



Patriot Family Operations Manual



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Product Description

Scope

This document describes the functional requirements and software features contained in the newly designed **PATRIOT FAMILY (E/L/M) Enhanced GEN2 Readers** hereon known as **Patriot Family**. This document lists the product specifications, as well as performance, and operational criteria.

Summary

The **PATRIOT FAMILY** is the brand name for a new line of 902~928 MHz RFID Readers and Tags. We are a U.S. based company comprised of seasoned RFID professionals, including engineers, marketing, and distribution specialists. We have designed a product line that is ideally suited to the parking, supply chain, document tracking, and many other markets. We will be selling our products through Systems Integrators, Distribution and OEM channels. The **PATRIOT FAMILY** is designed and manufactured in the USA to be an enhance version of the present **TRES900.2** GEN2 UHF Reader.

The **PATRIOT FAMILY** is designed to reduce the number of electronic components needed for a traditional Product. This is accomplished by using a custom integrated RF IC in place of many individual components. The product will offer the following features:

- Wiegand Output Format, multiple and custom formats, 3-wire. Supported formats: 26-bit, 30-bit, 33-bit, 34-bit, 35-bit, 37-bit, PeachPass (37-bit, F/C#7), and Alabama Pass (37-bit, F/C#8).
- EMI protected I/O lines, i.e., for Wiegand Output, for Trigger Input, for RS232, for RS485, etc.
- Reverse Polarity and Over Voltage protection on the input voltage
- Serial RS232 Bi-direction, used for configuration and data output
- RS485 serial out only, used for data output and OSDP (RS485) (**E standard/L optional**)
- Buffer (0 to 60 sec), read tag + output tag + buffer tag, read and output after buffered time
- Timer read (1second to 5 seconds), time between read and output data
- LED flashing and Audio (Piezo) tone for power on and for a tag read
- .NET option, Ethernet TCP/IP or Wi-Fi daughter boards (**E/L optional only**), with POE capability with the TCP/IP option
- Controller functionality w/relay, Facility Code (5 total) and ID (100 total) range configurable (**M does not have the relay option**)
- SPI Flash IC to restore the program and store valuable settings

Product Identity

The **PATRIOT FAMILY** will be given an engineering part number. This part number prefix will start with the prefix number '900x'. The serial number will be '900x.x.xx.xxxxx'. Designated as:

| Model # | Board rev | Hardware rev | Serial Number |
|---------|-----------|--------------|---------------|
| 900x | x | xx | xxxxx |

Revision History

- Rev A 09/30/21 - first draft combining all 3 readers by RL
- Rev B 04/12/22 - updated to reflect new name and features for each Patriot reader by RL

Product Operations

Hardware Description

The **PATRIOT FAMILY** Reader comes with many rich features like multi-protocol and multi-tag reading, integrated and environmentally protected packaging and long-distance reading.

The **PATRIOT FAMILY** Reader is a fully integrated reader with a RF module IC, power conditioning, built-in antenna and packaged in a weather-tight and UV protected housing. The antenna allows it to work in AVI and asset management applications and its programmable triggering modes enable the reader to work in either self-triggering (timing) or trigger mode. Versatile I/O interfaces enable the **PATRIOT FAMILY** to work with multiple serial devices and with standard Wiegand controllers.

The **PATRIOT FAMILY** Reader is a multi-protocol UHF reader, which supports ISO18000-6B and EPC protocols. It can read UCODE, TI, Alien and many other labels. The reader's firmware is field upgradable, enabling it to support protocol expansion and feature upgrades, giving it the ability to grow with the maturing RFID technologies.

The integrated 7.5dBi gain circular polarized antenna (**on the E model**) and a 10 dBi gain vertical polarization (**on the L and M models**); allows the reader to achieve a respectable read range, and the internal DSP module enables the reader to manage multi-tag arbitration at high speed, thus making it suitable for AVI and material management applications.

Reader

The RFID Reader is a device that captures and processes tag data. These devices are called readers or interrogators. Readers are connected to the antenna and are connected to the RFID network infrastructure. The Reader provides the energy of which a fraction is used to energize and wake up the tag. The reach of the reader is determined by the design of the antenna (both Tag and Reader) and the power and configuration of the reader. The Reader detects and filters data bits emitted from compatible RF Tags then converts the bits into the associated computer format of serial RS232/485 (485 Optional on L and not available on M), Ethernet (optional) and/or Wiegand communications protocols. Advanced error detection algorithms provide error-free operation.

The **PATRIOT FAMILY** Reader operate on a fixed power source of 8vDc to 48vDC. Connection to the Reader is best made by using shielded twisted pair cables (22 AWG).

Tags

An RFID-tag is a device which is attached to objects and/or assets to be identified. When radio signals are received, information is transmitted back to the RFID reader. RFID tags consist of the following components: the microchip (or IC), the antenna, the connection between IC and antenna and the substrate on which the tag is produced. The microchips are the brains of the tag. The antenna handles the communication from either the Tag to the Reader or from the Reader to the Tag.

Passive tags reflect the RF signal transmitted to them from a reader or transceiver and add information by modulating the reflected signal. A passive tag does not use a battery to boost the energy of the reflected signal.

Wiegand interface

The Wiegand interface uses three wires, one of which is a common ground and two of which are data transmission wires usually called DATA0 and DATA1, alternately labeled "D0" and "D1" or "Data Low" and "Data High". When no data is being sent, both DATA0 and DATA1 are pulled up to the "high" voltage level, usually +5 VDC. When a 0 is sent the DATA0 wire is pulled to a low voltage while the DATA1 wire stays at a high voltage. When a 1 is sent the DATA1 wire is pulled to a low voltage while DATA0 stays at a high voltage.

The high signaling level of 5 VDC is used to accommodate long cable runs from card readers to the associated access control panel, typically located in a secure closet. Most card reader manufacturers publish a maximum cable run of 500 feet. An advantage of the Wiegand signaling format is that it allows very long cable runs, far longer than other interface standards of its day allowed.

Serial RS232/RS485

The Reader will output standard RS232/485 outputted via standard ASCII format or HID serial format and can be viewed on any ASCII terminal viewer like Hyper Term. The RS232 will be a bi-directional device because it also needs to communicate to a PC the setup parameters described later in this document. OSDP (**optional on L and not available on M**) can be used with the RS485 IO device.

Trigger Mode

When the Installer puts the reader in trigger mode, the reader will be put into IDLE mode, this means the reader will not read and power consumption will be only 450mA (great for solar powered isolated areas). Once the trigger is activated (Trigger wire to ground); it will take 6mS to start reading and outputting tag data again. There are two external terminals on the connector, software configurable.

Power Requirements

The **PATRIOT FAMILY** is powered from the TRES supplied regulated power supply with a fixed voltage of +12vDC @ 3A. the reader needs 5vDC @ 2A maximum. We have designed a DC-to-DC on the PCBA so you can power the reader from +8vDC to +48vDC, great for POE.

Relay Description

The CPC1018N is a miniature single-pole, normally open (1-Form-A) solid state relay (**available on E/L and not available on M**) that employs optically coupled MOSFET technology to provide 1500V_{rms} of input to output isolation with up to 600mA Load Current and 60Vp Blocking Voltage. The super-efficient MOSFET switches and photovoltaic die use IXYS Integrated Circuits Division's patented OptoMOS architecture while the optically coupled output is controlled by a highly efficient infrared LED. Never connect the onboard relay to switch a powered device, use it to control an external relay, get a relay that can handle the current and voltage your device needs (Isolation Relay).

