



Installation & Set-up Manual

Version 2.1 1:006:006f – January, 2012

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About this document:

This document includes notation warning levels as shown below. These are meant to bring attention to very important pieces of information that will aid in the installation of this system.

Note: Important items that require your attention.

Cautionary: Information that can present a problem if not followed correctly.

Critical: Critical items that can prevent the system from working properly.

Product Installation and Set-up Instructions

Section 1

Introduction to the RedStorm™ Parking Space Counting System

This section will give you a broad overview of a typical system and its capabilities. This may or may not reflect the specific hardware you have chosen.

The RedStorm System is a stand-alone network of space available signs and differential counter controllers that integrates with commercially available vehicle detection equipment. RedStorm Controllers keep a running count of the vehicles entering and exiting defined areas of a parking facility and communicate that information, in real-time, to our space available signage.

The RedStorm System integrates into new and existing parking structures and can be configured to fit most parking facility layouts and traffic patterns. Whether it's a total count for the entire facility or counts per level or area, RedStorm and Trans-Tech has your solution.

We recommend reading through this manual before beginning the system installation and setup configuration.

Section 2

Installation Preparation

Before you begin installing the RedStorm System we recommend you utilize the following checklist to ensure you have all of the proper components, tools and information to complete the installation.

Installation Checklist

A typical installation requires the following components, tools and information:

Provided by Distributor (Make sure all items are included. Verify against Packing Slip.)

- RedStorm Control Units
- RedZone Overhead Sensors, if applicable for your installation
- Installation and Setup Instructions
- Signage and mounting designed for your site

Note: Mounting hardware for the control units and sensors is not included in the RedStorm package and should be provided by others.

Provided by Installer

- Digital Multi-meter (DMM)
- Mounting hardware for RedStorm Control Units & Sensors
- Tools required for mounting hardware

Provided by the Owner or Others

- Garage diagram indicating the location of electrical service and desired location of loops, sensors and signs
- Number of parking spaces in the lot or garage
- Number of parking spaces per zone/level
- Lane Delineation

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Section 3 Installing the RedStorm System

This section will explain how to install the RedStorm System.

Note: RedStorm uses one of two methods for vehicle input, Loop Detectors or Overhead Sensors. Choose from the following:

Installing Loop Detectors

RedStorm takes the output from a loop controller and uses it to sense a vehicle's presence. The loop controller output **MUST** stay closed for as long as a vehicle is over the loop. Follow the manufacturer's installation instructions and return to these instructions once complete. **Refer to Appendix C1.**

Installing RedZone Overhead Sensors

Trans-Tech's RedZone Overhead Scanning Sensors require 12VDC and consume 100mA (.1Amp). **Refer to Figure 1.** Power for the sensor is drawn from the RedStorm Control Unit. The sensors are designed to operate in a temperature range between -4° to 140° Fahrenheit. Each RedZone Sensor comes with an attached, 16 foot long cable used to connect the sensor to the RedStorm Control Unit. This cable can be lengthened to a maximum of 350 feet using 3-conductor, 18 gauge cable. **Refer to Appendix C2.**



Fig. 1
RedZone™ Sensor

The RedZone Sensor is pre-configured at the factory as a 'Normally Closed' contact. An LED indicator light on the face of the sensor will illuminate when the sensor is tripped.

A pair of RedZone Scanning Sensors **MUST** be installed at each vehicle scanning (counting) location. To ensure accurate vehicle counts, place sensor pairs on the straightest part of an entrance, exit and/or level transition. A pair of sensors is capable of handling both uni-directional and bi-directional vehicle counting. In bi-directional mode, the sensors scan in an AB/BA sequence and communicate that information to the RedStorm Controller. The Controller translates the scanning sequence to AB/BA logic and tells the signage to add or deduct a space for a particular level and lot. The vehicle counting sequence is configured at the RedStorm Control Board during the Configuration step in the installation.

Mounting the Sensors

Sensors should not be located adjacent to parking spaces. When sensors must be placed next to parking spaces, the adjacent spaces should be removed from use through permanent delineation to maintain count accuracy. Sensor brackets **MUST** be securely fastened to solid structural supports to prevent sensors from shifting from ambient vibration during use.

Avoid placing sensor pairs in close proximity to fluorescent lighting fixtures. Reflected light and flickering from fixtures may cause sensors to trip which will affect vehicle count accuracy

Each sensor has a scanning field approximately 7 feet wide and 3 inches deep. **Refer to Figure 2.**

When placing sensors, be sure the sensing field does not overshoot the lane it is meant to scan (count) and keep the sensor scanning field away from pedestrian walkways as this may interfere with accurate vehicle counts. The sensors **MUST** be mounted in a location that is protected from rainfall or water exposure.

To ensure optimal vehicle detection performance, mount sensors level and parallel with the flow of traffic. **Refer to Figure 3.**

Mount each pair of sensors on a horizontal surface over the center of the target traffic lane a minimum of 48" to a maximum of 60" apart and no more than 9 feet above the finished floor. Optimal height is 7 feet 6 inches above the finished floor. If the sensors are spaced too close, a person or object other than a vehicle may be able to produce the trip sequence necessary to generate a vehicle count. Spacing the sensors more than 60" apart may prevent smaller vehicles from properly tripping the sensors.

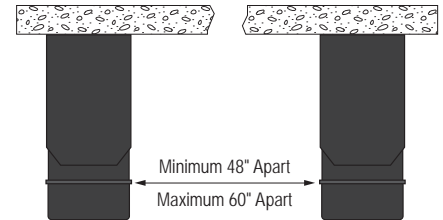
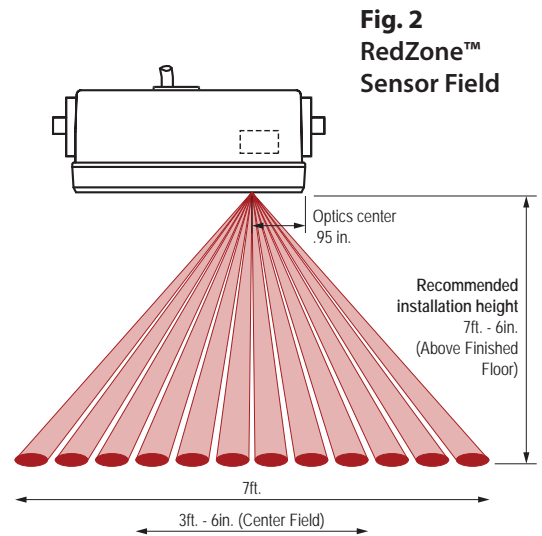


Fig. 3
RedZone™ Sensor

Critical: The sensors MUST be installed on a solid surface, a minimum of 48" to a maximum of 60" apart and no higher than 9 feet above the finished floor.

