Troubleshooting and Diagnostics

The troubleshooting and diagnostics guide provides instructions to assist in tracking down the source of many basic controller installation problems. If there is a problem with a controller installation, please review these instructions and if a listed problem matches the controller's problem, review the possible causes and corrective actions.

1.0 Troubleshooting

Many of the troubleshooting instructions require a digital voltmeter (DVM) to verify source voltages, circuit continuity, and noise levels on the PXL-500/PXL-510 controller. Please have a DVM on hand before beginning troubleshooting. Refer to Figure 1 to identify items on the controller PCB.

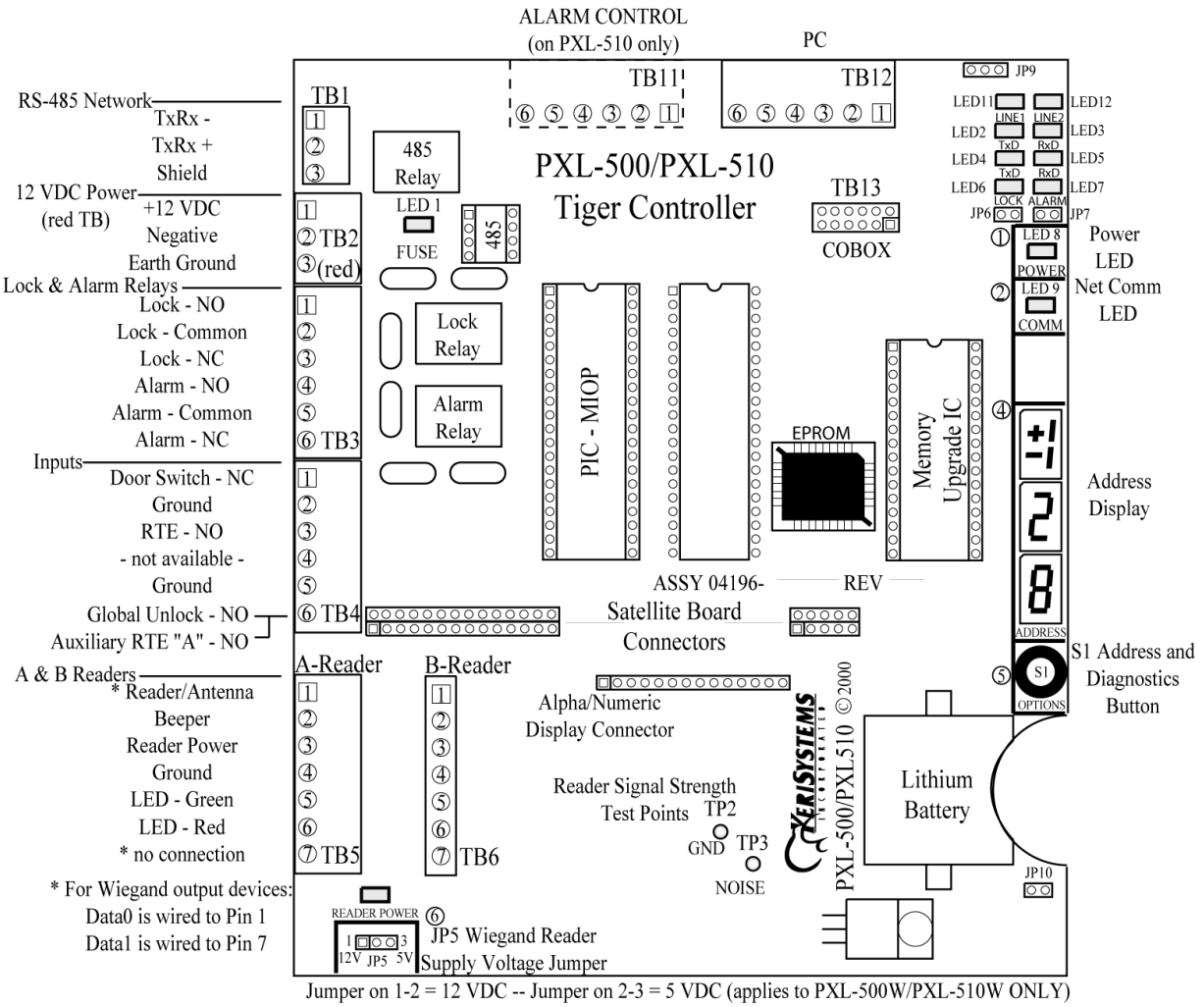

Figure 1: The PXL-500/PXL-510 Controller

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Problem	Possible Cause	Corrective Action
The *Doors*™ software cannot be installed on the host computer.	1. The host computer does not have a Pentium™ microprocessor. 2. The host computer does not have enough RAM memory. 3. The host computer does not have enough hard disk space. 4. The host computer's video card/monitor resolution is too low. 5. The host computer is running an operating system incompatible with the *Doors* software. 6. The host computer does not have a compatible operating system installed.	• Verify the host computer meets the minimum requirements specified in the *Doors* Users Guide.
The controller does not power-up (the power LED8 is not on and the LCD is blank).	1. No power or insufficient power has been supplied to the system.	• Check the main power circuit breaker. • Verify the positive power lead is on TB-2, pin 1 and the negative power lead is on TB-2, pin 2. Measure the input voltage across pin 1 (positive) and pin 2 (negative) of TB-2. The voltage should read between 12 and 14 VDC. • Disconnect the power supply from the controller and verify the supply's voltage. The voltage should read between 12 and 14 VDC. • The LCD-1 is bad or incorrectly plugged-in.

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Problem	Possible Cause	Corrective Action
The controller does not power-up (the power LED8 is red and the LCD displays a value).	1. The voltage supplied to the controller is too low or too high.	• If the supply voltage detected by the controller falls below 11.1 VDC or raises above 14.4 VDC, the power LED8 turns red and that voltage value is displayed on the controller's LCD address display (see Figure 1 on page 1).