Software Description

In this section, we will try to describe options that can be configured in the field. TRES developed a GUI that will be self-contained (.exe) so it can be run easily in the field and not have to install it on the user's device. Below are some of the features that will be incorporated in this program.

Option Feature

These below options are incorporated into the new setup program that would be used in the field by installers to configure the reader. Some of these features are optional or for certain readers only. Features that are included are:

- RF Power settings, 10 dBm minimum; to 30 dBm max (pull down menu selectable)
- Wiegand Output, pulse width, and pulse period (see range below in Table and References)
- Read tag output, read buffer to delay tag after first read and output, 0 mS minimum to 60 seconds maximum, works on both Wiegand and RS232/485 (**485 optional on L, not available on M**)
- Timing Read, timing read interval 1 second minimum to 5 seconds maximum
- Trigger Read Delay, length reader powered after Trigger let go, 0 to 100 seconds
- Switch between Wiegand + Serial or Serial Only modes, for faster serial outputs
- Serial output configured for Raw ASCII or HID serial simulation
- RS485 configurability, Baud rate, Protocol (CR/LF or OSDP), and Address
- Incoming Tag, filter Facility Code (up to 5) (26-bit only range) and tag IDs' (up to 100)
- Relay: not Enabled, Hold Time 100 mS to 3 seconds, (**available on E/L, not available on M**)
- Indicator's control, LED (on time 0 to 3 seconds) + Audio, On /Off, software configurable
- Log window, to monitor tags being read
- Update Firmware, a feature to flash the firmware in the field
- Large Tag display window to read tag data at a long distance

Default PATRIOT FAMILY settings

Default Patriot M settings

- Radio Power: set to 20dBm or 22' in factory, or optimum for read range
- Reader: Timed Mode, 1 second timed interval, and trigger read delay 0 sec.
- Put Reader in trigger mode, use timing functional timer
- Wiegand: Wiegand + serial, output buffer 2 Seconds, Pulse Width 80uS, Pulse Period 1600uS
- Indicators: LED selected at 200mS, Audio ON

Default Patriot L settings

- Radio Power: 25 dBm, or optimum for read range
- Reader: Timed Mode, 1 second timed interval, and trigger read delay 0 sec.
- Serial Comm: RS232 + RS485 baud rate 115200, ASCII mode
- Wiegand: Wiegand + serial, output buffer 2 Seconds, Pulse Width 80uS, Pulse Period 1600uS
- Ids: Facility Code is not selected
- Indicators: LED selected at 200mS, Audio ON

Default Patriot E settings

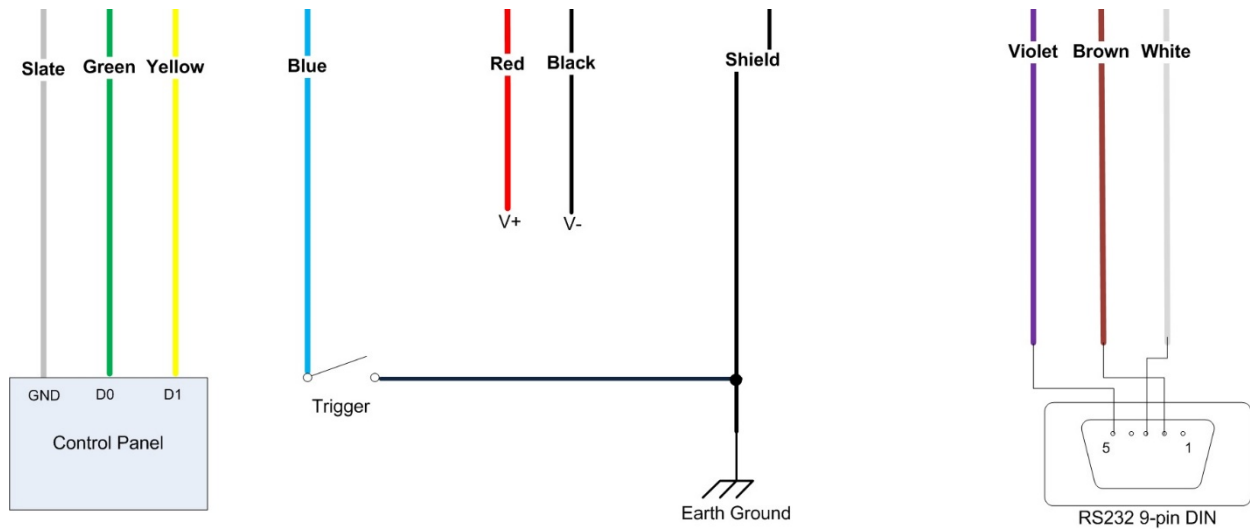
- Radio Power: 25 dBm, or optimum for read range
- Reader: Timed Mode, 1 second timed interval, and trigger read delay 0 sec.

- Serial Comm: RS232 +RS485 baud rate 115200, ASCII mode
- Wiegand: Wiegand + serial, output buffer 2 Seconds, Pulse Width 80uS, Pulse Period 1600uS
- Ids: Facility Code is not selected
- Relay should not be selected
- Indicators: LED selected at 200mS, Audio ON

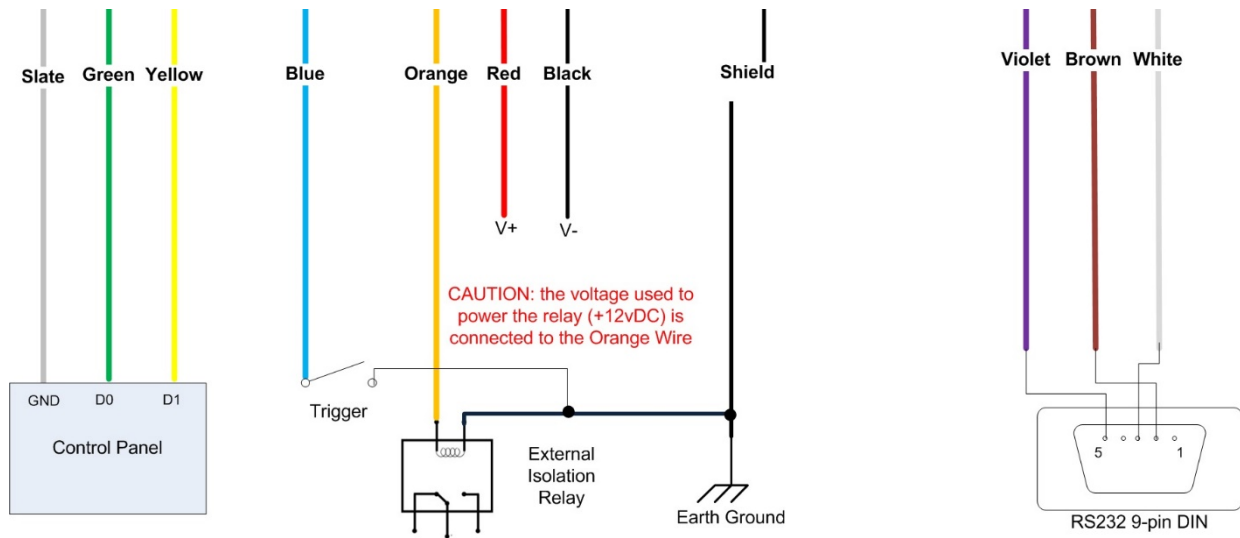
Connecting to PATRIOT FAMILY

In this section we will detail the 5' pigtail wires from the **Patriot Family** reader. Some of these features are optional or for certain readers only.

