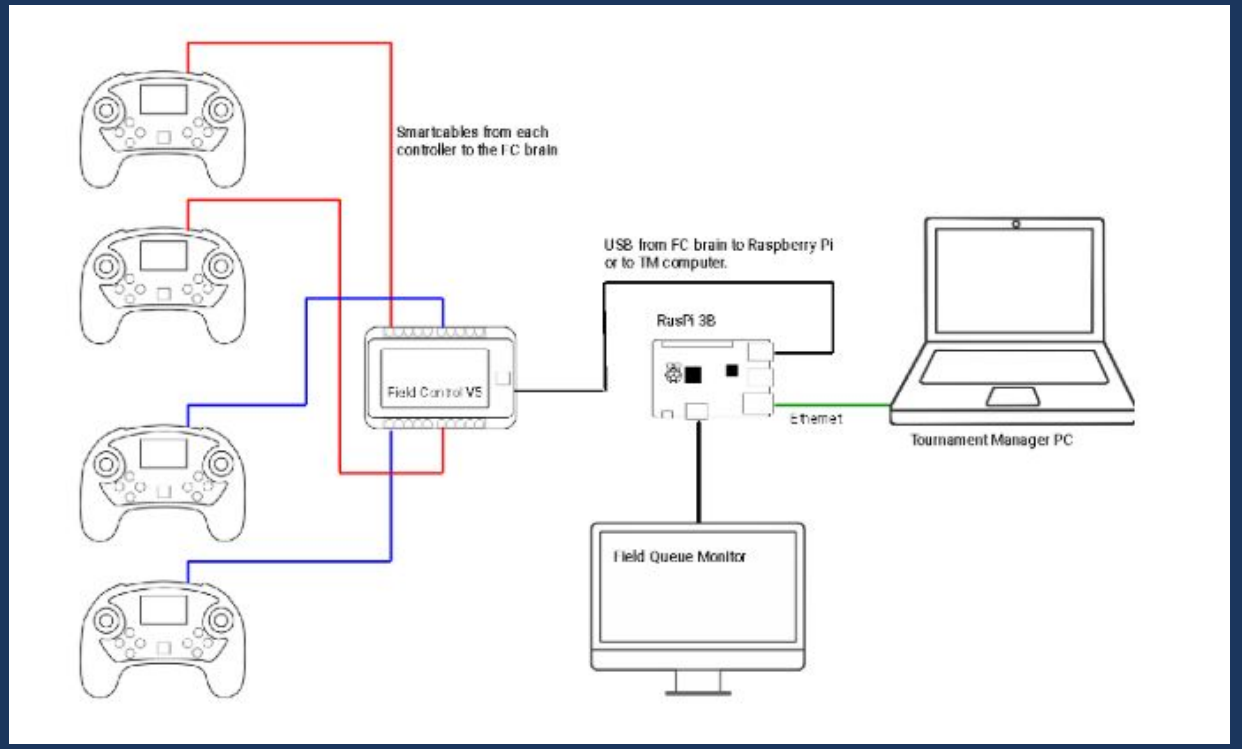
Smart Field Control

CONNECTION ISSUES



VEX Smart Field Controller

THE WEAK LINK IN THE SYSTEM AND THE CAUSE OF MOST ISSUES THAT ARE ACTUAL FIELD ISSUES IS THE FAULTY WIRING OR FAULTY PORTS.