The fuse LED1 is red.	1. The thermal power fuse has opened. ***CAUTION: The fuse becomes hot over time and may burn. Always give the fuse time to cool before touching.***	• If the fuse LED1 is red, the fuse is open because the power and ground lines are reversed. Turn controller power off and verify the polarity of the power coming to the controller.
The fuse LED1 is green.	1. The thermal power fuse has opened. ***CAUTION: The fuse becomes hot over time and may burn. Always give the fuse time to cool before touching.***	• If the fuse LED1 is green, the controller's fuse has opened because there is a power problem. Remove power from the unit and give time for the fuse to cool, then verify the polarity of the power coming to the controller. Measure the input voltage across pin 1 (positive) and pin 2 (negative) of TB-2. The voltage should read between 12 and 14 VDC. If controller power is correct, the controller should be serviced.

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Problem	Possible Cause	Corrective Action
The reader does not beep and/or the reader LED does not flash when a card is presented. OR The controller keeps resetting.	1. The reader is not wired correctly.	• Verify all TB-5/TB-6 connections have been made on lead wire and not on wire insulation. • For Keri Systems proximity readers, verify all readers are wired to the controller correctly (refer to the reader Quick Start Guide or to the wiring section of the PXL-500/PXL-510 Quick Start Guide or the Technical Reference). • For Wiegand readers, verify all readers are wired to the controller correctly (refer to the readers' installation manual and the wiring section of the PXL-500/PXL-510 Quick Start Guide or the Technical Reference).
	2. Insufficient power to the reader.	• Measure the output voltage across the red and black power wires at the reader. The voltage should read between 12 and 14 VDC. • Refer to the reader Quick Start Guide and the PXL-500/PXL-510 Quick Start Guide or the Technical Reference and verify the reader cable length does not exceed the maximum allowed cable length.
	3. JP5 on the controller is installed incorrectly.	• For Keri Systems' proximity readers and 12 VDC Wiegand readers, verify that JP5 on the PXL-500/PXL-510 controller is installed across pins 1 and 2 to supply 12 VDC. • For 5 VDC Wiegand readers, verify that JP5 on the PXL-500/PXL-510 controller is installed across pins 2 and 3 to supply 5 VDC.
	4. The controller is receiving transients.	• Verify a transorb has been installed across the electric lock device (for the lock relay) and across the alarm device (for the alarm relay). If so, install an isolation relay (IRP-1) across the lock and alarm devices.

