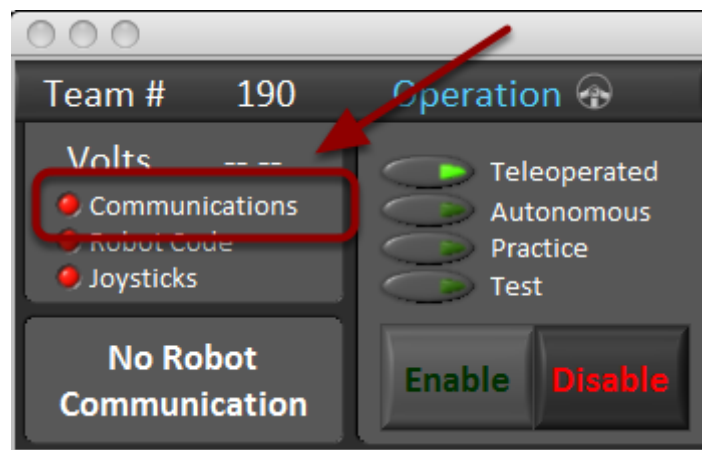


Troubleshooting

This is a document put together by CSA Laura Rhodes that contains a lot of information about troubleshooting steps for a lot of common control system problems encountered at events.

No "Communication" light on Driver's Station



- cRIO is not turned on
- Windows Firewall or other Firewall enabled (turn off)
- Incorrect version of Driver's Station application software
- Incorrect version of cRIO firmware
- Classmate Ethernet port has become detached from board
- Loose cRIO, radio, Power Distribution Board wiring
- On 8-slot cRIO, Ethernet cable should be plugged into Ethernet socket #1 (socket #2 is a totally separate LAN for Camera)
- On 8-slot cRIO, dip switches may have been inadvertently changed – all should be off with the possible exception of the "Console Out" switch.
- The robot battery is disconnected
- The robot battery has insufficient charge (low voltage level)
- cRIO is not in communication (either wired or through the WiFi) – TRY PINGING!
- Driver's Station software is not set up with proper team number. See Setup tab -> Team Number
- Driver's Station computer has both wired and wireless ports enabled (and is confused). See Setup tab -> Choose NIC. If you want to be sure to use only the wired port, turn off Wireless

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completely either through the "Network and Sharing Center" or via an external switch on the laptop.

- Driver's Station has its Ethernet port address to be obtained automatically (should be a static IP 10.XX.YY.05 where XYY is your four digit team number)
- Driver's Station computer has its Ethernet port address on the wrong subnet mask (should be 255.0.0.0)
- The Ethernet cable between the wireless bridge and the cRIO (or between the Driver Station laptop and the bridge) has come unplugged or is bad
- The wireless bridge is not correctly configured

No "Robot Code" light on Driver's Station

- No robot code installed - C++ debugging may leave cRIO in this state.
- Incomplete code download
- Code Exception/Crash – Check NetConsole for possible details
- Possible missing routine (C++) – Fails dynamic linking on bootup– Check NetConsole for possible details

Improper Driver Station and/or cRIO software version

This is an inspection failure – shown on "Diagnostics" tab

- Make sure the latest software updates have been applied to the Driver Station computer and any computers used for robot programming.
- Update the cRIO to latest Firmware version using the cRIO imaging tool.
- Reload robot application program after re-imaging cRIO.
- **WARNING NOTE-FIRST** may issue software updates up to and during the competition season.

Robot grounded to frame

This is an inspection failure, not meeting the requirement of >10k Ohm between either PD battery post and chassis.

- Check with multimeter set to OHMS (Ω)
- cRIO chassis should be isolated from the frame. Mount on non-conductive material
- Axis 206 Camera – mounting screw/post on back of camera is grounded – use nylon screws or mount on non-conductive material
- Loose wire making contact with frame
- Faulty motor (Banebots motor likely suspect)

Troubleshooting

Robot intermittently loses communications for 5-10 seconds during match

- Robot radio improperly powered. Needs to be powered from 5V regulator, verify polarity before powering up.
- Loose radio power connector
- Battery voltage drop due to excessive motor current
- Radio mounted too close to electronics
- Radio location not ideal – away from motors, outside frame, best
- Loose radio-to-cRIO Ethernet cable
- Improper delay loop in robot program
- Check robot log chart from match: use C:\ProgramFiles\FRCDriverStation\DriverStationLogFile Viewer.exe and observe "LostPackets"
- WiFi interference – make sure all computers that have ever been used for Driver's Station or robot programming that your team brings to competition have their WiFi ports turned off (even those still asleep in their cases).
- Excessive bandwidth used by the Axis camera – turn down frame rate and resolution to the minimum required for driver use.