FAULTY WIRING

SMART CABLES

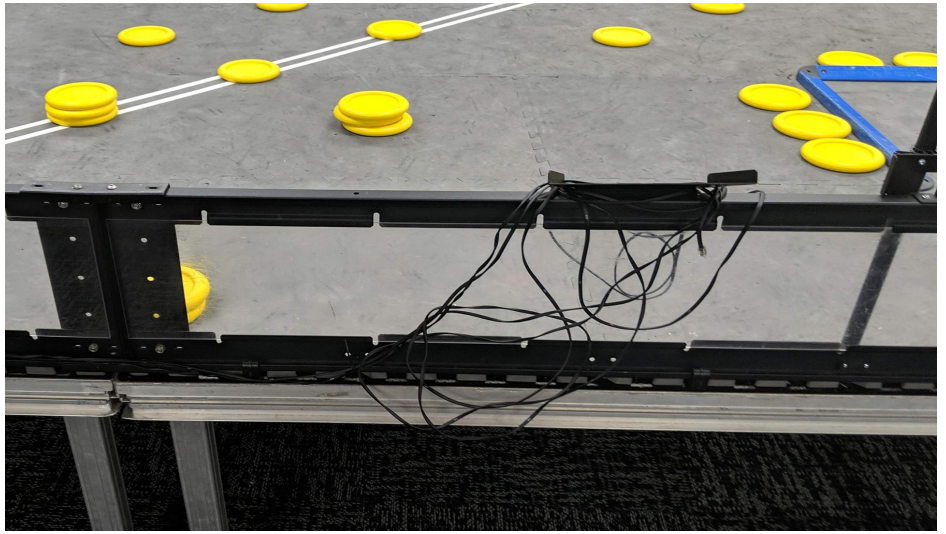
- The cable connecting the Smart Field controller to the 4 team controllers is a standard VEX Smart Cable.
- These cables are susceptible to breakage if not taken care of.
- The small retaining clip can break off, allowing the plug to easily fall out, or the wires themselves can pull loose.

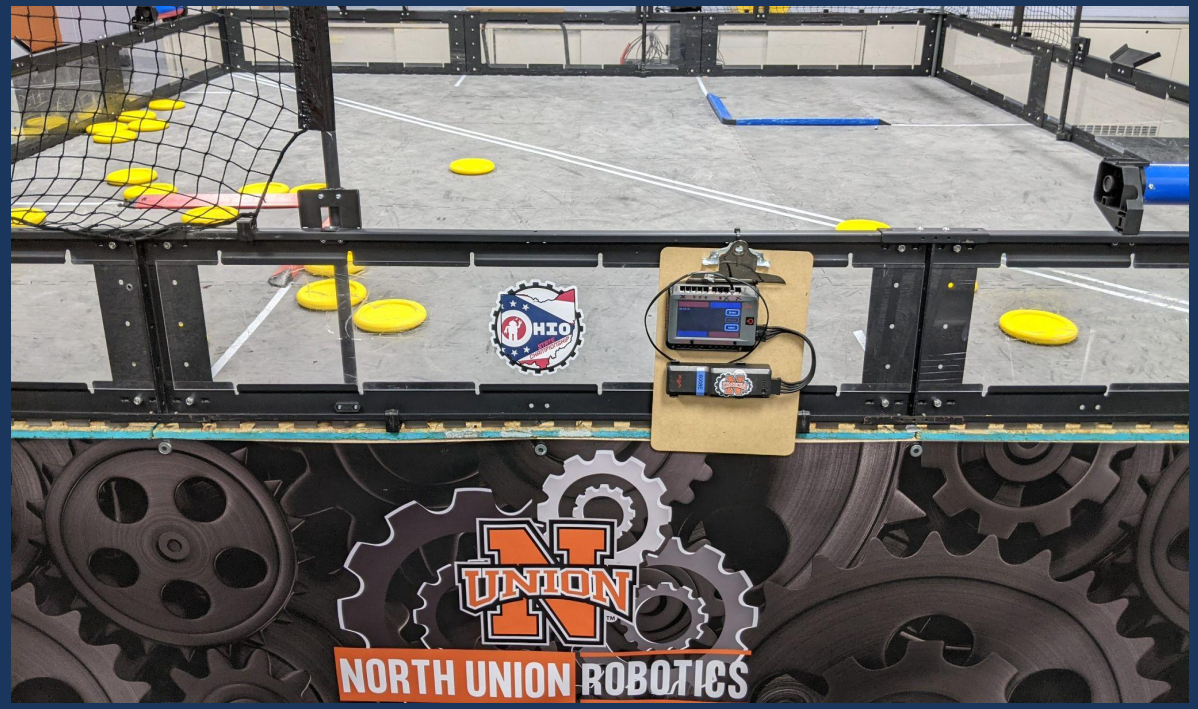
Best Practice:
Be sure to have tools like the ones pictured here and spare cabling to quickly identify, replace, and/or repair faulty cables