Problem	Possible Cause	Corrective Action
	5. The controller is mounted too close to an EMI source.	• Verify there is at least four feet of separation between the controller and the controller's power supply. • Verify there are no other EMI sources (such as a computer monitor) in close proximity to the controller.
	6. The reader has not been enabled in the *Doors* software.	• In the *Doors* program, verify the reader has been enabled in the Setup > System > Doors menu option.
	7. The wrong type of card has been presented to the reader.	• Verify the correct type of card has been enrolled and assigned to the users.
	8. Card is not functioning.	• Present a different card to the reader to verify it is the card that is not functioning correctly. • Present the card to a different reader to see if it will respond to the card.
The reader's read range is very short.	1. There is a poor earth ground.	• Verify pin 3 of TB-2 is connected to a good earth ground. Refer to the PXL-500/PXL-510 Quick Start Guide or the Technical Reference for information regarding earth grounding.
	2. The reader is mounted too close to an EMI source.	• Follow the instructions provided in the diagnostic section (see page 12) and measure the reader's signal strength. The measured value should be less than 500 mV. If not, an EMI source is affecting the reader. Relocate either the reader or the EMI source.
	3. The reader's cable is not properly shielded or is located too close to an EMI source.	• Replace the unshielded cable with a shielded cable. • Verify the reader cable is not routed along side power cables. • Follow the instructions provided in the diagnostic section (see page 12) and measure the reader's signal strength. The measured value should be less than 500 mV. If not, an EMI source is affecting the reader. Relocate either the reader or the EMI source.

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Problem	Possible Cause	Corrective Action
	4. A reader that was not designed to be mounted on metal has been mounted on a metal surface.	• Remount the reader on a nonmetallic surface. • Replace the reader with one designed for mounting on metallic surfaces.
At power-up, the reader continuously beeps.	1. The door sense input is open.	• If a door switch is installed, verify switch operation and verify the switch is installed across pins 1 and 2 of TB-4. • If a door switch is not being used, verify a jumper is installed across pins 1 and 2 of TB-4.
	2. The controller's RAM needs to be reset.	• Follow the instructions provided in either the PXL-500/PXL-510 Quick Start Guide or the Technical Reference, and reset the controller's RAM.
The controller cannot communicate with the *Doors* access control program.	1. Verify data is being transferred to and from the controller.	• At the upper right corner of the controller PCB is a set of communication LEDs (see LEDs 2-5 on Figure 1 on page 1). Initiate a data transfer command and view the TxD and TxR LEDs. These LEDs should flicker if data is being transferred to and from the controller.
	2. The communication cable is loose or unplugged.	• Verify the communication cable is plugged in correctly.
	3. The controller to PC direct-connect cable is not wired correctly.	• If the installation uses a Keri Systems cable, verify the correct cable has been installed. • If the installation uses a self-made cable, refer to the instructions in the PXL-500/PXL-510 Quick Start Guide or the Technical Reference and verify the cable has been wired correctly.
	4. *Doors* is not configured to communicate through the proper COM port.	• Refer to the *Doors* Users Guide or online help for COM port configuration instructions. • Run COMTEST to verify basic COM port operation.