Cautionary: Avoid locating RedZone Sensors on turns, tight bi-directional traffic situations, or near heavy pedestrian traffic.

Critical: Well defined vehicular lane delineation is critical to achieving accurate vehicle counts.

Installing the RedStorm Control Units

The RedStorm Control Units are responsible for maintaining the counts and communicating this information to the signs. Each RedStorm Control Unit consists of a power supply and RedStorm Controller Board installed in a NEMA 4X enclosure. **Refer to Figure 4.** The overall enclosure dimensions are 12"H x 10"W x 6"D. **Refer to Appendix A.** When laying out your RedStorm System, a RedStorm Controller Unit should be located adjacent to each loop detection unit or each group of RedZone Overhead Sensors. The RedZone Overhead Sensors draw their power from the RedStorm Controller Unit. For optimal performance locate the sensors and their associated controller unit within 50 feet of each other.



Fig. 4
RedStorm™ Controller Enclosure

Note: RedStorm Control Boards function as either Masters or Slaves within the RedStorm System. Refer to Section 7 for Theory of Operation.

One RedStorm Control board is configured as the Master Control Unit on each Level of the parking facility. This Master Control Unit is responsible for communicating all parking counts for its Level to signs throughout the parking facility. The role of a Slave Control Unit is to add additional sensor

inputs to a specific Level within a Lot. Each Master Control can support up to four Slave Control Units. Each Level ID must have one, and only one, RedStorm Master Controller. The master or slave designation is set at the factory.

Each RedStorm Control Board, **Refer to Figure 5**, is equipped with:

- Two RJ-45 connections for 2-wire RS-485 network communications
- Four 3-position terminal blocks for sensor and/or loop detector inputs
- An LCD screen to configure the controller, view system status, and adjust space counts
- Six buttons for menu navigation

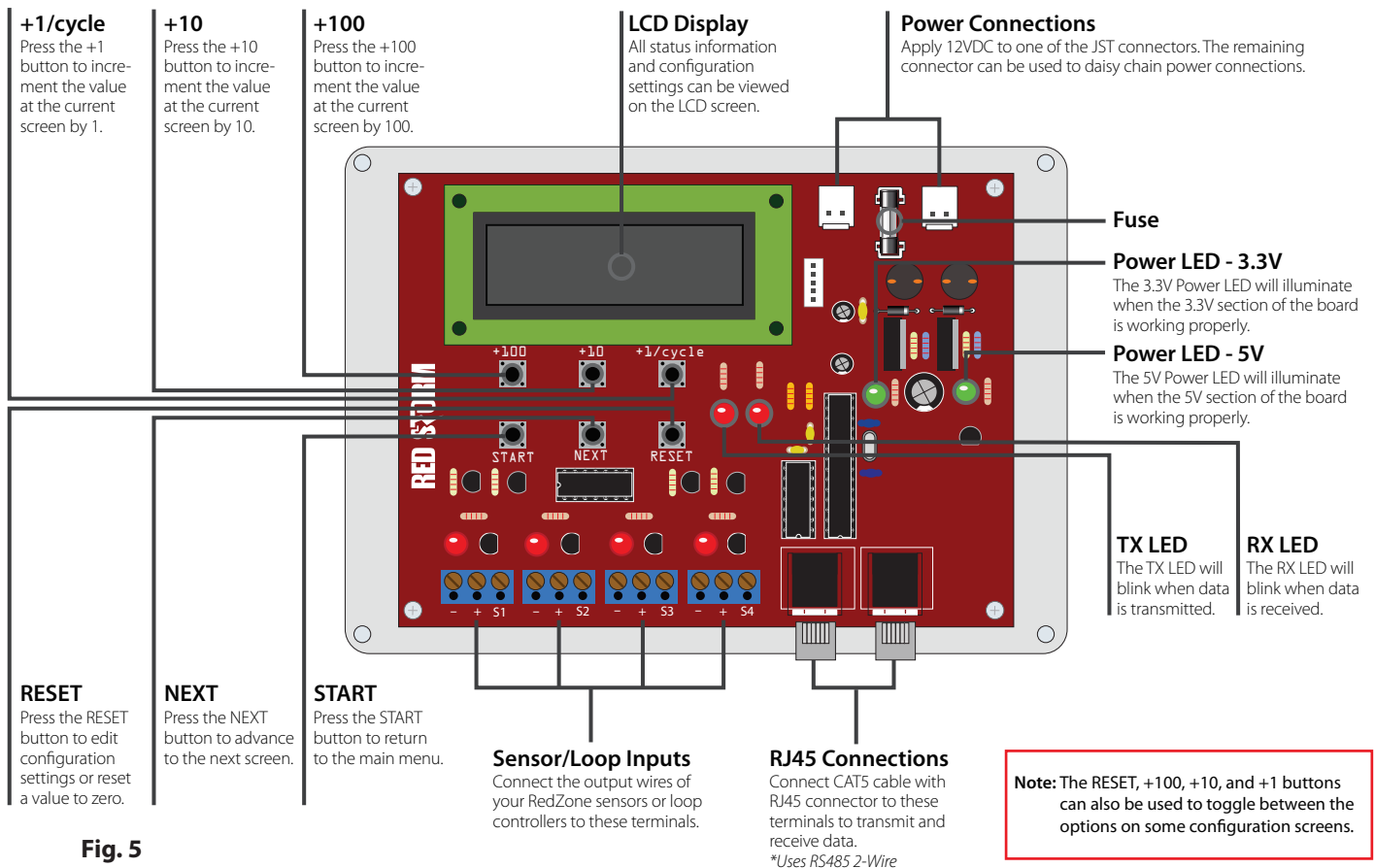


Fig. 5
RedStorm™ Control Board

Note: Information on using these menus is covered in Sections 4 and 5 of this manual.