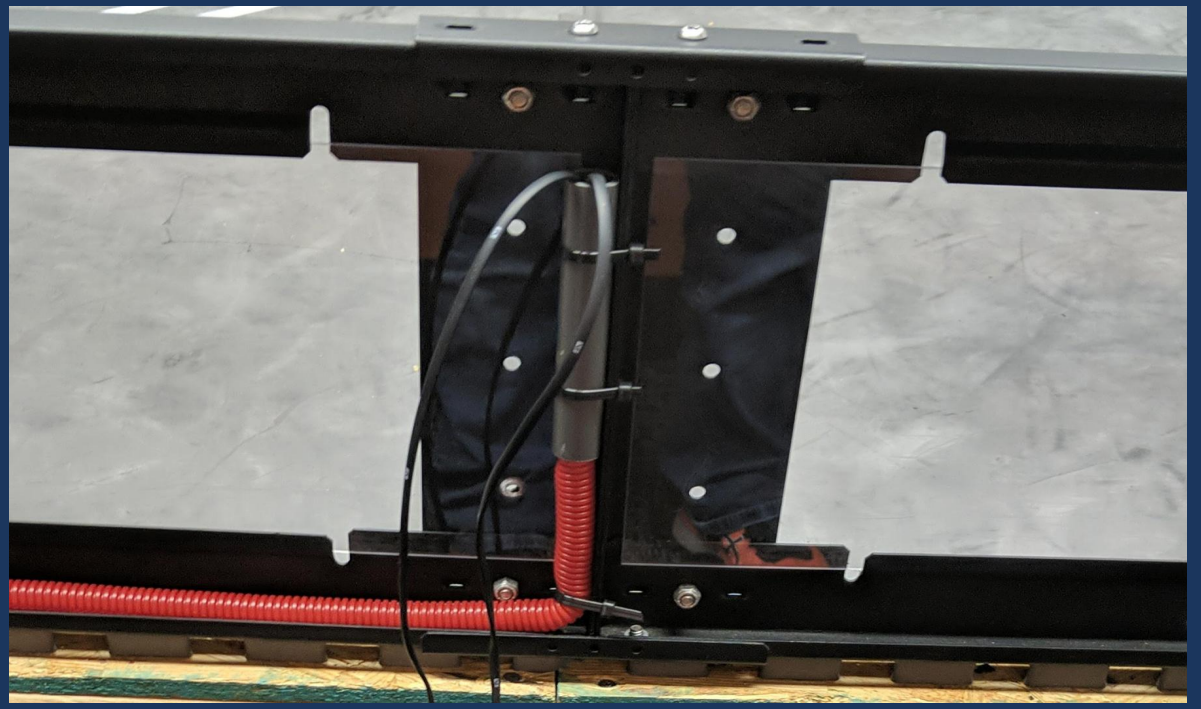
Cable Management

Do what you can to keep the cables off the floor and tangle-free, and test the cables often.

Pro tip: Label both ends of the cable so you can identify a single cable quickly.