Problem	Possible Cause	Corrective Action
	5. The communication cable is connected to the wrong COM port.	• Verify the communication cable is connected to the correct COM port.
	6. The communication cable is connected to the wrong controller.	• Verify the communication cable is connected to the master controller in the access control network.
	7. The master controller is not set with address 1.	• Verify the master controller's address is 001.
	8. The *Doors* program is connected to the wrong site (if the software is configured for multi-site mode).	• In the *Doors* program, click on the **Select Site** button and verify the correct site has been selected.
	9. The wrong PIN has been entered (if the software is configured to use the PIN security feature).	• In the *Doors* program, verify the PIN is correct in the Setup > System > Sites menu option.
	10. The controller's firmware and the *Doors* software are not compatible.	• The firmware found in older controllers is not compatible with *Doors* software. Contact your Keri Dealer to verify firmware/software compatibility.
	11. The host computer's serial port has an incompatible UART.	• The serial port must have a 16550 UART. Consult a computer technician to resolve this problem.
	12. There is an IRQ conflict.	• Consult a computer technician to resolve this problem.
	13. The COM port is not working.	• Consult a computer technician to resolve this problem.
The controller will not communicate with the modem.	1. Verify data is being transferred to and from the controller.	• At the upper right corner of the controller PCB is a set of communication LEDs (see LEDs 2-5 on Figure 1 on page 1). Start a data transfer command and view the TxD and RxD LEDs. These LEDs should flicker if data is being transferred to and from the controller.

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Problem	Possible Cause	Corrective Action
	2. The modem is turned off.	• Verify the modem's power is on.
	3. The modem was plugged into an already active controller.	• Turn the power off to both the controller and modem. Power the modem on and then the controller.
	4. The controller to modem cable is not correct.	• If the installation uses a Keri Systems cable, verify the correct cable has been installed. • If the installation uses a self-made cable, refer to the instructions provided in either the PXL-500/PXL-510 Quick Start Guide or the Technical Reference, and verify the cable has been wired correctly.
	5. The modem is the wrong type.	• Refer to the modem's manual and verify the modem is Hayes compatible, communicates at 9600 baud or greater, can be configured to turn error checking off, and has nonvolatile RAM backup.
	6. The modem cable is connected to the wrong controller.	• Verify the modem cable is connected to the master controller in the access control network.
	7. The master controller is not set with address 1.	• Verify the master controller's address is 1.
	8. The *Doors* program is connected to the wrong site (if the software is configured for multi-site mode).	• In the *Doors* program, click on the **Select Site** button and verify the correct site has been selected.
	9. The wrong PIN has been entered (if the software is configured to use the PIN security feature).	• In the *Doors* program, verify the PIN is correct in the Setup > System > Sites menu option.
The host PC will not communicate with the modem.	1. The modem is turned off.	• Verify the modem's power is on.

Problem	Possible Cause	Corrective Action
	2. The wrong COM port has been selected in the *Doors* program.	• In the *Doors* program, verify the correct COM port has been selected in the Setup > System > Network Configuration menu option.
	3. The modem is the wrong type.	• Refer to the modem's manual and verify the modem is Hayes compatible, communicates at 9600 baud or greater, can be configured to turn error checking off, and has nonvolatile RAM backup.
	4. The host PC to modem cable is not correct.	• If the installation uses a Keri Systems cable, verify the correct cable has been installed. • If the installation uses a self-made cable, refer to the instructions provided in either the PXL-500/PXL-510 Quick Start Guide or the Technical Reference, and verify the cable has been wired correctly.
	5. The host computer's serial port has an incompatible UART.	• The serial port must have a 16550 UART. Consult a computer technician to resolve this problem.
	6. There is an IRQ conflict.	• Consult a computer technician to resolve this problem.
	7. The COM port is not working.	• Consult a computer technician to resolve this problem.
The lock relay continually cycles on and off.	1. The firmware PROM is not seated properly.	• Turn controller power off. Refer to Figure 1 on page 1, locate the firmware PROM, and ensure the PROM is seated properly in its socket on the PCB. Now follow the instructions provided in either the PXL-500/PXL-510 Quick Start Guide or the Technical Reference, and reset the controller's RAM.
The *Doors* program will not run.	1. The host PC does not have enough conventional memory available for the program.	• The host PC must have at least 560K of conventional memory available for use by the *Doors* program. Consult a computer technician to resolve this problem.