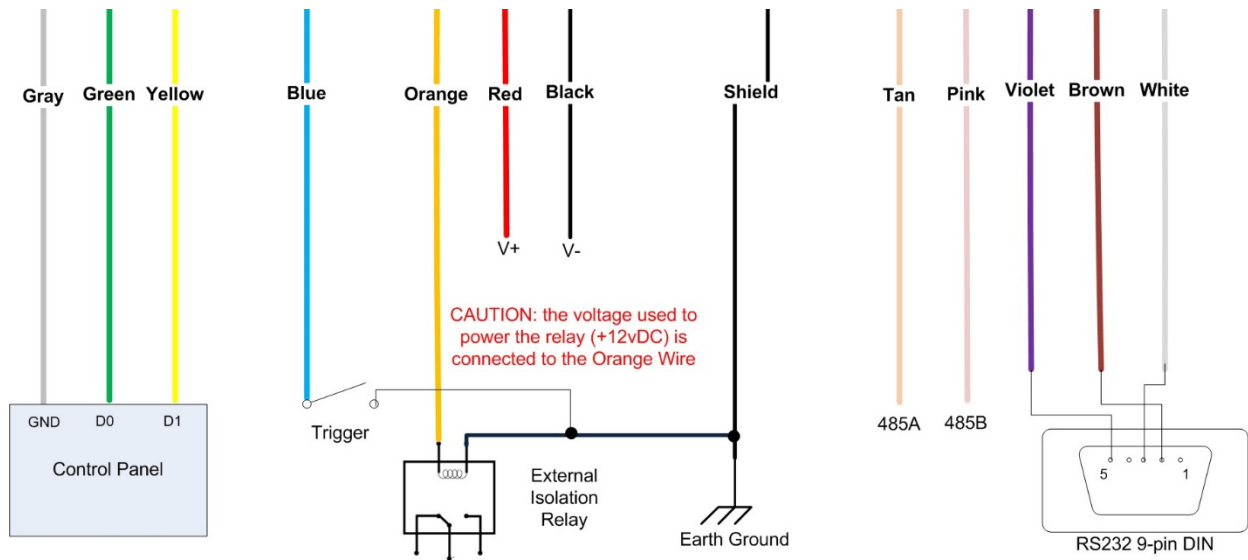
Patriot M Wiring Guide



Patriot L Wiring Guide



Patriot E Wiring Guide



Wire Gauge Chart

In order to supply proper current needed for reader.

| 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 |

Reader cabling requirements shall be:

1. Cable distance: (Wiegand): 500 feet (150m); RS-232 50 feet (15m); RS-485 4000 feet (1200m); Ethernet 328 feet (100m).
2. 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.

LED Control

This is an LED control output; it will control the front panel LED with 12vDC, using a built-in voltage regulator. Turns the LED ON or OFF.

RS232 Control

This input / output lines are used to control or be controlled by and RS232 device. Wire description, White wire goes to pin 3 of a 9-pin DIN (RX), Brown wire goes to pin 2 of a 9-pin DIN (TX) and Violet wire goes to pin 5 of a 9-pin DIN (ground).

RS485 Control

This data output only, are used output the tag data thru a RS485 device. Line description, Tan wire normally goes to the T/R- or 485B line, Pink wire normally goes to the T/R+ or 485A line and the Violet wire is the Ground line, if needed.

Earth

Here you would connect an Earth ground to the reader, this is the cables' shield wire.

Power Connect

This is where you get power to the reader from TRES supplied regulated power supply. TRES has on board +8vDC to +48vDC input DC-to-DC to an outputted +5vDC regulated, TRES supplies a regulated DC supply +12vDC @ 3A for your convenience. The reader has EMI, reverse polarity, and overvoltage resettable fused protection.

Relay Control

This relay (**not available on M**) can control a 12vDC isolation power relay that supplies more power. The relay is a form C NO relay. This relay should not be used to control a gate by itself, you should use a larger industrial relay to do that, and this relay can control the isolation relay.

Trigger Control

Here is where you would connect your dry contact outputted from a detection device or anything you would want to control the reader. When you select trigger mode, you need to short-out the Blue wire with the Ground wire, usually thru a dry contact. In trigger mode, the reader only needs 450mA of DC power, once triggered, the reader takes 1.80A of DC power.

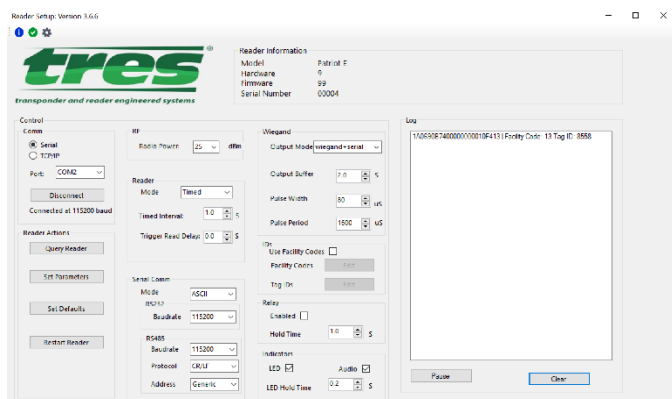
Wiegand Control

This is your typical open collector Wiegand output terminals. The Yellow wire goes to your DATA 1 (D1) terminal on your controller, the Green wire goes to your DATA 0 (D0) terminal and the Gray wire is the Wiegand ground line.




PATRIOT FAMILY Interface Setup Program

In this portion of the document, you will learn how to communicate and configure the **PATRIOT FAMILY** Reader. Hook up your **PATRIOT FAMILY** and stated in the previous section, connect to a serial port, and power up everything. When you run the tres_setup.exe program, (Downloadable from our website) the screenshot to the right.

As you can see from the image, you have many features that allow you to modify the **PATRIOT FAMILY** reader, so you can have a more successful install. These features were described above in this document and below. **Some options are not changeable on certain reader models.**



ICON Buttons – Upper Left Window

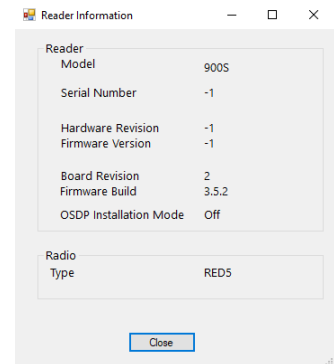
-  : Information Button, reader specific information
-  : Status Button, reader connection and temperature
-  : Options Button, open tag display and update firmware



Reader Information

The information contained in this window is:

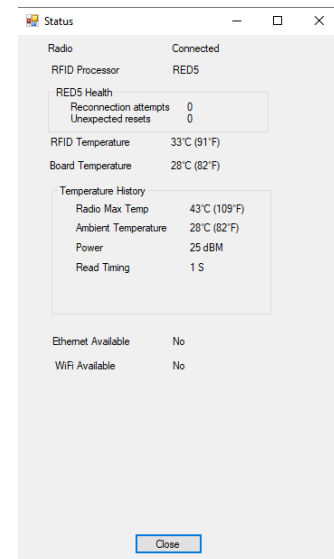
1. Reader model number
2. Reader serial number
3. Hardware and Software version number
4. PCBA and firmware revision number
5. If OSDP is turned on
6. Radio type