The RedStorm Controller and power supply come within a NEMA 4X enclosure. The input voltage of the power supply is 120VAC, unless specified otherwise. Applying power to this power supply will turn on the RedStorm Controller.

Critical: DO NOT apply 120VAC directly to the RedStorm Controller's power connections.

Mounting the RedStorm Control Unit

Use the supplied mounting tabs with the NEMA 4X enclosure to wall mount the unit. Mounting hardware is not included. When selecting the control unit location, remember to locate the unit near a 120VAC power source. Each RedZone Overhead Sensor includes a 16 foot cable. This may be extended, by the installer, up to 350 feet, using 3-conductor, 18 gauge cable. Wire in accordance with local electrical codes and weatherproof all electrical connections made to the RedStorm Control Enclosure.

Critical: To reduce risk of water damage, all conduit connections MUST be made on the bottom of the enclosure. Holes made elsewhere will void the warranty.

Wiring the RedStorm Communication System

The RedStorm Controller Units and signs **MUST** be wired in a daisy-chained pattern based on their physical location within the parking facility. **Refer to Appendix B.**

Critical: Star & parallel patterns WILL lead to interference & insufficient communication signal strength, which will result in lost vehicle counts and incorrect or missing sign updates.

We recommend using CAT5 cable, or better, for the system. RJ45 connections must be wired according to T568B straight through standard. **Refer to Figure 6.** Communication cabling lengths **MUST** be kept as short as possible. The length of the RS485 cable run **MUST** not exceed 4,000 feet. Use proper terminating and bias resistors. Refer to the TIA/EIA-485-A guidelines for additional requirements.

Note: We recommend having a knowledgeable telecom professional make the RJ45 and other communications connections. Refer to the communications terminal block diagram on the CC-Series 7-Segment Display Board in **Appendix D.**

Installing Signage

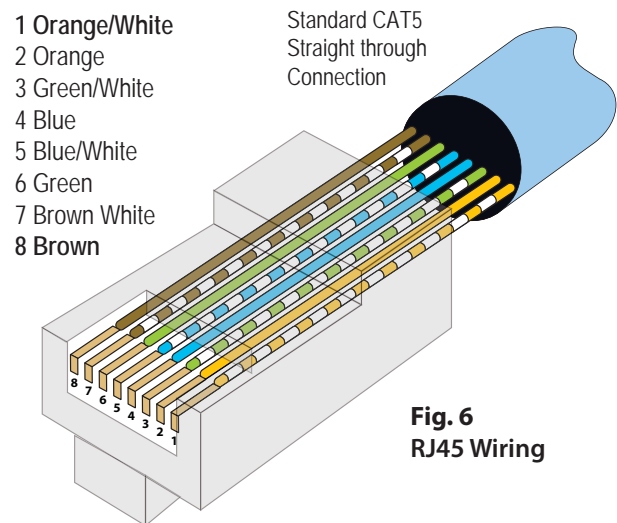
To mount and power your signage, follow the installation and wiring instructions that shipped with them. If additional copies are required, please contact Trans-Tech by phone to request another set. Most Installation and Wiring Instructions can also be downloaded from our website at www.transportation-tech.com/info_center.

Critical: Communication and power wiring MUST be run through separate conduits to avoid cross-over interference. ALL installations must be grounded. Additional protection against voltage transients on the network is highly recommended.

The RedStorm System should be connected to an uninterruptible power supply (UPS) to prevent vehicle count interruption during a power disruption. The UPS is not part of the RedStorm System and should be provided by others.

Addressing Your Signs

Your Trans-Tech Space Available signage is designed to communicate with the RedStorm Control Unit via a 2-wire RS-485 network. The CC-Series 7-Segment Display Boards within each sign receives information from



the RedStorm Control Unit. Terminal blocks are present on the display boards, which are to be wired into the RS-485 network.

Each sign address is a combination of two identifiers: the Lot ID and Level ID. The Lot ID and Level ID have been pre-set at the factory.

Critical: DO NOT CHANGE THESE SETTINGS, otherwise the system will fail to recognize the proper inputs and vehicle counts will be incorrect.

Note: The Lot ID and Level ID assigned to each sign should be documented as the information may be required in the event a replacement sign is needed.

Adding Signs to an Existing RedStorm System

It is possible to add additional signs and devices to your RedStorm System after it is up and running. When ordering additional signs or devices, let the salesperson know it will be interfacing with an existing RedStorm System to ensure proper configuration of the new signs. Refer to *Addressing Your Sign* to integrate the new sign into your system.

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Section 4

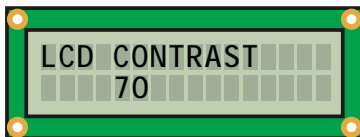
RedStorm Controller Configuration Menu Settings

Your RedStorm System has been pre-configured at the factory. Only a few settings need to be made during the install. The main setting is the actual **Lot Size**, (number of spaces available), in **Menu 8**.

On initial startup, press the **RESET** key to display the **RESET CPU** menu shown in **Figure 5**. Press any one of the **+1**, **+10**, **+100** or **NEXT** buttons to change the selection to **YES**. Then press the **RESET** button again to move into the configuration menus.

Pressing the **NEXT** button on the RedStorm Control Board will cause it to advance through the menus, in the following order.

Available on Master & Slave Displays



LCD Contrast (Menu 1, shown at left)

This setting allows you to adjust the screen contrast. Contrast values range from 0-150. The factory default setting is 70. Use the **+1**, **+10**, **+100** to adjust the value. Pressing the **RESET** button will return the value to 0.

