



transponder and reader engineered systems



# TRES900S

## Installation Guide

# Shipping Box Contains

Included in the box being shipped to a customer contain:

- Reader Assembly
- Power Supply
- Bracket Assembly
- Printed Documentation (Quick Start Guide)
- Sample Test Tags

Everything will be securely inserted inside the box, so items do not shift during shipping and handling. We pay special attention to the bracket assembly. CD can be downloaded from our website: 'www.tresrfsolutions.com'

# TRES900S CD Contains

- \CoolTerm
  - Coolterm.exe: freeware terminal program (like HyperTerminal)
- \Documents
  - TRES900S Quick Start Guides, TRES900S Operations Manual, TRES900S Reader Specification, etc.
- \Firmware Upgrades
  - Firmware
- \Product Sheets
  - Sales brochures for the product, pictures of our tags
- \Utilities
  - TRES\_SETUP.EXE: Reader configuration control program

# Electromagnetic Interference

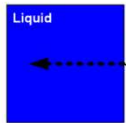
Transmission line-related radio-frequency interference is the indirect effects of transmission line and is produced by the physical interactions of line electric fields. The electromagnetic interference or EMI created by power transmission lines can interfere with radio waves. This can result in interference with RFID, radio, and cell phone signals. Both electricity and RF used to transmit data vibrate at certain frequencies. The electrical effects of transmission lines can be reduced through shielding or burying the transmission lines. **Contact your local power company for assistance in suppressing EMI.**



# RFID Obstructions

Be sure your readers have a clear view of any tags.

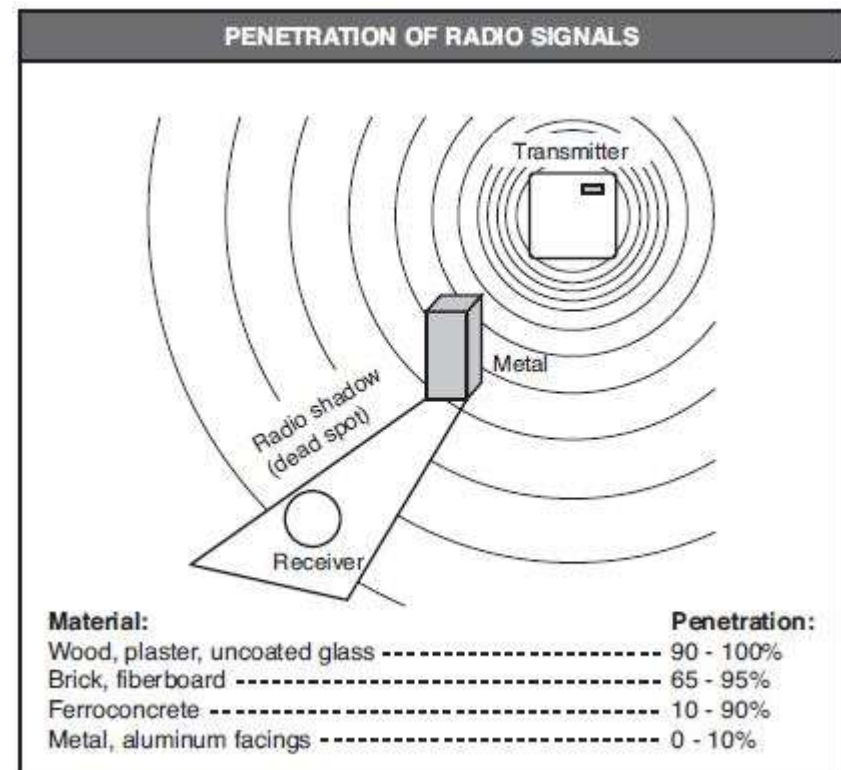
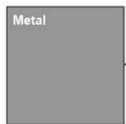
RF is absorbed by liquid,  
weakening the signal