Reader Status

The information contained in this window is:

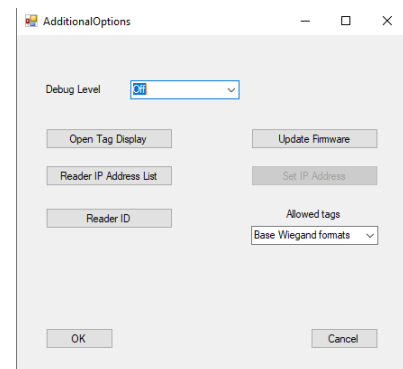
1. Reader radio device connected
2. Reader RFID processor type
3. RED5 Health, reconnection attempts and resets
4. RF module temperature
5. PCBA temperature
6. RFID processor Maximum Temperature seen
7. PCBA maximum temperature, under Microprocessor
8. Maximum power level the unit was set to
9. Lowest read tag timing
10. If the TCP/IP option installed
11. If the Wi-Fi option installed



Reader Options

The information contained in this window is:

1. Turn the debug on/off
2. Put the Tag display onto your computer window
3. Display the list of IP addresses, and set the readers IP
4. Update the readers firmware
5. Set reader ID, factory only
6. Reader reads the allowed tag selection: base tres tags, base plus specialty tags, and all GEN2 tags.

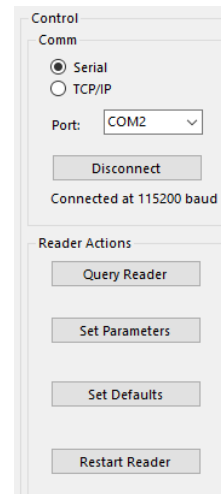


Control Section

This is the first section you will use to connect to the **PATRIOT FAMILY**, here is where you will connect and communicate between your computer and to the **PATRIOT FAMILY**. You may first want to do a Device Manager lookup on your computer to see what COM PORT you are using to connect to the reader with.

Comm

Upon power up, the **PATRIOT FAMILY** will search for available communication 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 also select it here. When connected, you will get the screen that states that you are connected, a **Query** is done during the connection process. When finished using the setup program, just press the **Disconnect** button. If you plug in your serial device after starting this software, that device will not be recognized, you will have to shut down the setup program, then restart the setup program to recognize your communications port.



Reader Interface Actions

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

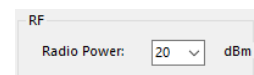
Set Parameters, this is the icon button you press to update the Reader settings with your changes you make. After you make your changes to the reader, you will have to press this icon button to send your changes to the flash memory.

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 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. 25dBm should be recommended maximum.

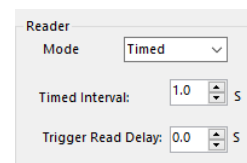


Reader section

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).

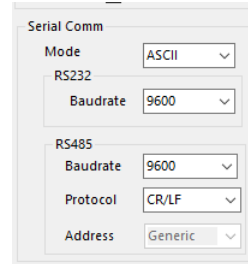
Timed Interval, this is where you set the frequency of when you read tags, minimum is 1 second and maximum read interval is 5 seconds.



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.

Serial Comm Section

Mode, this portion allows you to select between standard **ASCII** (2 HEX character F/C and 4 characters ID) or **HID** Serial PROX reader output from a converted Wiegand Input. An example of the HID format is the top line to the right and the ASCII equivalent is the second line, where the first two HEX characters is the Facility Code (0F hex = 15 decimal) and the second four characters is the ID number (0005 hex = 05 decimal).

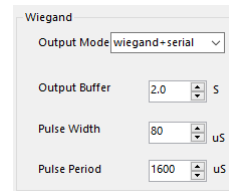


RS232, here you will select your baud rate you want to communicate thru the serial port. Selections are 9600, 19200, 57600, 115200 (default). This is usually set to the 115200 baud and most devices are automatic baud selection, this is mainly for use with your dumb terminal program like HyperTerm or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

RS485, in this section you can also modify the baud rate of the RS485 (**optional on L, not available on M**), 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.

Wiegand Section

This is where you can 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 Wiegand Setting section of the Setup Software, then select the desired timing parameters.



Output Mode, you have the options of select to output both Wiegand and Serial or just the Serial data output only option.

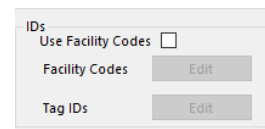
Output Buffer, this allows you to select a Wiegand buffer from 0...60 seconds. That means, when the **PATRIOT FAMILY** reads the first tag, this tag will be outputted thru either or both Wiegand and serial, then store this tag into the buffer for time selected or until another valid tag is read. If another tag is read before the timer times out, this tag data will be outputted, the buffer will be reset, and this tag will be the new stored tag.

Pulse Width, this allows you to modify the Wiegand Pulse Width, the specification is 20 μ Sec to 100 μ Sec

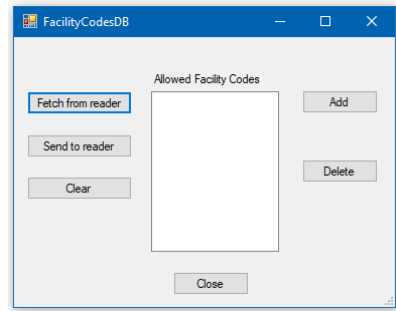
Pulse Period, this allows you to modify the Wiegand Pulse Period, the specification is 200 μ Sec to 20000 μ Sec

IDs Section

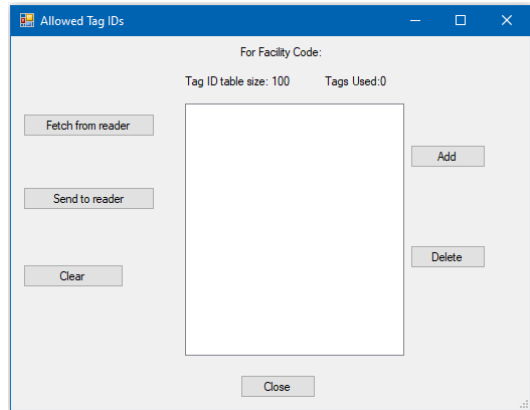
In this section of the software, you will have the ability to select then add 5 Facility Codes and/or 100 ID number(s). This is where you select and set a facility code and all other facility codes read will be ignored. If no facility code is selected, all valid IDs will be outputted per user configuration. If one Facility Code is selected, only this Facility Code will be outputted per user configuration.



Use Facility Code, when this box is selected, up to 5 facility codes can be used to output only the facility code selected. This means that you can read other tags with a different facility code and they will not be outputted to your device. If you select the relay option, later in this document, then only when this facility code is read, the relay will engage.

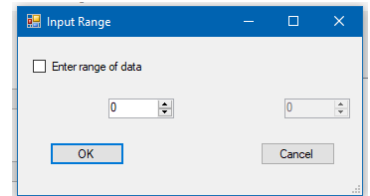


Facility Code, here you will select the facility code you want to output only. When you select between 0...255, only a tag read with this site code will be outputted thru the Wiegand port. You can use the up down scroll option or you can just enter the facility code you want. Remember to send your changes to the reader by using the ‘Send to reader’ option.