Available on Master & Slave Displays



Sensor Logic (Menu 2, shown at left)

This feature describes how to determine the status of the sensors. Sensors are configured a Normally Closed at the factory. Using the **+1**, **+10**, **+100** and **NEXT** buttons toggle between the logic options: **Normally Closed** and **Normally Open**. On the second line of the MAIN ID screen, the sensor status for each input is displayed as **shown in Section 5, Menu 2**.

Available on Master & Slave Displays



Input Configuration (Menu 3, shown at left)

This setting defines the vehicle counting logic for the loops or sensors associated with the Controller Board being configured. There are four settings to choose from: **DEFAULT (BI-DIRECTIONAL)**; **HALF-IN/HALF-OUT**; **ALL IN**; and **ALL OUT**. Use the **+1**, **+10**, **+100** or **RESET** buttons to toggle between options.

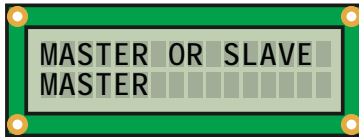
DEFAULT (BI-DIRECTIONAL) - Selecting the **DEFAULT** option will cause each pair of sensors to operate as a bi-directional set. The sensors must be tripped in a specific sequence for the vehicle to be recognized as entering or exiting the parking lot or garage. For example, if sensor 1 is tripped first and then sensor 2, the vehicle will be counted as entering. Conversely, if sensor 2 is tripped and then sensor 1 the vehicle will be counted as exiting. Terminal block inputs S1 and S2 form the first sensor pair. S3 and S4 form the second sensor pair.

HALF-IN/HALF-OUT - With this option, terminal block inputs S1 and S2 are used to detect a vehicle as entering, and terminal block inputs S3 and S4 are used to count a vehicle exiting.

ALL IN - With this option, all inputs are configured such that any sensor trip will count the vehicle as entering.

ALL OUT - With this option, all inputs are configured such that any sensor trip will count the vehicle as exiting.

Available on Master & Slave Displays



Master / Slave Setting (Menu 4, shown at left)

This setting is pre-set at the factory and is used to identify the role of the RedStorm Control Board in the system.

One RedStorm Control board must be set as the Master Control Unit in each Level of the parking facility. The Master Control Unit is responsible for maintaining the vehicle counts on its Level of the parking facility. Each Master Control Unit is also responsible for sending its Level count data to the signs. The role of a Slave Control Unit is to expand the number of sensor inputs on a specific level. Slave Control Units do not maintain their own vehicle counts, and they do not send data to the signs. They only send data to the Master Control Unit on the same Lot ID and Level ID.

Note: A Slave Control Unit only communicates with the Master Controller that matches its Lot and Level ID.

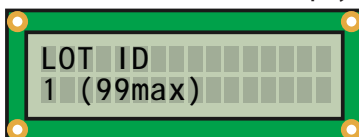
Each Master Control board can support up to four Slave control Units. If there is only one RedStorm Control Unit on a level, it must be set as a Master. Also note that each Level within a Lot can contain only a single Master.

Use **+1**, **+10**, **+100** or **RESET** buttons to toggle between options. Pressing **RESET** will return the display to the default option.

LOT ID and Level ID Numbers

Each RedStorm Control Board is assigned a Lot and Level ID so that each one is responsible for counting a specific portion of the parking facility. These ID's are pre-set at the factory.

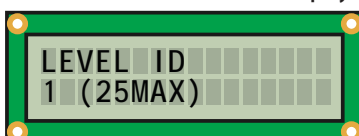
Available on Master & Slave Displays



LOT ID # (Menu 5, shown at left)

This setting is used to identify which LOT (area/zone) the control unit is a part of. The factory default setting is 1. To change it, use the **+1**, **+10**, **+100** buttons to set the desired value. Press **RESET** to return to the default value.

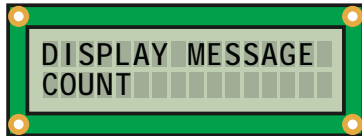
Available on Master & Slave Displays



LEVEL ID# (Menu 6, shown at left)

This setting is used to identify which level of the parking facility the control unit has responsibility for counting. Each Lot may contain multiple Levels. The factory default setting is 1. To change it, use the **+1**, **+10**, **+100** buttons to set the desired value. Press **RESET** to return to the default value.

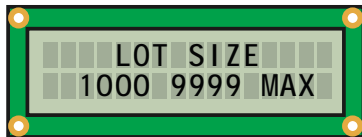
ONLY Available on Master Display



DISPLAY MESSAGE (Menu 7, shown at left)

This menu option is only available on a Master Control Unit. This setting allows you to select whether the space available signage displays the actual numeric counts or the word **OPEN**. Use the **+1**, **+10**, **+100** buttons to make your selection.

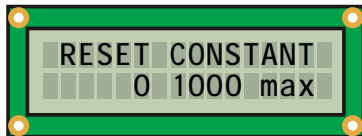
ONLY Available on Master Display



LOT SIZE (Menu 8, shown at left) ****Enter your number of spaces here****

This menu option is only available on a Master Control Unit. This allows you to enter the number of spaces in the controller's Level of the parking facility. The maximum number of spaces that can be set is 9999. Use the **+1**, **+10**, **+100** buttons to add spaces. To reset the selection back to 0 spaces, press the **RESET** button.

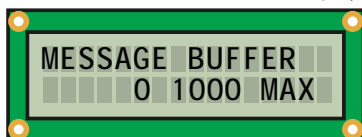
ONLY Available on Master Display



RESET CONSTANT (Menu 9, shown at left)

This menu option is only available on a Master Control Unit. This setting changes the count which will be displayed upon initial power-up of the RedStorm Control Board in the event of a reset or loss of power. The default setting is zero (0).