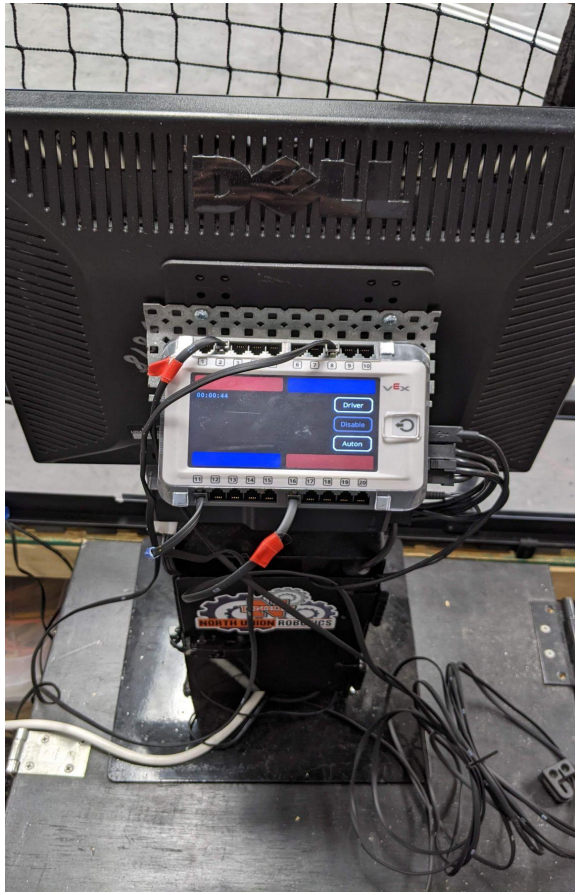




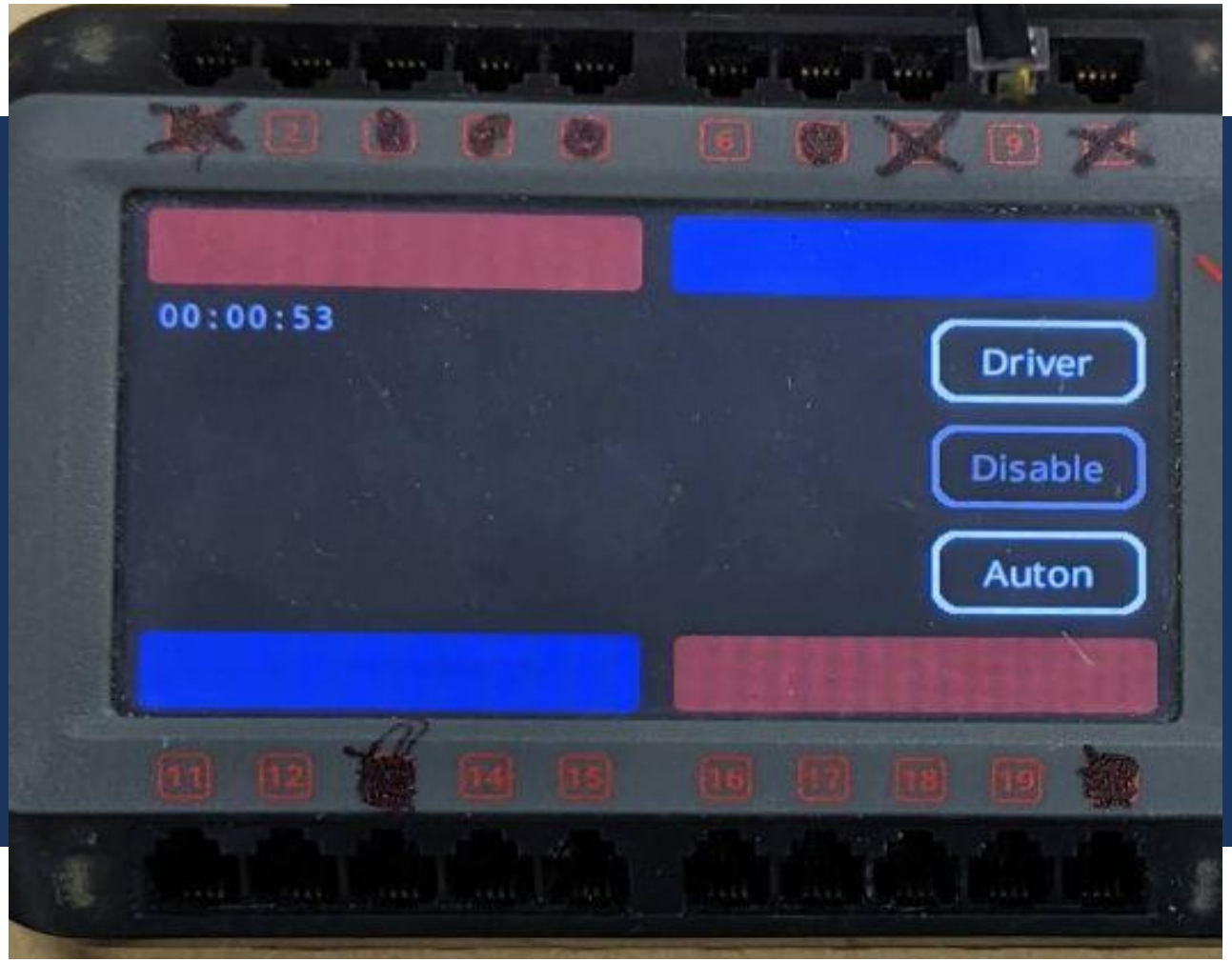


Cable Management

The Smart Field Controller itself can be mounted on a clipboard for skills or practice, or on the back of a field monitor using a flat piece of VEX metal for match fields. They should not be lying on the floor.

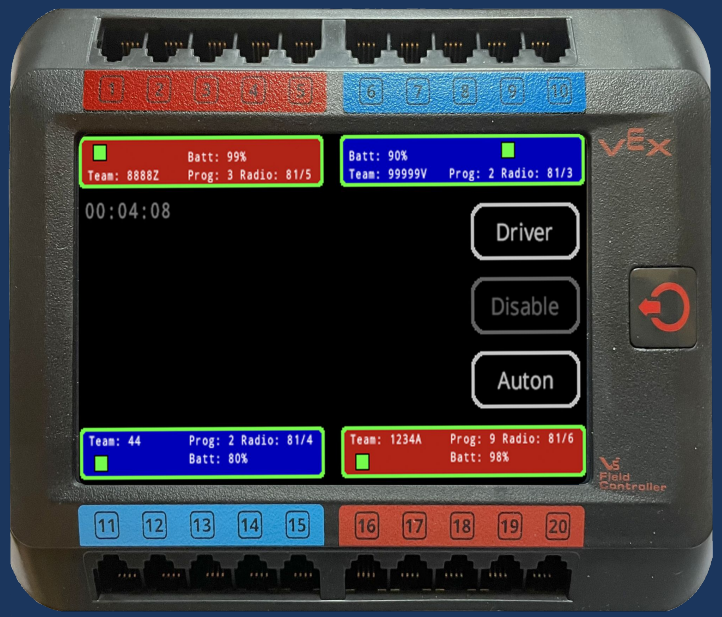


Port Fault



Port issues can be tougher to isolate than cable issues. Port issues can be caused by static or physical damage to the port itself. Finding port issues tends to be trial and error. Trying different ports on the Smart Field Controller and then later on the teams controller to see if it remedies the connection issues. Once bad ports are found, be sure to mark them.

Troubleshooting TM Connection issues



If TM frequently loses connection with the Smart Field Controller

1. Check the cable connecting the Smart Field Controller to the Raspberry Pi or laptop running that field. This should be a high-quality shielded micro USB cable.

2. Check to make sure the laptop or Pi is connected to the router via an Ethernet cable. It is not advised to use WIFI to network field equipment. Check that Ethernet cable for any issues.

Troubleshooting

What if I encounter technical issues?

It’s not if, it’s when!

- BREATH, SLOW DOWN, RE-CHECK.
- USE THE EVENT HELP CHAT ON ROBOT EVENTS (FRESH CHAT)
- CONTACT YOUR LOCAL REGIONAL SUPPORT MANAGER
- ASK ANOTHER EXPERIENCED EP / COACH
- RUN THE MATCHES DIRECTLY FROM THE V5 SMART FIELD CONTROLLER IF YOU NEED TO. (NO COMP SWITCH)
- INTERNET ISSUES IN A SCHOOL ENVIRONMENT CAN BE YOUR BIGGEST ISSUE. GET YOUR IT STAFF ON-BOARD
- WORST-CASE SCENARIO: YOU RUN MATCHES AND YOU HAND SCORE UNTIL THE SYSTEMS ARE BACK UP.

Contact

We are here for you

Event Partners and Coaches are the core of our competition program here at the REC Foundation. Please reach out to us with any questions or concerns. Thank you for all of your support.

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