Most materials have little  
impact on RF signals



Metal reflects and weakens  
the signal of an RFID tag



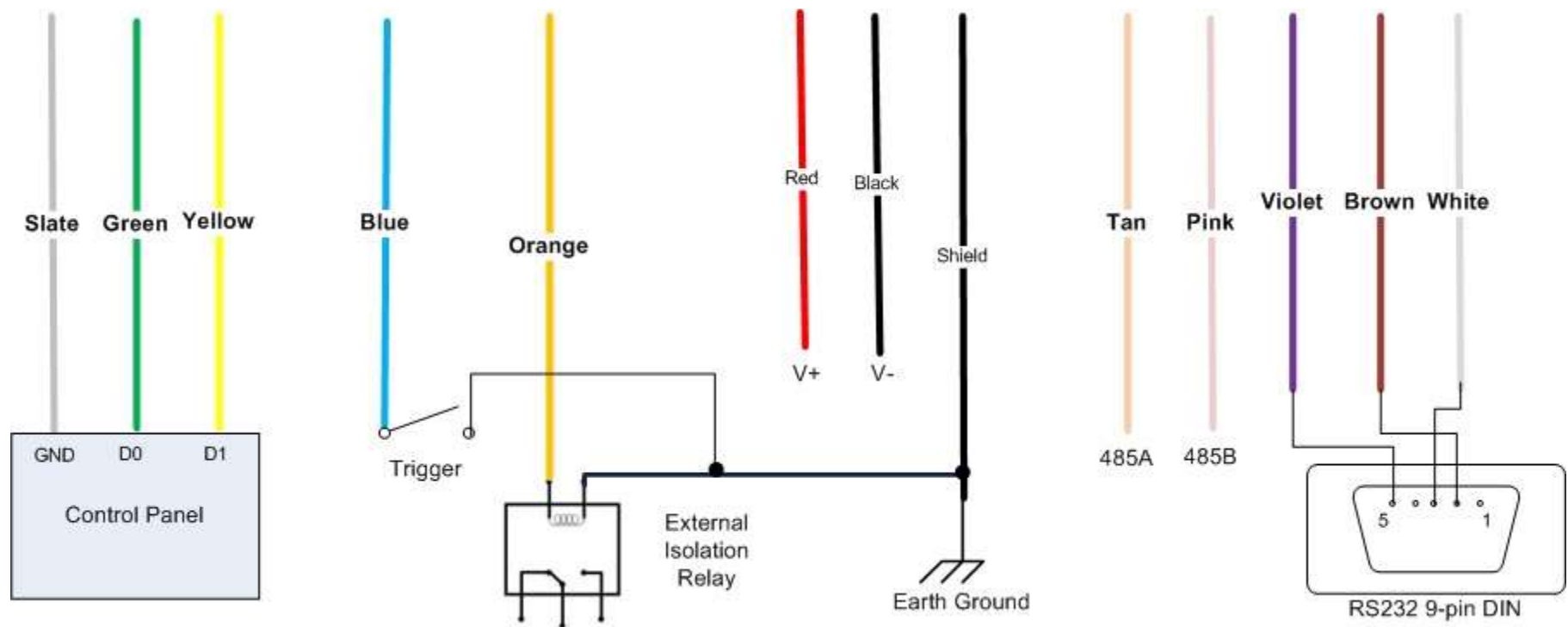
# Power Requirements

The Reader needs to be powered with 8 to 48vDC@10 Watts, TRES supplies a DC to DC converter and a power supply for ease of installation. The positive power and the ground connections are applied to the Reader at the supplied cable. The Chart below will assist you with selecting proper power supply and wire gauge for installing your new TRES900S. Check that the **RED** and **BLACK** wires are installed correctly to the supplied power supply.

10watts' Power Wire Chart in feet for TRES Readers										
voltage	8awg	10awg	12awg	14awg	16awg	18awg	20awg	22awg	24awg	26awg
5vDC@2A	458	298	183	115	71	46	29	17	11	7
12vDC@0.84A	1100	715	440	275	170	110	70	40	26	16
24vDC@0.42A	2200	1430	880	550	340	220	140	80	52	32
48vDC@0.21A	4400	2860	1760	1100	680	440	280	160	104	64

# Wiring Requirements

The TRES900S is now terminated outside the reader, supplying a 6' pigtail. The diagram below will help you with wiring up the new TRES900S to your selected controller or other controlling device. The standard wiring of the Reader is described here.