Tag IDs, this is where you add, modify, and delete ID numbers. See larger picture on the right. First you select the **Add** button on the right of the popup box and another popup box will be displayed.

You can enter a single number or a range of numbers. The single number can be entered by just entering a number in the highlighted box

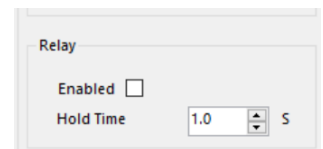


You can also select the **Enter range of data** box and enter the starting ID then the ending ID. You have up to 100 different IDs. Once completed, just press the **OK** to save or **Cancel** to not save them. You now need to press the **Send to Reader** button to update your changes into the readers flash memory.

You can send this data to the Reader, Fetch numbers already stored in the Reader or you can Clear and start over. Remember to always send your changes to the memory by using the ‘**Set parameters**’ option mentioned earlier after you ‘**Close**’ from this option.

Relay

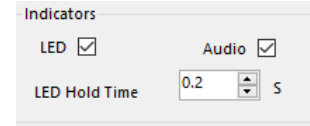
Enabled, when this box is selected, you enable the use of the relay (**not available in M**). It works off the Facility Code, if no Facility Code selected, then it closes contact on any valid Wiegand input read. If the Facility Code and/or ID range selected, the relay will close only when a valid tag with that Facility Code and ID range is received from the reader.



Hold Time, this is the relay hold time, you select between 0 to 3 seconds. When the relay is selected, and a valid tag is read, this time selection will keep the relay closed for that period of time. This is handy when you want to control a device for a longer or shorter period of time after the valid tag is read and manipulated per user configuration.

Indicators

Here is the section where you turn the LED and the Audible Beeper ON/OFF for a valid read. The 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.



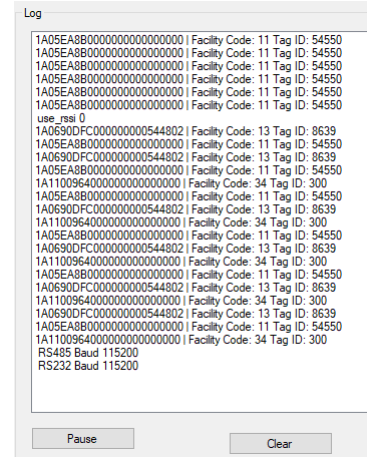
The LED Hold Time is how long you want to turn the external LED on for. This time is between 0 to 3 seconds.

Log Window

This is a very useful section, every valid tag read will be converted and displayed here. Even if you set facility code, every GEN2 tag read will be displayed. This is a very useful tool for troubleshooting your tag data and a good way to check the tags programming.

Pause, this icon button just stops displaying the inputted tag data. Like anything else, if you tired of seeing data displayed, then you pause the data being displayed.

Clear, this icon button is useful for clearing out the log window. Sometimes you get too much data and want to clear it out and start over.



Patriot M Specifications

| Item Details | Patriot M |
|----------------------------|--|
| Operating Frequency | 902.75MHz~927.25MHz @ 500KHz hop (50 total hops) |
| RF Protocol | ISO18000-6B, EPC Class 1, EPC Class 1 GEN 2 |
| Operating Method | Frequency Hopping Spread Spectrum (FHSS) |
| Antenna | 10 dBi Gain, Vertical Polarization |
| Max RF Power | 30 dBm (1 Watt) |
| RF Power Range | Fixed for Read Tag Distance noted below |
| Tag ID Modes | Timed Mode - automatically reads at fixed time |
| | Trigger Mode - external trigger control to read |
| Wiegand Timing Parameters | Pulse Width 80µS, Pulse Period 1600µS (adjustable) |
| Wiegand Formats Supported | 26-bit, 30-bit, 33-bit, 34-bit, 35-bit, 37-bit |
| Identify Tag Time | <8ms - Identify single tag |
| Reading Tag Time | Reads every 8 bytes in less than 5ms |
| Reading Tag Distance | 18' to 20', depends on environmental variables |
| Communication Interface | Multiple Wiegand Formats, RS-232 |
| Input | One-way trigger input |
| Power Supply (suggested) | 12vDC to 48vDC, 5vDC @ 2Amp (PCB Requirements) |
| Power Consumption (peak) | 1.82 A max. @ 5vDC at 30dBm in timing mode 470mA @ 5VDC in trigger mode (RF awakens on trigger) |
| Size | Antenna: 9.45x6.45x1.65" (240x240x42mm) Back Housing: 8.35x8.35x 2.17" (212x212x55mm) |
| Work / Storage Temperature | -4°F to 158°F (-20°C to +70°C) / -40°F to 185°F (-40°C to +85°C) |
| Operating Humidity | 5% to 95% relative humidity non-condensing |
| Certifications | FCC Part 15 Subpart C and Canada RSS-210, FCC ID: Y3D-RED5 |
| Working Status Indication | Audible Beeper, Built-In LED |
| Extra Features/Options | NONE |

Patriot L Specifications

| Item Details | Patriot L |
|----------------------------|---|
| Operating Frequency | 902.75MHz~927.25MHz @ 500KHz hop (50 total hops) |
| RF Protocol | ISO18000-6B, EPC Class 1, EPC Class 1 GEN 2 |
| Operating Method | Frequency Hopping Spread Spectrum (FHSS) |
| Antenna | 10 dBi Gain, Vertical Polarization |
| Max RF Power | 30 dBm (1 Watt) |
| RF Power Range | 10~30 dBm, Software Adjustable |
| Tag ID Modes | Timed Mode - automatically reads at fixed time |
| | Trigger Mode - external trigger control to read |
| Wiegand Timing Parameters | Pulse Width 80μS, Pulse Period 1600μS (adjustable) |
| Wiegand Formats Supported | 26-bit, 30-bit, 33-bit, 34-bit, 35-bit, 37-bit, PeachPass, Alabama Pass |
| Identify Tag Time | <8ms - Identify single tag |
| Reading Tag Time | Reads every 8 bytes in less than 5ms |
| Reading Tag Distance | 18' to 25', depends on environmental variables |
| Communication Interface | Multiple Wiegand Formats, RS-232 |
| Input | One-way trigger input |
| Power Supply (suggested) | 12vDC to 48vDC, 5vDC @ 2Amp (PCB Requirements) |
| Power Consumption (peak) | 1.82 A max. @ 5vDC at 30dBm in timing mode 470mA @ 5VDC in trigger mode (RF awakens on trigger) |
| Size | Antenna: 9.45x6.45x1.65" (240x240x42mm) Back Housing: 8.35x8.35x 2.17" (212x212x55mm) |
| Work / Storage Temperature | -4°F to 158°F (-20°C to +70°C) / -40°F to 185°F (-40°C to +85°C) |
| Operating Humidity | 5% to 95% relative humidity non-condensing |
| Certifications | FCC Part 15 Subpart C and Canada RSS-210, FCC ID: Y3D-RED5 |
| Working Status Indication | Audible Beeper, Built-In LED |
| Extra Features/Options | Multiple Wiegand Formats, Relay, Tag Filter FC (1-5) + tag ID (1-100) / (optional: RS485, OSDP, TCP/IP, Wi-Fi) |