ONLY Available on Master Display



MESSAGE BUFFER (Menu 10, shown at left)

This menu option is only available on a Master Control Unit. When a vehicle leaves a full level, the sign display will immediately change from **FULL** to the vehicle count. With this buffer, a specific number of spaces must be available before the sign will change from its **FULL** message back to the actual count of available spaces. This is to prevent the sign from alternating back and forth between a count and **FULL** as vehicles travel in and out of a level. The default setting is zero (0).

ONLY Available on Master Display



MESSAGE (Menu 11, shown at left)

This menu option is only available on a Master Control Unit. This setting is to choose to display either the **FULL** or **CLSD** (Closed) message when the number of spaces remaining equals zero (0). The default message is **FULL**. Use **+1**, **+10**, **+100** buttons to toggle between options. Press **RESET** to return to the default value.

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Section 5 RedStorm Controller Maintenance Menu Settings

These menus are used both to change the current vehicle counts, as well as view various status and diagnostics.

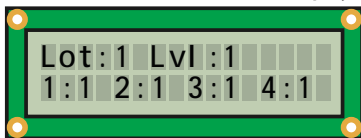
Available on Master & Slave Displays



Welcome to RedStorm

Upon power up, Welcome to RedStorm will momentarily display. For the following menus, use the buttons labeled **+1**, **+10**, **+100** to adjust the numeric values. Press the **NEXT** button to begin running through the Maintenance Menu Settings. Refer to **Figure 5** for the location of these buttons.

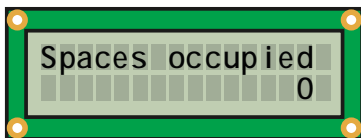
Available on Master & Slave Displays



Controller Status (Menu 2, shown at left)

This is a status screen, which shows the controller's Lot and Level ID, Master/Slave designation, and current sensor trip status. When the sensor logic is set to Normally Closed, each sensor will show 1 for untripped, and 0 for tripped. If it is set to Normally Open, each sensor will show 0 for untripped, and 1 for tripped.

ONLY Available on Master Display



Manually Adjusting Spaces Occupied Count (Menu 3, shown at left)

This menu option is only available on a Master Control Unit. This menu is used to change the count of the number of spaces currently in use in the section being counted. Use the **+1**, **+10**, **+100** buttons to change this count. If the count is adjusted too high, press **NEXT** to move to the Spaces Remaining screen, where the spaces can be adjusted back down to the desired count.

ONLY Available on Master Display

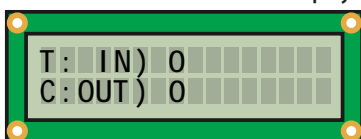


Manually Adjusting Spaces Remaining Count (Menu 4, shown at left)

This menu option is only available on a Master Control Unit. This menu is used to change the count of the number of spaces currently available in the section being counted. Use the **+1**, **+10**, **+100** buttons to change this count. If the count is adjusted too high, press **START** and then **NEXT** to move to the Spaces Occupied screen, where the spaces can be adjusted back to the desired count.

The following four menus are for diagnostic purposes and are all available on both the Master and Slave Controllers. The last two menus are used for adjusting sensors.

Available on Master & Slave Displays

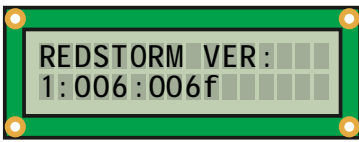


View Statistics (Menu 5, shown at left)

This function is used to view the Total Vehicle IN and OUT Counts. This represents the total number of vehicles counted-in and out since the control unit was last reset or lost power.

This is a status-only menu, and is not adjustable.

Available on Master & Slave Displays

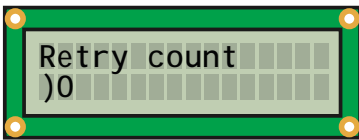


RedStorm Version Number (Menu 6, shown at left)

This is the software version that RedStorm is running.

This is a status-only menu, and is not adjustable.

Available on Master & Slave Displays

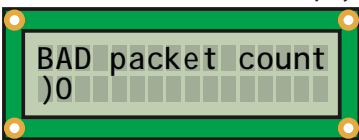


Retry Count (Menu 7, shown at left)

This is a cumulative count of the number of retries sending data to other Controllers since the last reset.

This is a status-only menu, and is not adjustable.

Available on Master & Slave Displays

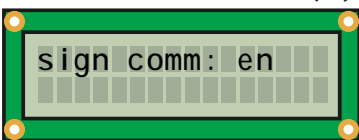


Bad Packet Count (Menu 8, shown at left)

This is a cumulative count of the number of packets received that are deemed to be bad from other Controllers since the last reset. This bad data is automatically filtered out and ignored.

This is a status-only menu, and is not adjustable.

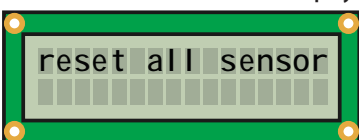
Available on Master & Slave Displays



Sign Communication (Menu 9, shown at left)

Used to enable or disable communications to signs. Displays EN as enabled and DS as disabled. Default is EN Enabled.

Available on Master & Slave Displays

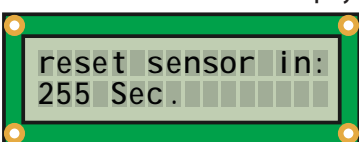


Reset Sensors (Menu 10, shown at left)

Menu used for manually resetting sensors. (**RedZone Sensors only.**)

Allows for resetting all the sensors connected to the RedStorm Controller or individual sensors. Use the +1 button to cycle through individual sensors. Pressing the **RESET** button will reset the chosen sensor.

Available on Master & Slave Displays



Reset Sensor Timer (Menu 11, shown at left)

Sets the number of seconds the Controller will allow a sensor to stay tripped. If sensor remains tripped longer than the set time the Controller will reset the sensor automatically.

Section 6

Troubleshooting

1. The LCD shows that an input is tripped, but no vehicle is present.

- a) Make sure that a short has not formed between the 'S' and + terminals of the terminal block on the RedStorm Control Board.
- b) A foreign object may be present in the sensor's field of vision, keeping it tripped. Remove the object.
- c) The sensor has sustained an impact which has damaged it or altered its position. If the sensor is undamaged, check its mounting and position, and reset its power to allow it to relearn its background environment.
- d) The sensor window has become dirty, causing a false trip. Clean the window and reset the sensor.