Robot stops working for 20-30 seconds during match

- Possible cRIO reboot
- Loose cRIO power connector
- Loose radio-to-cRIO Ethernet cable
- Battery voltage drop due to excessive motor current
- Improper delays loop/CPU usage in robot program
- Memory leaks in robot program
- Check robot log chart from match using C:\ProgramFiles\FRCDriverStation\DriverStationLogFileViewer.exe and observe lost packets, cpu usage, and battery voltage
- Check for CPU usage and memory leaks using "Charts" tab on Driver's Station while running robot test.

Motors pulse on and off and/or the message "Output not updated often enough"

Check that the motor safety is either disabled or that the motors speeds are updated periodically. The problem is that the watchdog isn't being "fed" and shuts off the motor signal every 100ms. This will be accompanied by a message that says "Output not updated often enough".

Troubleshooting

Robot stops working at some point in match

- Power problems – low battery, disconnected battery cable
- cRIO and/or wireless bridge radio resets – see suggestions above
- Robot Application process crash due to user software bug or library/FPGA bug. Try to reproduce problem in the pit using the “Charts” tab on Driver Station and monitoring the Messages on the “Diagnostics” tab.
- For C++ and Java programs use the Netconsole program on the driver station to look for error messages from the robot. In particular the message "Robots don't quit" is caused by an uncaught exception in a Java robot program that is not caught. Remember though that the Netconsole is disabled on the field so you'll have to reproduce this one in the pit.

Robot behaves differently in the pit than on the field

Try the following things:

- Try running the robot in "Practice mode" from the driver station in the pit. Often there is code in the autonomous part of the program that causes issues with the teleop. If the robot is only tested with the autonomous or teleop code separately, then those issues may never be seen in the pit.

Joystick controls are “laggy”

- Improper delays loop/CPU usage in robot program. Use “Charts” tab and “Diagnostic” tab messages to diagnose.
- Robot radio problems – see intermittent loss of communications above
- Vision processing taking too much CPU time.

Robot does not sync with FMS

- Robot radio problems – see intermittent loss of communications above
- Improper wireless bridge configuration (needs to be in Bridge mode)
- Bad or disconnected cable between wireless bridge and cRIO
- On 8-slot cRIO, Ethernet cable should be plugged into Ethernet socket #1
- Radio not configured at the provided kiosk in the pits

Driver Station does not sync with FMS

- Bad Ethernet port (especially on Classmates)
- Wired Ethernet port improperly configured
- Wrong version of Driver Station software

Troubleshooting

- Improper team number on Driver station
- WiFi on Driver Station computer not disabled (only wired Ethernet used on the field and in the pits) and/or is set with a conflicting IP address.
- Driver's Station computer has its Ethernet port address on the wrong subnet mask (should be 255.0.0.0)
- Driver Station plugged into incorrect operator control station.
- Windows Firewall should be disabled.

Battery Voltage displayed as 0V on Driver Station

- Missing jumper on Analog Input board
- Analog input board not being powered (check for lit power LED on board)
- Analog input board in incorrect slot (Slot 1)

Battery Voltage displayed as larger than 13V on Driver Station

- Analog input board not being powered correctly (should be powered with 12V but could get 24V if accidentally swap 24V solenoid and 12V analog card power connectors)
- Use of Analog Channel 8 for a different purpose and jumper is in wrong location.

Joysticks not responding

- The joystick is not plugged into the Driver's station USB port
- The joystick setup device order is incorrect on the Driver's Station (Setup tab, drag to order)
- The Driver's station is in the Disabled Mode
- The Driver's station is not in the desired Tele-Op Mode
- Incorrect robot programming

Digital Sidecar does not have BAT, 5V, and 6V LEDs lit

- Bad power connection to Digital Side Car
- Defective Digital Sidecar
- Digital Sidecar output shorted (check for debris and try removing connections one at a time)

Robot Signal Light (RSL) not functioning

- Bad power connection to Digital Side Car
- Defective Digital Sidecar
- Improper wiring of RSL (needs jumper between La and Lb)

Troubleshooting

- RSL wiring not connected to RSL port on Digital Sidecar
- Bad or missing cable between NI 9403 Digital I/O card and Digital Sidecar
- NI 9403 Digital I/O card not in correct cRIO slot (Slot 2)