Specifications

| Item Details | PATRIOT FAMILY |
|----------------------------|--|
| Operating Frequency | 902.75MHz~927.25MHz @ 500KHz hop (50 total hops) |
| RF Protocol | ISO18000-6B, EPC Class 1, EPC Class 1 GEN 2 |
| Operating Method | Frequency Hopping Spread Spectrum (FHSS) |
| Antenna | Internal 7.5dBi circular polarized |
| Max RF Power | 30 dBm (1 Watt) |
| RF Power Range | 10~30 dBm, Software Adjustable |
| Tag ID Modes | Timed Mode - automatically reads at fixed time |
| | Trigger Mode - external trigger control to read |
| Wiegand Timing Parameters | Pulse Width 80μS, Pulse Period 1600μS (adjustable) |
| Wiegand Formats Supported | 26-bit, 30-bit, 33-bit, 34-bit, 35-bit, 37-bit, PeachPass, Alabama Pass |
| Identify Tag Time | <8ms - Identify single tag |
| Reading Tag Time | Reads every 8 bytes in less than 5ms |
| Reading Tag Distance | 18' to 25', depends on variables defined later |
| Communication Interface | RS-232, RS-485, OSDP, Multiple Wiegand Formats |
| Input | One-way trigger input |
| Power Supply (suggested) | 12vDC to 48vDC, 5vDC @ 2Amp (PCB Requirements) |
| Power Consumption (peak) | 1.82 A max. @ 5vDC at 30dBm in timing mode 470mA @ 5VDC in trigger mode (RF awakens on trigger) |
| Size | 8.78" x 7.87" (223x200mm) x 2.36" thick (60mm) |
| Work / Storage Temperature | -4°F to 158°F (-20°C to +70°C) / -40°F to 185°F (-40°C to +85°C) |
| Operating Humidity | 5% to 95% relative humidity non-condensing |
| Certifications | FCC Part 15 Subpart C and Canada RSS-210, FCC ID: Y3D-RED5 |
| Working Status Indication | Audible Beeper, external LED option |
| Extra Features/Options | Multiple Wiegand Formats, Relay, Tag Filter FC (1-5) + tag ID (1-100) / (optional: TCP/IP, Wi-Fi) |

Reader Installation Guide

This section contains information for configuring the Reader's power and signal cabling. Power and communications are provided through supplied 5' (five foot) pigtail. Each wires color code and connection are described earlier in this document.

Mounting

Mounting bracket supplied are designed for mounting the reader on a pole, wood, or concrete structure. Minimum height of 5' off the earth surface and maximum of 10'. Observe the 18/18 rule, minimum of 18" from any metal or concrete surface on all sides, aim reader toward the zone of desired coverage.

Figure 7 below shows how the bracket looks assembled on a pole. The tool of choice would be a 3/8" (10 cm) wrench.



Figure 7

Installation Overview

The Reader is supplied in a weathertight enclosure for direct outdoor installation or can be placed indoors, such as in a guardhouse, or close to other electronic equipment. The Reader outputs the decoded ASCII data to an access control unit via standard data cabling. The system outputs data in both the standard Wiegand and serial RS232 outputted simultaneously.

Mounting Suggestions

Mounting bracket supplied are designed for mounting the reader on a pole, wood, or concrete structure. Minimum height of 5' off the earth surface and maximum of 10'.

Observe the 18/18 rule: a minimum of 18" from any metal or concrete surface on all sides, aim reader toward the zone of desired coverage.

Section 690.43; National Electrical Code: "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."

Trigger Function

If the Reader is configured for triggering mode, the reader will only read a tag when the trigger wire (Blue) is tied to ground. Normal ways to accomplish this is by using Loop Detectors 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.

Vertical Plane

Vertical orientation is adjusted so as to aim the antenna at a spot about twenty feet (6.5 M) on the road from the vehicle. From this spot forward, the detection area will increase as you get closer to the gate.

Tag Vehicle Installation

A vertical orientation is the optimal orientation of the Tag in order of signal response performance. Ensure the label-end of the Transponder is mounted in a vertical position for optimum read range. Prior to installation, make certain the desired location complies with all state and local vehicle code laws.

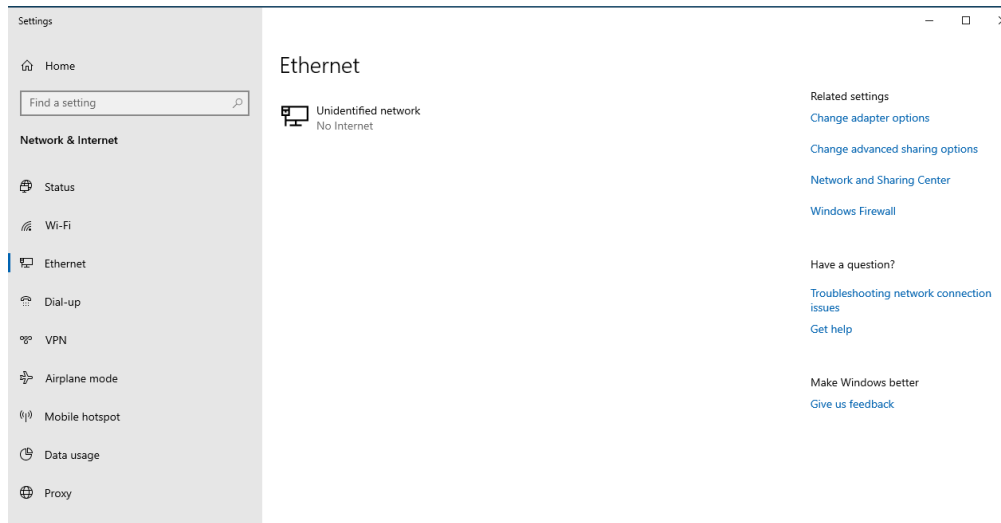
Parallel Surfaces Rule

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 to 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 reads.

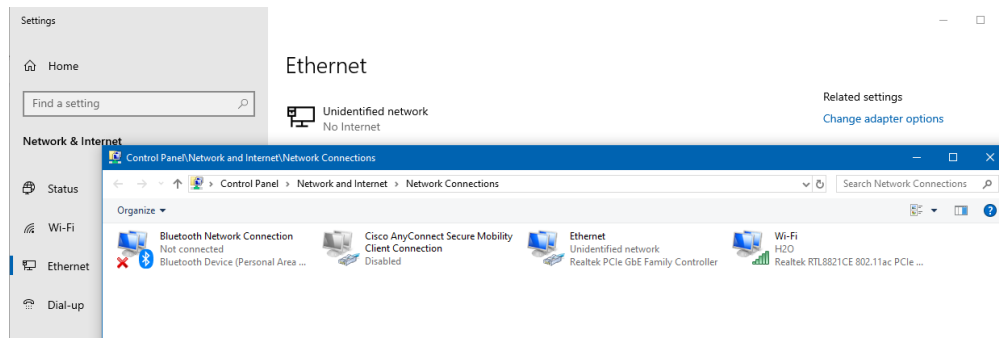
Connect Patriot Family via Wired Ethernet

First step is to “Turn off the FIREWALL” to your computer

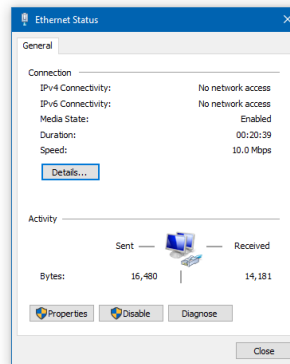
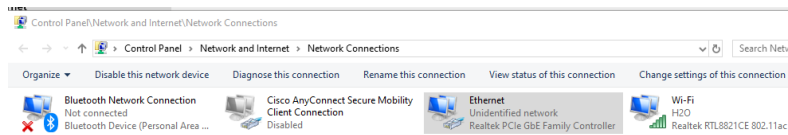
Then go to your network settings, as pictured below. On the left side of the below picture, select the Ethernet option and the following image will be displayed