# Cabling Requirements

- Cable distance: (Wiegand): 500 feet (150m); RS-232 50 feet (15m); RS-485 4000 feet (1200m); Ethernet 328 feet (100m).
- Cable type: twisted pairs #22 AWG w/overall shield for both Wiegand, RS232/485, and CAT5 for Ethernet. Additional conductor will be required for trigger and other control functions. Do not run data cables in same conduit with high voltage lines.
- Cable distance is also based on baud rates, the faster the baud rate the shorter the distance you can run data successfully.

# Power Requirements

The recommended power supply is the TRES-LRS-35-12 Power Supply. With an input voltage range between 85-264VAC, and an output of 35Watts, which is 12VDC @ 3A regulated, one of these power supplies are supplied with each TRES900S Reader. The power supply also offers an EMI filter on the output.

**The Reader unit Warranty is based on its use.**



# Mounting Reader

The mounting bracket supplied are designed specifically for mounting the tres900 Reader on a pole or on wood, or on concrete structures and aim the antenna toward the zone of desired coverage. Section 690.43 of the National Electrical Code makes the following statement:

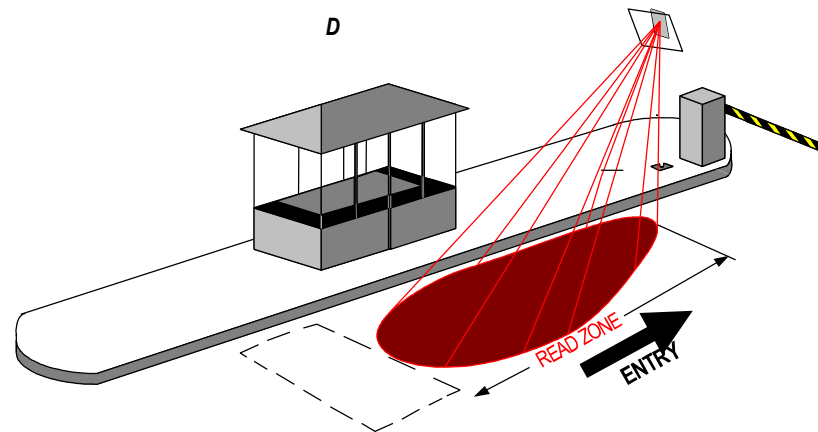
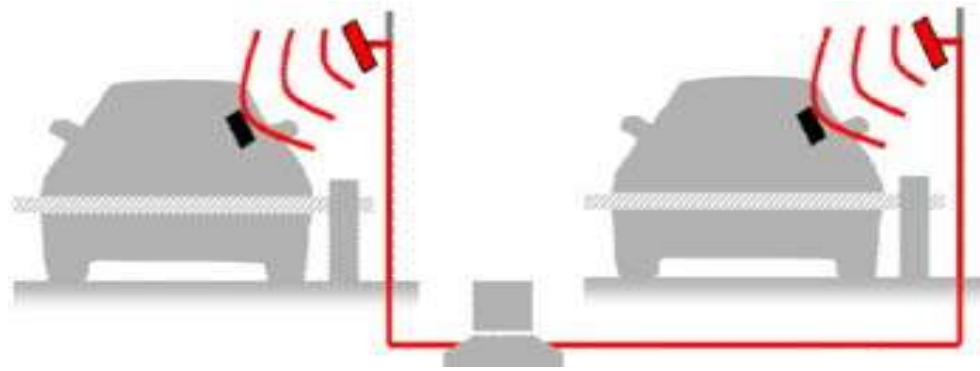
“Exposed non–current-carrying metal parts of module frames, equipment, and conductor enclosures **shall** be grounded in accordance with 250.134 or 250.136(A) regardless of voltage.”



Earth Ground needs to terminate at the shield wire of the Reader. A continuity test is required from reader shield cable to an earth ground stake or equivalent.



# Read Zone & Mounting Technique



# Parallel Surfaces Rule

A Passive RF tag gets its' power from the reader. That is to say that the reader is emitting RF and the tag must be able to absorb that RF, accelerate the signal and then reflect it back to the reader. Therefore, if the surface of the reader and tag are close to parallel, this principal will result in better tag read. Below is an example of this rule:



In this instance, the fact that vehicles were turning through the read zone meant poor performance when the reader was mounted on the white post. Once the reader was moved back closer to the operator, it worked much better!