No lights on a speed controller when robot is powered on

- Missing breaker for the corresponding circuit on Power Distribution board
- Tripped breaker for the corresponding circuit on the Power Distribution board – check break tripped LED on side of PDB.
- Loose power wiring
- The power distribution board is not getting power
- Broken speed controller – replace
- Controller needs calibration (Victor only, fan should be on)

Air compressor not turning on

- Verify proper relay output port cable connection from Digital Sidecar to Spike
- Circuit breaker in Spike module
- Check Proper connection of Spike Module to compressor motor.
- Check pressure switch input cable connection to DIO port on Digital Sidecar
- The digital sidecar is not getting power
- Check robot programming assignments for proper assignments of the compressor relay output and Pressure Switch Digital Input. Check for correct usage of the compressor object (there were subtle changes required in 2012 for LabVIEW compared to previous years).
- Check that Green LED next to Relay port on Digital Sidecar is turning on.

Speed Controller LED doesn't go solid orange/yellow when the robot is enabled (PWM Control)

- A speed controller does not have a PWM control signal cable connected
- Improperly seated PWM signal cable (especially with Victors)
- Incorrect PWM channel on digital sidecar wired (vs. in software)
- Bad or disconnected PWM cable.
- PWM signal cable polarity. On the speed controllers, check for the "S+-" or "B" in the plastic molding near the PWM ports. On the digital sidecar, follow convention printed near the PWM ports.
- PWM signal cable incorrectly plugged into DIO side of Digital sidecar instead of PWM connector side.
- Incorrect robot application software.

Troubleshooting

- The digital sidecar is not getting power (especially if opening four or more controllers breaks previously working functionality)
- Bad or missing cable between NI 9403 Digital I/O card and Digital Sidecar

Speed Controller LED doesn't go solid orange/yellow when the robot is enabled (CAN Control-Jaguars only)

- Incorrect robot application software.
- Wiring problems or improper configuration with 2CAN or serial port bus interface
- Bad CAN cable(s)
- Improperly seated CAN connectors in Jaguars
- Damaged CAN connectors in Jaguar
- Missing termination resistor(s)
- Missing CAN drivers enabling in cRIO (via cRIO imaging tool)

Speed Controller LED doesn't show speed changes (going to red and/or green) with joystick changes in Teleop Enabled Mode. Stays solid yellow

- Incorrect PWM channel on digital sidecar wired
- Incorrect robot application software – may not be specifying correct voltage or driving the motor from multiple areas of the code. Check with motor disconnected, multimeter on Volts DC setting. Use Dashboard or Smart Dashboard to display and check PWM control outputs

Motor doesn't move (even though speed controller lights go red and green)

- A motor is not connected with its speed controller
- A motor is stalled and is drawing too much current
- Two motors are operating against each other rather than together
- The robot battery has insufficient charge (adequate voltage level)
- Possible mechanical problems include broken key, loose set screw on shaft collar

Troubleshooting

Motor moves sluggishly (even though speed controller lights go red and green)

- A motor is stalled and is drawing too much current due to mechanical problems
- Two motors are operating against each other rather than together
- The robot battery has insufficient charge (adequate voltage level)
- Incorrect robot application software – may not be specifying correct
- Voltage or driving the motor from multiple areas of the code. Check with motor disconnected, multimeter on Volts DC setting. Use Dashboard or Smart Dashboard to display and check PWM control outputs.
- Speed controller type selected in the robot program doesn't match the actual physical model of speed controller.

Slow flashing RED LED on Jaguar

- Overcurrent trip, possibly caused by damaged or stalled motor
- Other Jaguar error
- Possible broken Jaguar - replace

Servo Motor not running

- PWM cable plugged into wrong port on digital sidecar
- Missing 6V jumper on PWM port on digital sidecar.
- Bad or missing cable between NI 9403 Digital I/O card and Digital Sidecar
- The digital sidecar is not getting power
- Incorrect robot application program.

Analog Sensors (such as gyro) not working

- Incorrect pin assignments on signal cable
- Signal cable not plugged into analog input card
- Signal cable polarity reversed (correct pin polarity shown on side of analog input card)
- No power to the analog input card (unlit LED on card)

I2C Sensors (such as accelerometer) not working

- Incorrect pin assignments on signal cable
- Signal cable not plugged into I2C pins on Digital Sidecar(they are on the row next to the I2C plug – not on the row labeled "OUT")