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Problem	Possible Cause	Corrective Action
Some controllers on the access control network are not communicating with the *Doors* program.	1. There is an addressing conflict between the controllers.	• Check the addressing on each controller on the network. Each controller must have a unique address. The master controller must have address 1.
	2. RAM is corrupted in one or more of the controllers.	• In the *Doors* program, click on Setup > System > Controller Status menu option. Select each controller, one-at-a-time, and click on the Status button. Note those controllers that do not respond or that respond incorrectly. These controllers must have their RAM reset. Follow the instructions provided in either the PXL-500/PXL-510 Quick Start Guide or the Technical Reference, and reset the controller's RAM.
	3. The access control network is not wired correctly.	• Review the access control network wiring on each controller. Verify the network wiring is connected correctly. • Verify all connections have been made on lead wire and not on wire insulation.
	4. Controllers are not powered on.	• Verify all controllers are powered on.

Problem	Possible Cause	Corrective Action
	5. No power or insufficient power has been supplied to the system.	• Check the main power circuit breaker. • Verify the positive power lead is on TB-2, pin 1 and the negative power lead is on TB-2, pin 2. • If the supply voltage detected by the controller falls below 11.1 VDC or raises above 14.4 VDC, the power LED8 turns red and that voltage value is displayed on the controller's LCD address display (see Figure 1 on page 1). • Measure the input voltage across pin 1 (positive) and pin 2 (negative) of TB-2. The voltage should read between 12 and 14 VDC. • Disconnect the power supply from the controller and verify the supply's voltage. The voltage should read between 12 and 14 VDC

Troubleshooting and Diagnostics

2.0 Diagnostics

Built into every PXL-500/PXL-510 controller is a set of diagnostic programs designed to assist in field verification of basic reader and controller functions.

- Receiver A Signal Quality Test (available only on Proximity controllers)
- Receiver B Signal Quality Test (available only on Proximity controllers)
- PXL-500/PXL-510 Inputs Test
- SB-593 Inputs Test (this diagnostic routine is displayed, but is not yet available)
- Network Error Rate (available only on the master controller - address #1)

To use the diagnostic routines the controller must have an LCD-1 Alpha/Numeric Display installed at J6. To access the diagnostics, click the S1 button (see Figure 1 on page 1) until the Diagnostics Entry screen (see Figure 2) appears on the LCD display (each click of the S1 button rotates the display between time, date, firmware revision, unit number, and diagnostics).

Figure 2: Diagnostics Entry Screen

Now double-click S1 and the first diagnostic test appears on the display. Clicking S1 once advances to the next test. Double-clicking S1 enters the test identified on the display.

2.1 Receiver A and B Signal Quality Tests

The receiver input signal quality tests provide a measure of the strength of the signal and the amount of interference in the signal received by a PXL-500/PXL-510 controller from the A-Reader or B-Reader. There are two methods for measuring receiver input signal quality: the on-board diagnostics and measuring with a DVM (for installations without an LCD-1 display, instructions for measuring with a DVM are found on page 18).

NOTE: The Receiver Signal Quality Tests are only valid for Keri Systems proximity readers. These tests are not valid for Wiegand readers or for proximity readers from other manufacturers.

NOTE: Access control functions are disabled while the receiver signal quality test is being performed. Access requests are ignored until the receiver signal quality test is exited.

The steps for performing the Receiver A and Receiver B Signal Quality Tests are identical. The following instructions may be applied to either test.

1. Once in the diagnostic routines, single-click S1 until the Receiver A/Receiver B Signal Quality Test header appears on the LCD display.

Figure 3: Receiver A/B Signal Quality Test Entry Screen

2. Double-click to enter the diagnostic routine. The following information appears on the LCD display.

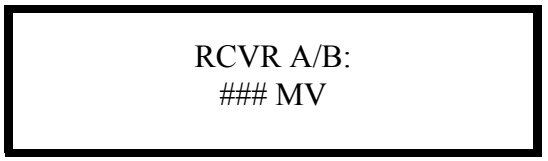

Figure 4: Receiver A/B Input Signal Quality

3. Monitor the MV reading over a period of time. The reading fluctuates as the signal strength fluctuates. Determine an average value for this reading.
4. Exit the Signal Quality test to return the reader/controller to normal operation.

The average value should be around 500 mV. This indicates the PXL-500/PXL-510 controller is receiving a reader signal with little electrical interference.