2. The LCD screen is frozen or nothing is displayed.

- a) Turn the power off, and power the unit up again.

3. The LCD is too dark/too light.

- a) Adjust the LCD contrast on the RedStorm Control Board. Refer to Section 4 Configuring the RedStorm Control Unit.

4. Vehicles are coming in and out of the lot, but the count is not updating.

- a) If the count is not updated on the LCD screen, check the sensor status.
- b) If the count is not updated on the sign, check the wiring from the sensor/loop outputs to the RedStorm Control Unit.
- c) Check the input configurations; ensure that the appropriate setting has been selected.

5. There is no communication between a RedStorm Master Control Unit and sign.

- a) Ensure that all wiring is correct. Refer to wiring diagram(s).
- b) The RedStorm Control Board sends updates to any sign on the network every 5 seconds, causing the TX LED to blink. Make sure the RX/TX LED blinks when data is sent/received on the RedStorm Control Board as well on as the display boards.

6. A device's RX and/or TX LED is stuck on.

- a) Recheck all wiring for correct wire sequence, and for connection integrity. Refer to wiring diagram(s).
Typically, this type of stuck LED means that the A and B wires in the RS-485 network have been reversed at some location.
- b) Check connection wiring on the display boards.
- c) Disconnect the affected board from the system and reconnect it again.
- d) If either of these LEDs remains on at this point, it is possible that a board failure has occurred.

7. None of the power LEDs are lit/only one of the power LEDs is lit.

- a) If none of the power LEDs are lit, check the fuse and all power connections.
- b) If only one of the power LEDs is lit, check the board for damage.

8. The sign will not turn on.

- a) Check all power connections and fuses.

9. General Troubleshooting

- a) Make sure the RX/TX LEDs blink periodically. On a Master board, the TX LED will blink every 5 seconds. On a Slave board, the TX LED will blink only when a vehicle is counted.
- b) If a Slave board's TX LED is blinking repeatedly when it is not counting vehicles, it is not receiving an acknowledgement from the Master Control Board on its same Lot and Level ID. Verify Lot/Level settings, and verify communications wiring.
- c) Check sign settings: Verify the Lot and Level ID settings on the affected display board.

9. Sensors not responding

- a) Verify that a minimum of 10.2VDC is present at the sensors.

Note: Any additional questions/concerns may be directed to your sales representative.

Section 7

RedStorm™ Theory of Operation

RedStorm Controllers are configured using a Lot ID and Level ID naming scheme. Each Lot ID acts as a completely independent location or zone. Within each Lot ID, different Level IDs are used to distinguish between different sections to be counted, such as the levels of a multi-level garage.

RedStorm is programmed such that any entrances and exits to a Lot exclusively occur on Level ID 1.

Within a Lot, vehicles travel from Level to Level.

- 1) As a vehicle travels from Level ID 1 to Level ID 2, the sensors attached to the Level ID 2 controller record that the vehicle has entered Level ID 2. The Level ID 2 RedStorm increases its vehicle count by one.
- 2) The Level ID 2 RedStorm informs the Level ID 1 RedStorm, via RS-485, that it has lost a vehicle.
- 3) The Level ID 1 RedStorm receives the packet, acknowledges it, and adjusts its vehicle count accordingly.

Moving in the opposite direction:

- 1) A vehicle travels from Level ID 2 to Level ID 1. The Level ID 2 RedStorm detects a vehicle exiting, and decreases its vehicle count by one.
- 2) The Level ID 2 RedStorm informs the Level ID 1 RedStorm, via RS-485, that it has gained a vehicle.
- 3) The Level ID 1 RedStorm receives the packet, acknowledges it, and adjusts its vehicle count accordingly.

RedStorm Slave Control Boards are used to add extra sensor inputs to a Lot and Level ID. Each combination of Lot ID and Level ID can have up to 4 Slave Controllers. A Slave Control Board will only transmit information to the Master Control Board on its own Lot and Level ID. Data transmission from a Slave Control Board will only occur when it detects a vehicle count on its own sensors. When it sends this data, the Master Control Board will immediately send back an acknowledgement packet.

Updating the count displayed on the signs is performed by the Master Controllers. Each Master Control Board broadcasts its count data onto the network every 4-5 seconds, which is received and displayed by any appropriately-addressed display board on the network. Multiple signs of the same Lot and Level ID may be on the network. For example, if the vehicle count for Lot 1 Level 3 must be displayed in multiple locations, each of the necessary displays must be set to Lot 1 Level 3, and all will display the count for that Lot and Level combination. The sign data transmitted from each RedStorm is similar to a radio broadcast, in that many listeners can receive information from a single sender.

Bidirectional functionality is provided by the RedStorm's monitoring of the sensor inputs for a specific trip sequence. This functionality is used when the RedStorm is set to the **DEFAULT** Sensor Logic.

- 1) One of the sensors in a pair trips while the other is untripped. This will help determine the direction of travel.
- 2) The second sensor trips while the first sensor is still tripped.
- 3) The first sensor that tripped is released, while the second sensor is still tripped.
- 4) The second sensor is released.
- 5) A count is registered at this time.

If the first sensor tripped was an A terminal block, the vehicle is counted as entering the Level.

If the first sensor tripped was a B terminal block, the vehicle is counted as exiting the Level.

Indicated with letters, the Level entry sequence is: none, **A**, **A&B**, **B**, none.

The Level exit sequence is: none, **B**, **A&B**, **A**, none.