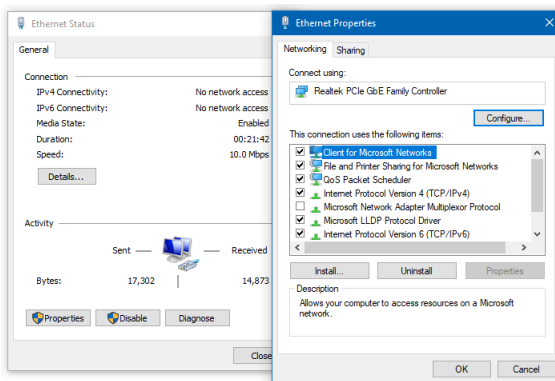
You will now see the option in the right-hand side to select “Change adapter options”. When you select this, you will see the following image



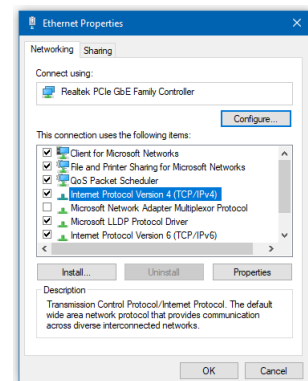
You will now select the ‘Ethernet’ icon to get the following options



In that popup window, select the “Properties” option to get the following image

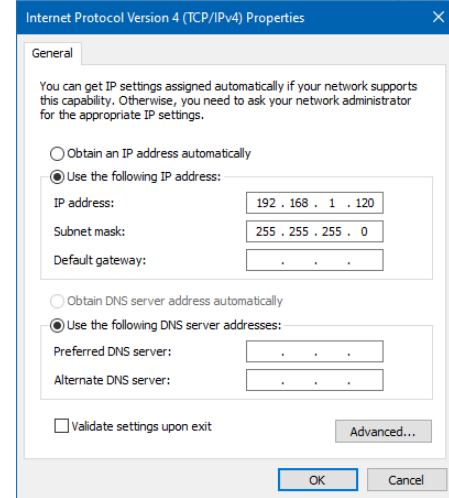


You can now select the “Internet Protocol Version 4 TCP/IPv4” and click on “Properties”

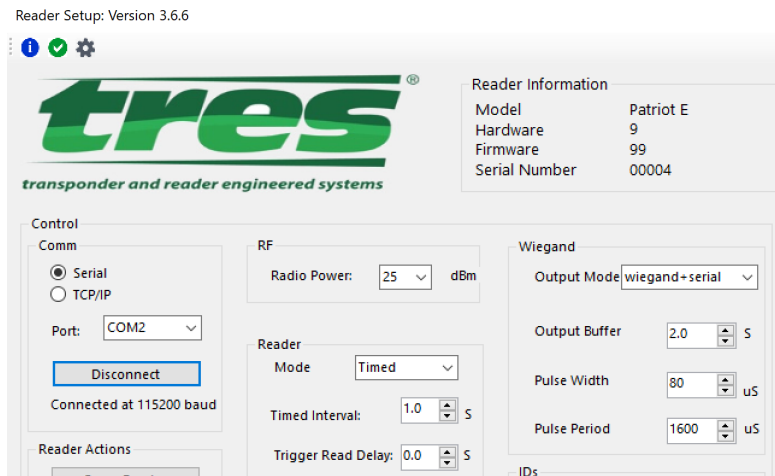


You will now see the following window. Enter the information as described below

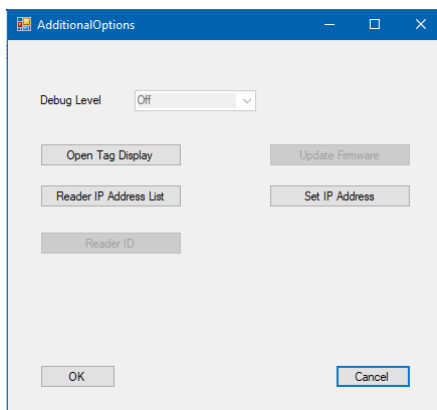
You are done setting up your network portion on your computer, you can now setup you Reader as follows. Don't forget to click 'OK' above to save your changes.



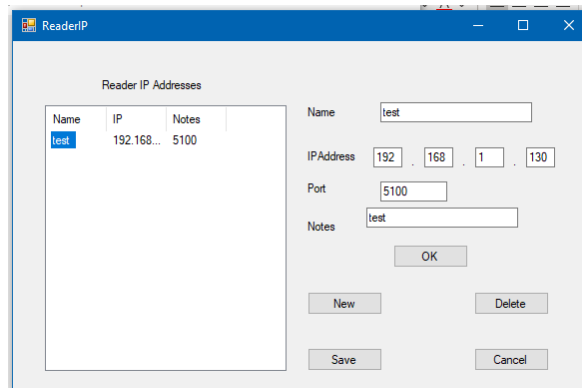
You will now need to connect to your Patriot Family thru the RS232 port so you can configure the Ethernet option, so connect to your Patriot Family.



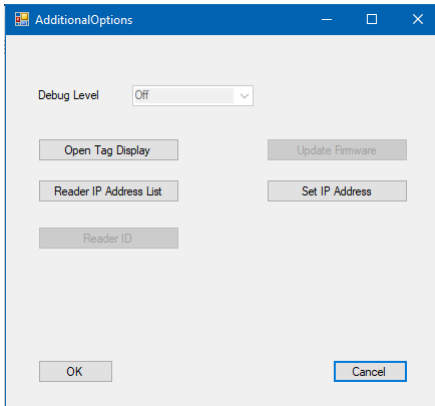
Once connected to your Patriot Family, select the options icon (the gear in the upper left of the screen) and you will see the following options



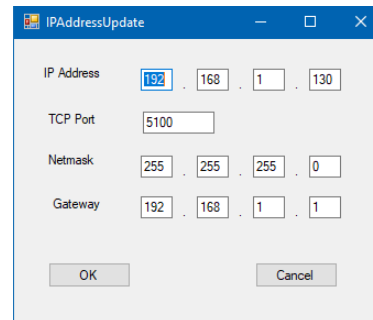
You will now select the "Reader IP Address List" option and will see a new window where you can setup the Ethernet.