# Tag Orientation - Vertical Plane

Vertical orientation is desired, aim the antenna at a spot down the road from the gate where you want to start reading tags. From this spot forward, the detection area will increase as you get closer to the gate. The tags must be vertically oriented for optimum read range. The Windshield tag must be mounted on windshield glass for optimum read range.



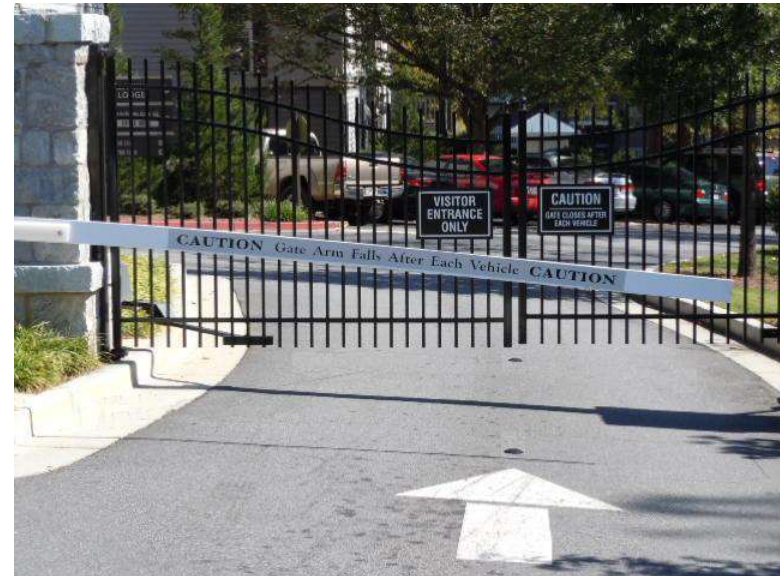
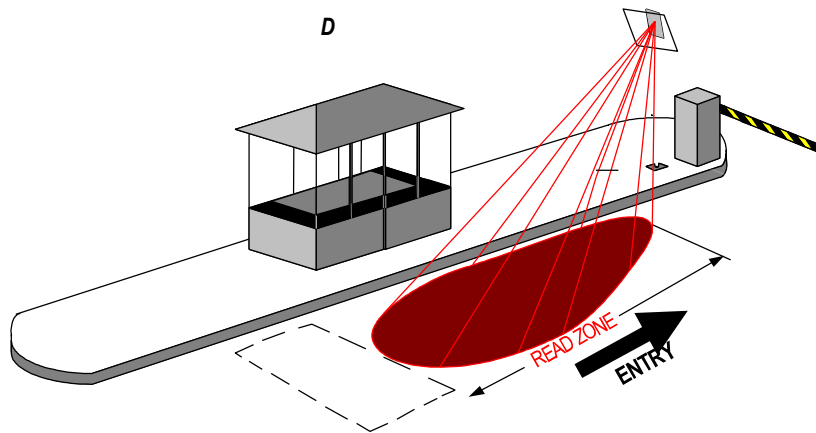
# Tag Vehicle Installation

Ensure the Tag is mounted in a vertical position for optimum read range. Windshield sticker should be 2 inches away from any metal posts on all sides. Prior to installation, make certain the desired location complies with all state and local vehicle codes/laws. **Caution: some windshields contain metal so an exterior tag should be used.**



# Trigger Function

If the Reader is configured for triggering mode, the reader will only read a tag when the **BLUE** trigger wire (T1) is tied to ground. Normal ways to accomplish this is by using a Loop Detector or by whatever your preferred detection system you use to detect the presence of a vehicle to open a gate, or as a safety device to prevent the gate from closing on a vehicle in its path.