- A higher reading indicates the controller is receiving electrical interference that may affect the reader's signal. The higher the reading, the more interference is being received which directly affects the reader's read range.
- A lower reading indicates the controller is receiving a weak signal from the reader. The lower the reading, the weaker the signal being received, which directly affects the reader's read range.

2.2 PXL-500/PXL-510 Inputs Test

The PXL-500/PXL-510 Inputs Test allows an operator to verify the basic operation of all inputs on the PXL-500/PXL-510.

1. Once in the diagnostic routines, single-click S1 until the PXL-500/PXL-510 Inputs Test header appears on the LCD display.

Figure 5: PXL-500/PXL-510 Inputs Test Entry Screen

NOTE: The Input Test Entry Screen only says PXL-500 even on a PXL-510 controller. This is normal.

2. Double-click to enter the diagnostic routine. Information appears on the LCD display corresponding to input status (see Figure 4); inputs that are in their normal, inactive state are displayed on the LCD, inputs that are in their active state are not displayed (see Table 1).

Figure 6: PXL-500/PXL-510 Inputs

Table 1: Normal States for Controller Inputs

Input	Normal State
AUX	Normally Open
RTE	Normally Open
DR1	Normally Closed

3. To test an input, change its state. When an input is inactive, its header name appears on the LCD display. When an input is active, its header name disappears from the LCD display.

2.3 Net Error Rate Test (Master Controller ONLY)

The net error rate test allows an operator to monitor the communication between controllers to see if any network communication errors are occurring during master/slaves polling cycles. This can help verify the integrity of the controller communication network.

A polling cycle is defined as the set of network communications between the master controller as it contacts each slave controller in the access control network, one-at-a-time, monitoring slave controller status.

1. Once in the diagnostic routines, single-click S1 until the Net Error Rate Test header appears on the LCD display.

Figure 7: Net Error Rate Screen

2. Double-click to enter the diagnostic routine. Three sets of numbers appear on the LCD display (see Figure 8). Each set of numbers corresponds to different kind of network error count.

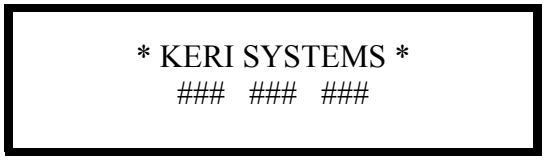

Figure 8: Net Error Rate Fields

3. The first set is a count of the number of network errors that have occurred on the current polling cycle. If network errors are occurring during the current polling cycle, this counter will increase until the end of the polling cycle. When a new polling cycle begins this number resets to zero.
4. The second set is a count of the highest number of network errors that have occurred on any single polling cycle since the test began.
5. The third set is a count of the total number of network errors that have occurred over all polling cycles since the test began.

NOTE: A number of network errors will be reported during an auto-configuration initiated by the Doors/Doors program. This is due to the master controller polling all 128 possible controllers on the network to determine which controllers are actually connected. Errors during an auto-configuration cannot be considered valid errors.

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2.4 Exiting Diagnostics

1. Single-click S1 until the Exit header appears on the LCD display.

Figure 9: Exit Diagnostics Screen

2. Double-click to exit the diagnostic routine.

2.5 RS-485 Wiring Test

The RS-485 wiring test is provided for field testing of the RS-485 connection. The RS-485 wiring test is done in two steps. The first step tests the negative side of the RS-485 (TB-1 pin 1 - see Figure 1 on page 1). The second step tests the positive side of the RS-485 (TB-1 pin 2).

Make sure the RS-485 cable drain wire is connected to pin 3 on TB-1 on each controller in the network.

NOTE: The RS-485 wiring test will show if there are any PXL-250s that still have the R45 resistor. This resistor must be removed for the RS-485 wiring test to work properly. For information on how to test a specific controller and remove the R45 resistor, refer to the R45 (2.2K) Resistor Removal Application Note (P/N 01736-001).