Select the “New” option first (center of your screen) and populate as shown above. Once populated, you would need to select the “OK” then the “Save” buttons. You will then be returned to the following screen



You will now select the “Set IP Address” button and get the following screen. Populate as shown



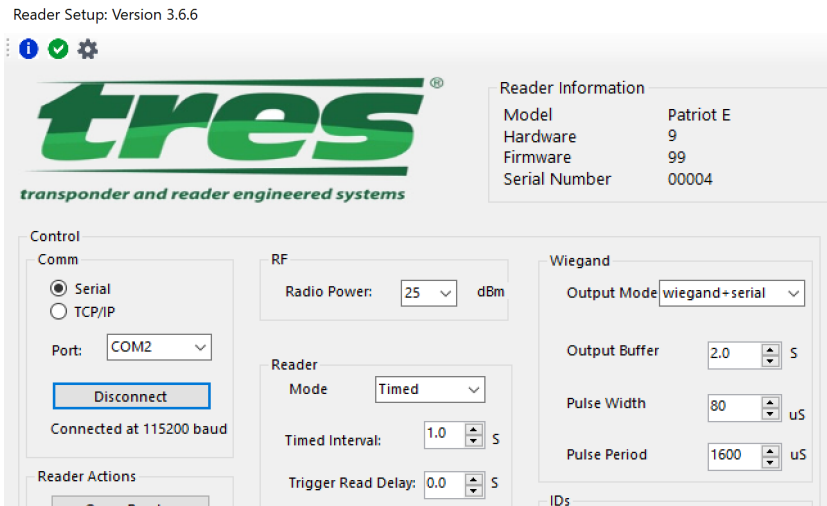
- IP Address: This is the address that will be used by the reader.
- TCP Port: This is the TCP port number that the reader will listen on for setup connections.
- Netmask: This is the subnet mask for the Ethernet network.
- Gateway: This is the gateway address for the Ethernet network.

When you make any changes to the fields in the “IP Address” screen, click “OK”, then click “OK” on the additional options screen

Then wait a few seconds and click “Restart” to restart the reader.

When the reader has restarted, you will be able to connect to it using the setup program with the “TCP/IP” Comm option

Disconnect from RS232, then select the “TCP/IP” for COMM Control. Select the Reader you configured, then ‘Connect’

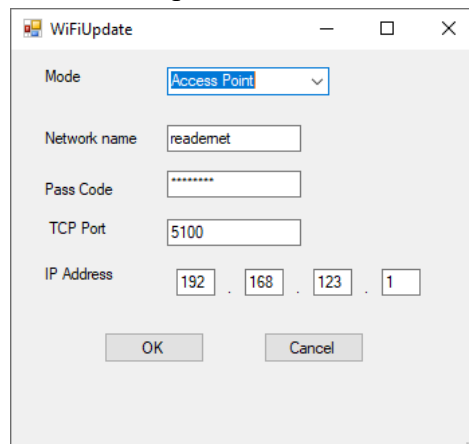


You are now configured and running. Remember to turn on your FIREWALL.

Connect Patriot Family via Wireless Ethernet (Wi-Fi)

Access Point

The Patriot reader can create its own wireless network. This is useful if there is no existing wireless network. To configure the Patriot reader in this way using the Wi-Fi update screen, Select “Access Point” from the Mode dropdown list.



- Network name: This is the name (SSID) of the new network to be created, (default ‘readernet’).
- Pass Code: This is the passcode to be used when connecting to this new network, (default ‘reader123’).
- TCP Port: This is the TCP port number that the reader will listen on for setup connections.
- IP Address: This is the IP Address that will be assigned to the Patriot reader in this new network. This is the IP address you will use when connecting to the Patriot reader using the setup program.

Set these fields properly, then click OK, then click OK on the “Additional Options” screen. Wait for a few seconds and then click “Restart” to restart the reader.

When the reader has restarted, you can use your PC Wi-Fi controls to connect to the network name (SSID) defined above.

Your PC will probably prompt you to enter the passcode for this network. Enter the “Pass Code” defined above”.

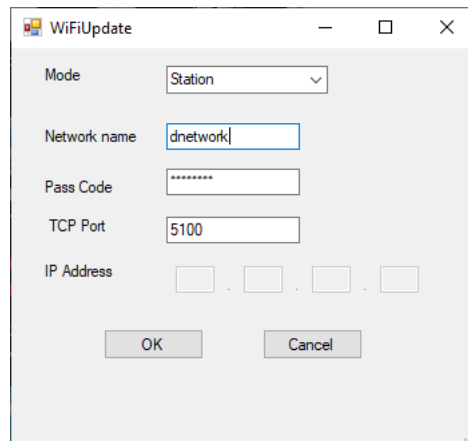
When your PC connects to this Wi-Fi network, it will be assigned an IP Address to work with this Wi-Fi network.

Then use the Setup program to connect to the reader using TCP at the address and TCP port defined above.

Station

The Patriot reader can connect to an existing Wi-Fi network. To configure the Patriot reader in this way using the Wi-Fi update screen,

Select “Station” from the Mode dropdown list.



- Network name: This is the name of the existing Wi-Fi network (SSID).
- Pass Code: This is the pass code to connect to this existing network.
- TCP Port: This is the TCP port number that the reader will listen on for setup connections.
- IP Address: This field is read only. It will show the IP address that has automatically been assigned to the reader via the existing Wi-Fi network.

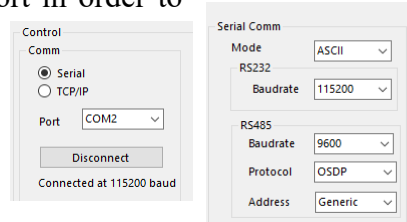
Set these fields properly, then click OK, then click OK on the “Additional Options” screen.

Wait for a few seconds and then click “Restart” to restart the reader.

Connect Patriot Family via OSDP (RS485 only)

In order to communicate to your control panel, that is looking for an OSDP device, wire up your device with three wires. Violet wire is the ground wire between the reader and your panels RS485. Tan wire is used for the T/R+ (485A) and Pink wire is used for the T/R- (485B). Once you have everything connected, we can then sync up the reader to your controller.

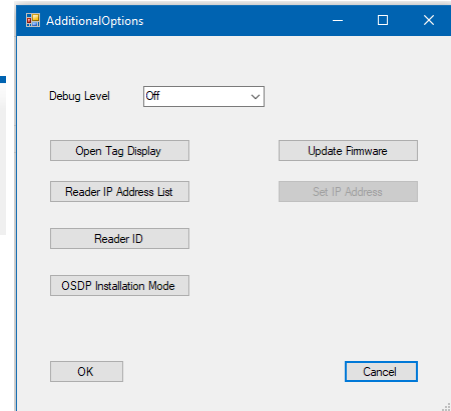
Now you can run the reader setup program thru an RS232 port in order to configure your reader and to sync it up to your control panel. Once connected, change your Serial Comm information to reflect the appropriate baud rate your control panel wants to run at. Then select the Protocol to OSDP. Now you can select an address you want your reader to be, select from Generic to address 239. Generic is address '0'. This would be good time to save your settings by selecting the 'Set Parameter' option to the left of the reader setup screen.



Now you can go into your reader option menu, the little gear looking icon in the upper left of the reader setup screen. Once you select this option



you will now see the additional option to press the 'OSDP Installation Mode' button. This button will sync up your controller and reader for either secure or non-secure modes.



You are done configuring your reader via RS485 in OSDP mode, now press the 'OK' button and disconnect your serial port. Everything should now be up and running and a test card would be nice to present to the reader to see if all is working.

Do and Do Not's Guide

- Do **not** put another manufacturers Wiegand readers output wires on the same terminal of the controller as the PATRIOT FAMILY 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.

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, need larger cable gauge.
- 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.

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 PATRIOT FAMILY 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 facing the Readers Antenna (Parallel Surface Rule) for maximum performance and distance.

LIMITED WARRANTY

Transponder and Reader Engineered Systems, Inc. (hereafter TRES) warrants its PATRIOT FAMILY 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.

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 PATRIOT FAMILY 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.

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 PATRIOT FAMILY 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.