# Reader Setup Software

Reader Setup: Version 2.2.7

**tres**  
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**Reader Information**

Model	900S
Hardware	9
Firmware	99
Serial Number	99992

**Control**

**Comm**

☒ Serial  
☐ TCP/IP

Port: COM2

**Connect**

Disconnected

**Reader Actions**

Query Reader

Set Parameters

Set Defaults

Restart Reader

**RF**

Radio Power: 10 dBm

**Reader**

Mode: Timed

Use RSSI ☒

Timed Interval: 1.0 s

Trigger Read Delay: 0.0 s

**Serial Comm**

Mode: ASCII

**RS232**

Baudrate: 115200

**RS485**

Baudrate: 115200

Protocol: CR/LF

Address: Generic

**Wiegand**

Output Mode: wiegand+serial

Output Buffer: 2.0 s

Pulse Width: 80 uS

Pulse Period: 1200 uS

**IDs**

Use Facility Code ☐

Facility Code: 255

Tag IDs: Edit

**Relay**

Enabled ☐

Hold Time: 1.0 s

**Indicators**

LED ☒ Audio ☐

LED Hold Time: 0.2 s

**Log**

Pause

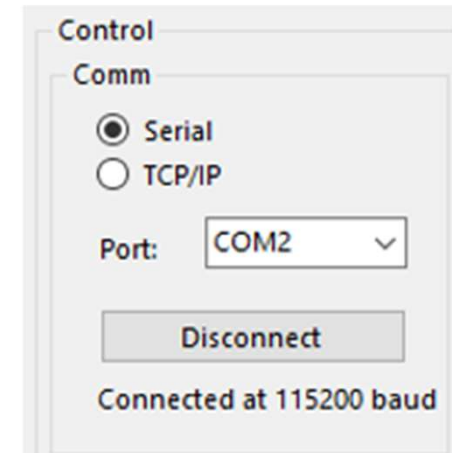
Clear

# Connecting Reader to Computer

- First step is to power up your computer and locate the program named “TRES\_SETUP.EXE”, but you do not need to run it at this time.
- Now connect the Reader to the computer with the RS-232 cable. Most likely a USB to RS232 device.
- Power up the Reader and make sure the power is on (an audible beep should be heard).
- Now you are ready to run the software and setup your Reader to your requirements.

# Connecting to the Reader

Upon power up, the **TRES900S** will search for available **COMM** devices. Select the appropriate **Comm Port** device from the drop-down menu to connect to your computer to the reader, then press the **Connect** button, if you have the TCP/IP option, you can select it here.

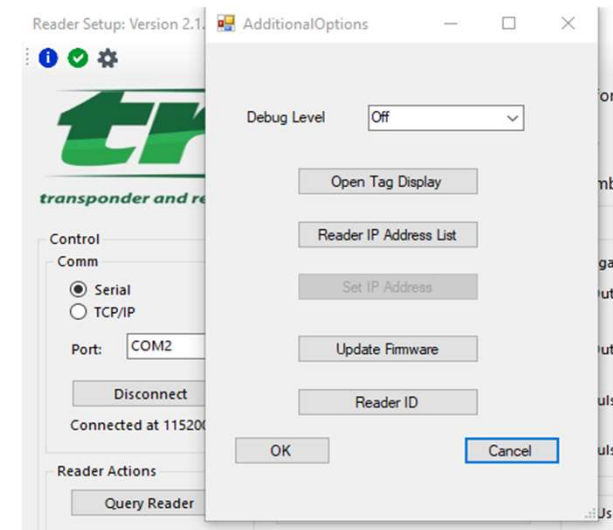


A **Query** is done during the connection process. When finished, just press the **Disconnect** button. If you plug in your serial device after starting this software, that device will not be recognized.

# Upper Left Tools

In the upper left section of the **TRES900S** Setup utility you will see three (3) icon buttons, the one that looks like a gear has four (4) options:

**Open Tag Display**, this is a feature that will display a large window in the upper portion of the computer screen that will display a valid Wiegand number that is read by the Reader



**Reader IP Address List**, you can modify the IP settings for the TCP/IP option.

**Set IP Address**, after you modified the IP address, this will upload to reader.

**Update Firmware**, this allows you to update the firmware in the field. This is useful if there are changes to the product or if you have custom firmware.