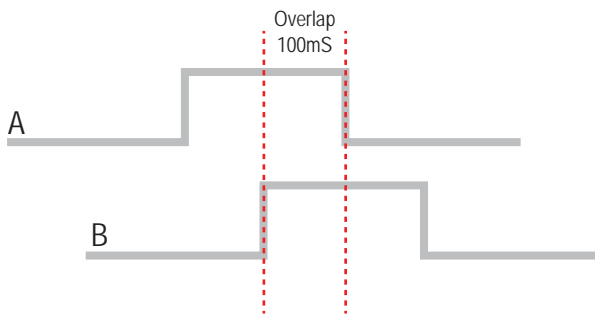


Fig. 7
Correct AB Sequence

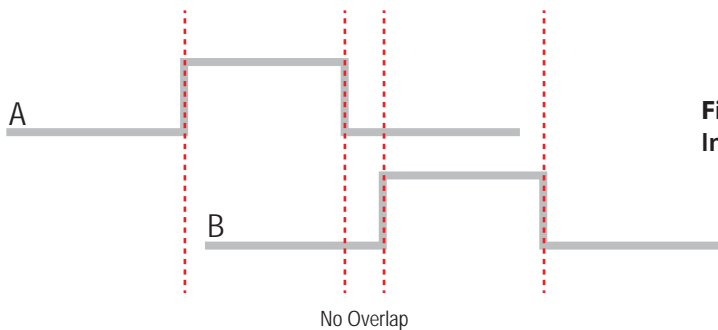


Fig. 8
Incorrect AB Sequence

Section 8 Appendices

Appendix A

RedStorm Controller Enclosure Information

The RedStorm Controller enclosure is a NEMA 4X rated enclosure. *Refer to Figure 9.*

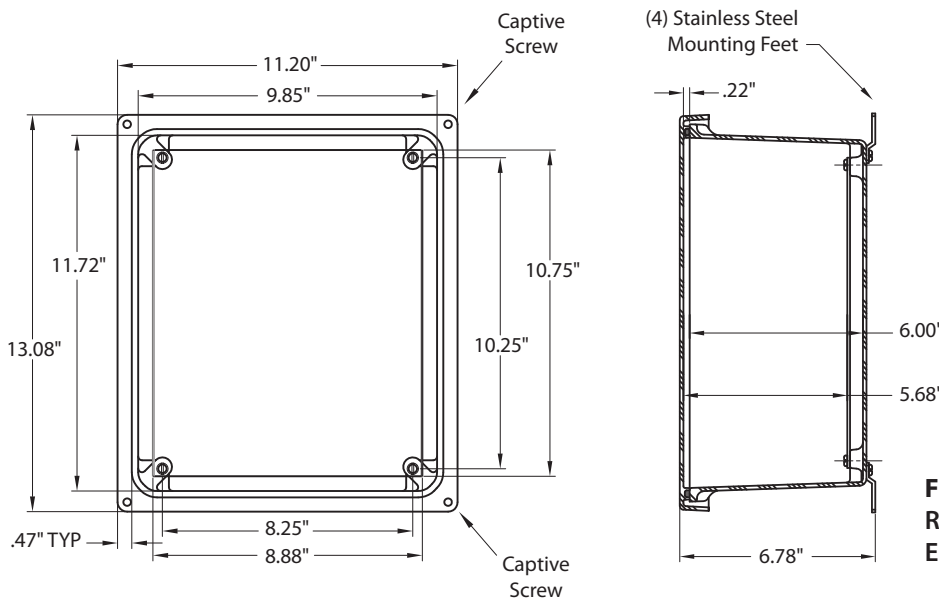


Fig. 9
 RedStorm Controller Enclosure

Appendix B

Network Topology

Daisy chain network topology that is **required** for RedStorm. *Refer to Figure 10.*

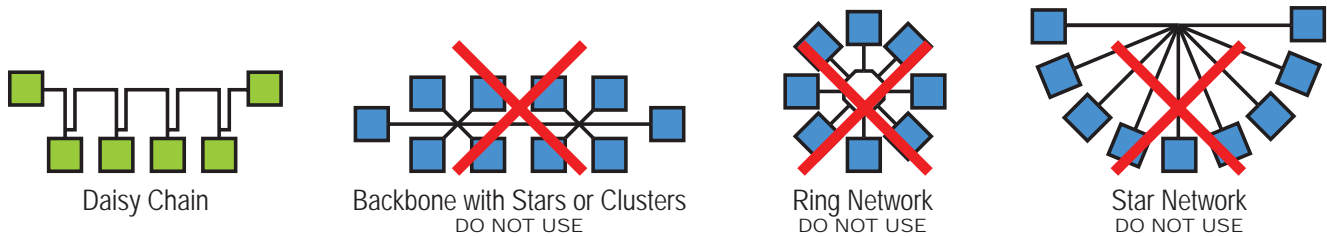


Fig. 10
 Network Topology

- Follow EIA/TIA-485-A standards
- Lay wire to minimize cable length of whole system
- Maximum communication cable length not to exceed 4,000 feet

Appendix C

Wiring Diagrams

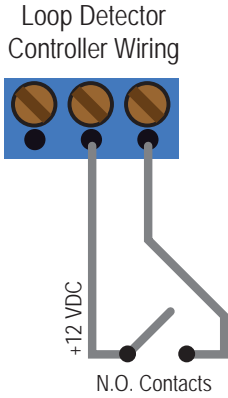


Fig. 11
Loop Detector to RedStorm
Controller Wiring

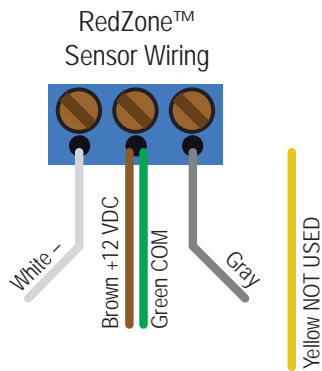


Fig. 12
RedZone Sensor to RedStorm
Controller Wiring

Appendix C1

Loop Detector Controller Wiring

The RedStorm Controller requires an input from each transition to detect a vehicle entering or leaving the level or zone. Loop controller output **MUST** stay closed for as long as vehicle is over the loop.

Wire loop detector controller to the RedStorm Controller as shown at left in **Figure 11**.