2.5.1 RS-485 Negative Test

1. Make sure all controllers are powered up.
2. Install the jumper across pins 1-2 on JP9 on the master controller ONLY.
3. LED11 will illuminate RED continuously (it is ok for the green LED to be either off or flashing).
4. Check each slave unit on the system. The following guide will inform you of that controller's status

- If LED11 is illuminated RED on every controller in the network, then the RS-485 negative wiring is ok.
- If LED12 is illuminated Green, then the + and - lines are reversed somewhere in the RS-485 wiring or at the controller.
- If no LED is illuminated, then there is an open wire somewhere in the RS-485 wiring, at the controller, or the drain wire.
- If both LEDs are illuminated on all controllers, then there is either a short in the wiring somewhere in the RS-485 wiring or at the controller, or there is one or more PXL-250s that still have the R45 resistor.

2.5.2 RS-485 Positive Test

1. Once all controllers on the network have been checked and are operating correctly, return to the master controller.
2. Switch the jumper on JP9 from pins 1-2 to 2-3 on the master controller ONLY.
3. LED12 will illuminate GREEN continuously (it is ok for the red LED to be either off or flashing).
4. Check each slave unit on the system. The following guide will inform you of that controller's status

- If LED12 is illuminated GREEN on every controller in the network, then the RS-485 positive wiring is ok.
- If LED11 is illuminated RED, then the + and - lines are reversed somewhere in the RS-485 wiring or at the controller.
- If no LED is illuminated, then there is an open wire somewhere in the RS-485 wiring, at the controller, or the drain wire.
- If both LEDs are illuminated on all controllers, then there is either a short in the wiring somewhere in the RS-485 wiring or at the controller, or there is one or more PXL-250s that still have the R45 resistor.

Once all controllers on the network have been checked and are operating correctly, return to the master controller.

5. Remove the jumper from JP9 (be sure to keep the jumper in a place where it may be used in future tests).
6. Either perform a reset on the master controller, or perform an Autoconfig in *Doors*. The test is complete and the system is in operating order.

NOTE: LEDs 11 and 12 blinking when not in RS-485 wiring test mode is normal.

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2.6 Receiver Signal Quality Test - DVM

The receiver input signal quality tests provide a measure of the strength of the signal and the amount of interference in the signal received by a PXL-500/PXL-510 controller from the A-Reader or B-Reader. There are two methods for measuring receiver input signal quality: the on-board diagnostics and measuring with a DVM (the on-board diagnostics method is described earlier in this document).

2.6.1 Reader "A" Measurement (refer to Figure 1 on page 1)

1. Remove TB-6 from the receiver board.
2. Disconnect the wire at TB-6, pin 1.
3. Loosen the wire connection at TB-5, pin 1 and attach a jumper wire between TB-6, pin 1 and TB-5, pin 1.
4. Tighten both connections and reinstall TB-6 on the receiver board.
5. Set the DVM to a range that allows it to read between 500 mV to 2 volts DC.
6. Connect the ground lead of the DVM to TP-2 on the receiver board.
7. Connect the positive lead of the DVM to TP-1 on the receiver board.
8. Take the reading from the DVM.

2.6.2 Reader "B" Measurement (refer to Figure 1 on page 1)

1. Remove TB-6 from the receiver board.
2. Disconnect the wire at TB-5, pin 1.
3. Loosen the wire connection at TB-6, pin 1 and attach a jumper wire between TB-6, pin 1 and TB-5, pin 1.
4. Tighten both connections and reinstall TB-6 on the receiver board.
5. Set the DVM to a range that allows it to read between 500 mV to 2 volts DC.
6. Connect the ground lead of the DVM to TP-2 on the receiver board.
7. Connect the positive lead of the DVM to TP-1 on the receiver board.
8. Take the reading from the DVM.

Be sure to remove the jumper wire between TP-6, pin1 and TP-5, pin1. Be sure to restore the "A" reader lead to TB-5, pin 1 and the "B" reader lead to TB-6, pin 1.

The average value should be around 500 mV. This indicates the PXL-500/PXL-510 controller is receiving a reader signal with little electrical interference.

- A higher reading indicates the controller is receiving electrical interference that may affect the reader's signal. The higher the reading, the more interference is being received which directly affects the reader's read range.

- A lower reading indicates the controller is receiving a weak signal from the reader. The lower the reading, the weaker the signal being received, which directly affects the reader's read range.