**Reader ID**, this is where you can get the serial number on the reader, can only be modified at the factory.

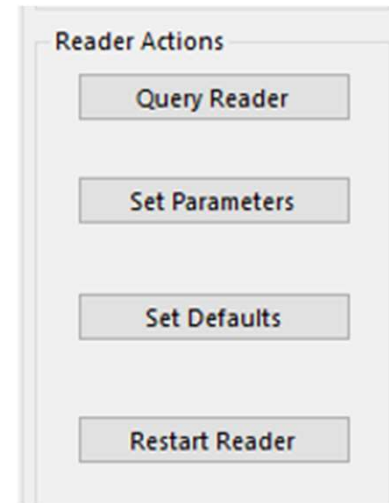
# Reader Interface Actions

**Query Reader**, this should be done if you made changes to the reader and want to get the stored data from the reader. A Query is done automatically when you first connect to the **TRES900S** and run the setup program.

**Set Parameters**, this is the icon button to update the Reader settings with your changes you make. After you make your changes to the reader, you will have to press this icon button in order to send your changes to the flash memory.

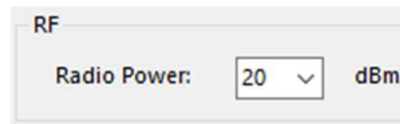
**Set Defaults**, in case you get lost and want to reset all setting to factory default, you would press this icon button to restore all your setting to the factory default mode.

**Restart Reader**, this just restarts the reader instead of having to remove power.



# RF Section

This is where you would change the RF output power from between 10dBm to 30 dBm. The higher the number, the more power the unit puts out. Remember, if you push too much power out, it will act just like a stereo where when you crank it too loud, the signal gets distorted. The setting shipped from the factory would be set to maximum distance without distortion.



The image shows a software interface for the RF section. It has a title bar labeled 'RF'. Below the title bar, there is a label 'Radio Power:' followed by a dropdown menu showing the value '20' and a downward arrow. To the right of the dropdown menu is the unit 'dBm'.

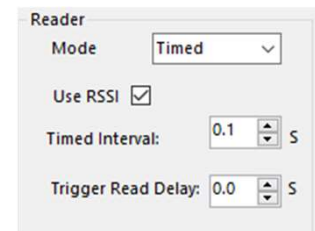
# Reader Section

This section allows you to modify how you read a tag. The explanation will follow along with describing each section.

**Mode**, this is where you would select Timing or Trigger mode. Timing mode is where you are constantly reading tags. Trigger mode is where the reader is not reading tags until the trigger line is triggered (shorted to ground).

**Timed Interval**, this is where you set the frequency of when you read tags, minimum is 100mS and maximum read interval is 5 seconds.

**Trigger Read Delay**, this is the setting to leave the reader on after the trigger is released, minimum setting is 0 seconds and maximum is 10 seconds.



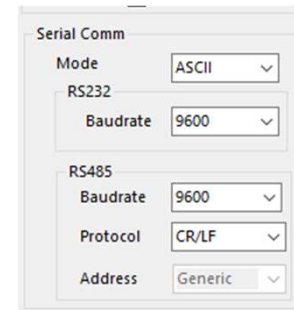
The screenshot shows a 'Reader' configuration window. It has a 'Mode' dropdown menu set to 'Timed'. Below it is a 'Use RSSI' checkbox which is checked. Then there is a 'Timed Interval' field with a value of '0.1' and a unit of 'S'. Finally, there is a 'Trigger Read Delay' field with a value of '0.0' and a unit of 'S'.

# Serial Comm Section

**Mode**, this portion allows you to select between standard **ASCII** (2 HEX char F/C and 4 char ID) or HID Serial PROX reader output from a converted Wiegand Input.

**RS485**, in this section you can also modify the baud rate of the RS485, just as you did with the RS232, 9600, 19200, 57600, 115200. The Protocol option allows you to select either the standard CR/LF output, or the secure OSDP option.

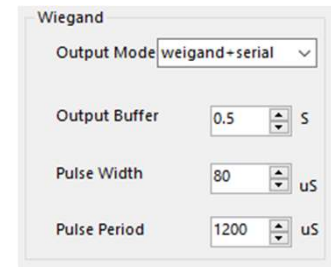
**RS232**, here you will select your baud rate you want to communicate thru the serial port. Selections are 9600, 19200, 57600, 115200 (default). This is usually set to the 115200 baud and most devices are automatic baud selection, this is mainly for use with your dumb terminal program like HyperTerm or CoolTerm.