There are four (4) inputs per RedStorm Controller. Additional inputs require an additional RedStorm Controller

Appendix C2

RedZone™ Sensor Wiring

The RedStorm Controller requires an input from each transition to detect a vehicle entering or leaving the level or zone. RedZone Sensors have 16 feet of cable that can be extended to maximum of 350 feet. Sensor require a minimum voltage of 10.2VDC to operate. Output from RedStorm Controller is 11.4VDC. At a minimum, a 3-conductor 18 gauge cable should be used. See **Figure 12** for wiring each sensor.

There are four (4) inputs per RedStorm Controller. Additional inputs require an additional RedStorm Controller.

Appendix D

Wiring RedStorm™ Controller to CC Series 7 Segment Controller in Signs

RedStorm communicates to each sign on the network using RS485 at 57600bps. This wiring goes from the RedStorm Controller to the 7 Segment Controller in each individual sign cabinet. The cable can be a maximum 4,000 feet and terminates with an RJ45 jack on the end going to the RedStorm Controller and a wire end that connects to the block on the 7 Segment Controller.

Communications are to be provided to the sign via RS-485 2-wire (plus ground (GND) connection). Note that there are two "G" (ground) connections at the RS-485 plug; either one or both may be used, as they are electrically tied together on the circuit board. Using the GND connection is necessary to ensure proper data transfer. Observe proper daisy-chain protocols for wiring multiple devices to an RS-485 network. In signs with multiple displays, the RS-485 communications have been daisy-chained together at the factory. A terminal block is available to facilitate external wiring inputs. See **Figure 13**.

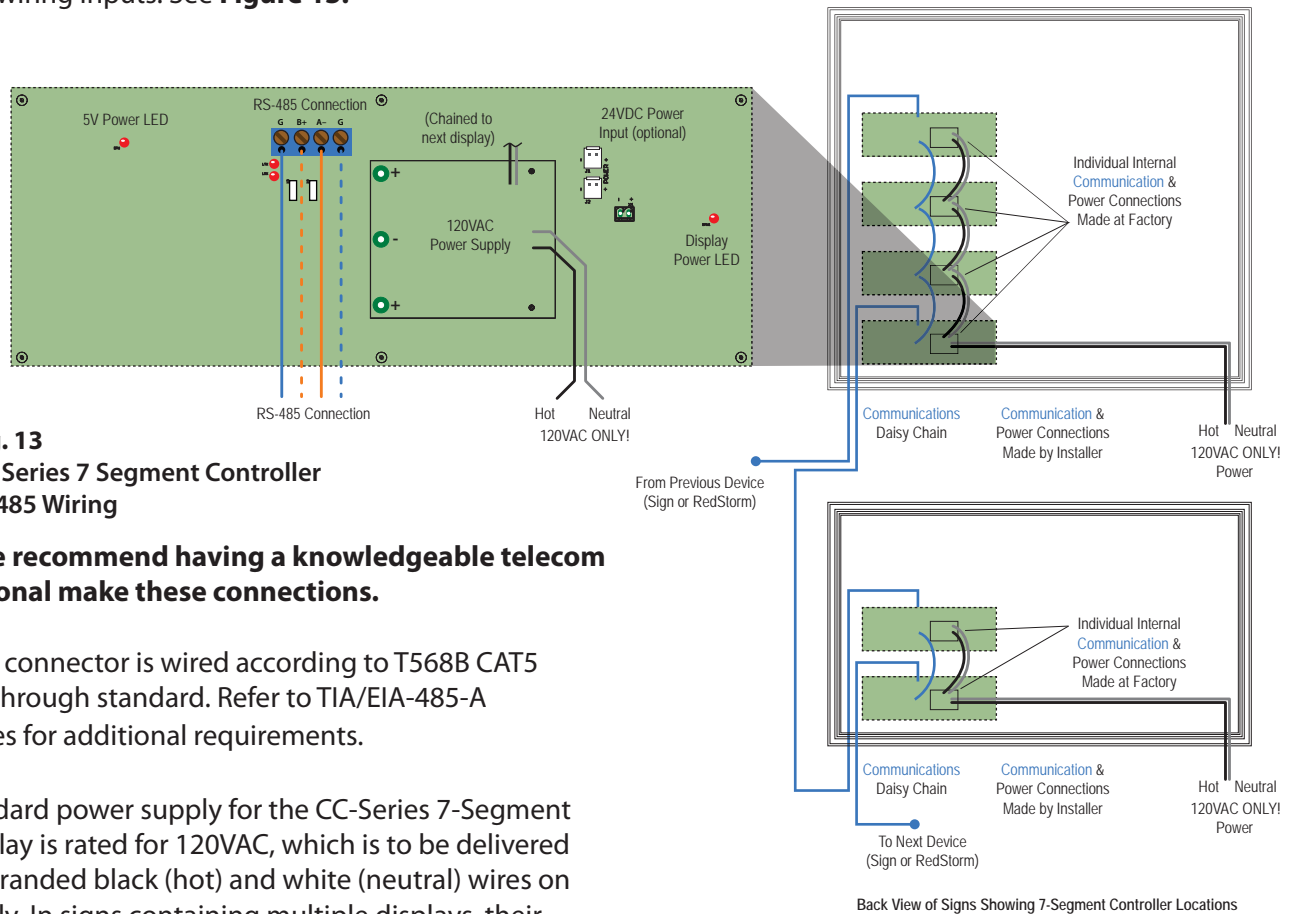


Fig. 13
CC Series 7 Segment Controller
RS485 Wiring

Note: We recommend having a knowledgeable telecom professional make these connections.

The RJ45 connector is wired according to T568B CAT5 straight through standard. Refer to TIA/EIA-485-A guidelines for additional requirements.

The standard power supply for the CC-Series 7-Segment LED Display is rated for 120VAC, which is to be delivered via the stranded black (hot) and white (neutral) wires on the supply. In signs containing multiple displays, their power has been daisy-chained together at the factory.

A unique address must be assigned to each circuit board to allow it to properly receive the correct data. The configuration is set by DIP switches located on the back of each display board. Refer to the installation instructions that shipped with the sign for details.

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