The screenshot shows a 'Serial Comm' configuration window. It has two main sections: 'RS232' and 'RS485'. The 'Mode' dropdown is set to 'ASCII'. Under 'RS232', the 'Baudrate' dropdown is set to '9600'. Under 'RS485', the 'Baudrate' dropdown is set to '9600', the 'Protocol' dropdown is set to 'CR/LF', and the 'Address' dropdown is set to 'Generic'.

# Wiegand Section

This is where you modify your Wiegand settings. You normally would not need to modify the Wiegand settings, but if you are running longer cable, then you may have to. To modify the Wiegand timing, go to the Wiegand Setting section of the Setup Software, then select the desired timing parameters



**Output Mode**, option to select both Wiegand and Serial or just serial data.

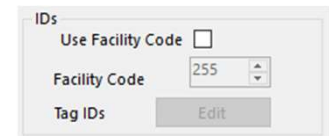
**Output Buffer**, this allows you to select a Wiegand buffer from 0...60 seconds. When first tag is read, this tag will be outputted, then stored into a buffer for time selected or until another valid tag is read. If another tag is read before the buffer times out, this tag data will be outputted, then stored in buffer.

**Pulse Width**, modify the Wiegand Pulse Width, the specification is 20...100  $\mu$ Sec

**Pulse Period**, modify the Wiegand Pulse Period, the specification is 200...20000  $\mu$ Sec

# IDs Section

In this section of the software, you will have the ability to select a Facility Code and/or ID number(s). When you select a facility code, all other facility codes read will be ignored. If no facility code is selected, all valid IDs will be outputted.

A screenshot of a software window titled "IDs". It contains a checkbox labeled "Use Facility Code" which is currently unchecked. Below it is a "Facility Code" label followed by a numeric spinner box showing the value "255". At the bottom, there is a "Tag IDs" label and an "Edit" button.

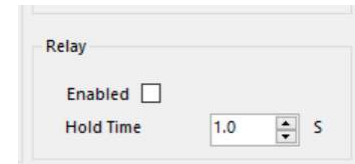
**Use Facility Code**, when this box is selected, a facility code will be used to output only the facility code selected. If you select the relay or LED option, then only when this facility code is read, the relay or LED will engage.

**Facility Code**, here you will select the facility code you want to output only. When you select between 0...255, only a tag read with this site code will be outputted.

**Tag IDs**, add, modify and delete ID numbers. First you select the **Add** button in the popup box and another popup box will be displayed. You can enter a single number or a range of numbers.

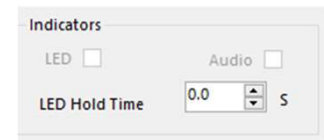
# Relay and Indicator Section

**Relay Enabled**, when selected, you enable the use of the relay. It works off the Facility Code, if no Facility Code, then the relay contact closes on any valid TRES Wiegand tag read. If the Facility Code and/or ID range selected, the relay will close only when a valid tag with that Facility Code and ID range is received from the reader.



**Hold Time**, relay hold time, between 100 mS...3 seconds.

**Indicators** is where you turn the LED and/or Beeper ON/OFF on a valid read. Factory default is on but if you do not need to see an LED flashing or hear the Beeper beeping for a valid Wiegand read, then you can turn either of them off here.



**LED Hold Time**, relay hold time, between 100 mS...3 seconds.

# Do and Do Not's Guide

- Do not put another manufacturers Wiegand readers output wires on the same terminal of the controller as the TRES900S unless you use a Wiegand splitter.
- Do not mount reader too close to concrete walls or metal surfaces, could cause signal reflection or absorption.
- Do use the supplied power supply supplied by TRES, use appropriate wire gauge. Warranty is based on its use.
- Do mount tags in a vertical orientation and test first before applying permanently.
- Do test the reader in-house before mounting it at jobsite.

If you have any doubts about the installation, call Technical Support at 888.574.tres (8737) ext.2

# Troubleshooting Guide

Q: To confirm that the unit is operating properly

- Confirm the beeper is audible when a good tag is presented or when power is first applied. If it is not, remove power.
- Check that the **RED** and **BLACK** wires are installed correctly to our supplied power supply, the **warranty** is based on its use.

Q: Reader just beeps and keeps beeping, about 3 x per second

- Not enough power from the power supplier, Insufficient power,
- Check the wire gauge to the Reader, if you under cabled the voltage drop would be too much to power up the Reader.

Q: Reader does not recognize a tag (no beep, no outputted tag data)

- If no beep, check to see if another tag works, maybe damaged tag. Verify Reader operations by connecting to a computer through the RS232 port and running a Terminal program.

# Troubleshooting Guide

- Q: Tag data to panel is scrambled or Reader beeping and host not responding
- One or more of the Reader's wiring connections are incorrect. Verify the wiring connections. Check that Data 0, Data 1 and ground are properly attached.

**Caution: some panels use the Wiegand Ground to be connected to either the panel ground or to the power supply ground.**

- Do not wire another manufacturer Wiegand output to same terminal
- Cable between Reader and panel is too long, check Wiegand specifications
- Check to insure the TRES900S tag is properly programmed in the host panel. Setup program can assist.

Q: Read Range too short

- Ground loop, see if earth ground terminates at the reader. Check by powering reader without reader ground wire connected. Earth ground should terminate at the Reader, check your panel or power supply.
- Tag orientation should be in a vertical position for the Readers Antenna maximum performance and distance.

# LIMITED WARRANTY

*Transponder and Reader Engineered Systems, Inc.* (hereafter TRES) warrants its TRES900S tag readers, cards and tags to the original purchasers to be free from defects in material and workmanship for a period of one (1) year from the date of shipment, subject to exclusions below. The Reader warranty is contingent upon the use of the TRES provided power supply, the TRES-LRS-35-5 (+5vDC@7Amps).

**Return Material Authorization:** TRES liability under this warranty is limited to the repair or replacement of the defective product (at the discretion of TRES). Product will be returned to TRES only after the issuance of a Return Merchandise Authorization (RMA) by TRES Technical Support Dept. TRES will provide advance replacement of TRES900S readers submitted for warranty claim provided that the customer requests advance replacement with the issuance of a Purchase Order at the time an RMA is issued, at which time an invoice will be generated for the Advance Replacement product(s). If the product to be returned under RMA is not received by TRES within 30 days of RMA issuance, or the warranty is determined to be void under the conditions of this warranty statement, the customer will be responsible for payment of the invoice issued at the time of the Advance Replacement, subject to normal credit terms and conditions. Customer will be responsible for shipping the RMA products to TRES at address listed on the RMA form and clearly marking the outside of the box with the RMA number. If the reader(s) are covered under this warranty, then a credit will be issued against the Advanced Replacement invoice.

# LIMITED WARRANTY

**Repairs:** TRES liability under this warranty is limited to the repair or replacement of the defective product (at the discretion of TRES). If the returned product is tested and deemed to be fully functional, it will be returned to the customer and a \$ 50.00 evaluation fee will be assessed. If the returned product can be repaired, and the product is deemed to be covered by warranty per this warranty statement, it will be repaired free of charge. If the returned product is not covered under this warranty, then it will be repaired at labor plus cost plus parts. In the event of a required repair that is not covered by warranty, the customer will be contacted prior to the start of repairs and provided an estimate of said repairs.

**Warranty Exclusions:**

- a. Defects or damage resulting from use of the product in manners other than normal and customary.
- b. Defects or damage from misuse, accident, vandalism, neglect or attempted modification.
- c. Defects from improper installation, testing, operation, maintenance
- d. Damage due to improper wiring of devices not in accordance with published installation instructions.
- e. Attempted disassembly or repair without written authorization from TRES.
- f. Power surges due to malfunctioning power supply regulation, surge suppression or lightning.
- g. No returns/refunds on custom tags
- h. Tags that have been de-faced, mishandled, improperly mounted and/or removed and re-mounted

This warranty is extended by TRES to the original purchaser and may not be assigned or transferred to any other party. This is the complete and exclusive warranty for TRES900S reader and tags sold by TRES, and this warranty may not be enlarged by any other statements that are not a part of this warranty statement without TRES' express written consent.