# X15500 Solar Tracking Unit (STU)
# With Optional Sensors

## Website Users Manual
## Version 1.1

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LAT-LON, LLC a Geotab Company
**2300 S. Jason Street**
**Denver, CO 80223**
**877-300-6566 Phone 303-531-5754 Fax**
**www.lat-lon.com**

## LEGAL INFORMATION



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**FCC NOTICE:** This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- It is strongly recommended that the TV be plugged into a separate wall outlet.

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception.

The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

**RF Exposure Notice:** The antennas used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

**ISED Notice:** This device complies with ISED Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

# INTRODUCTION

Welcome to Lat-Lon's tracking and monitoring service, more than latitude and longitude! Lat-Lon's website or mobile apps are your portals to view the data created by your Solar GPS Tracking Unit (STU). You now have the ability to track and manage your asset(s) from anywhere in the world using one of our data viewing tools:

1. Website browser with an Internet connection.
2. Mobile applications for Android and Apple iOS.

The following manual explains the structure and functionality of the Lat-Lon website. The document is divided into six main sections that mirror the menu structure of the website: 1. Login
2. Dashboard
3. Reports – Viewing data / maps
4. Dispatch
5. Administration
6. Preferences / Support

Lat-Lon will keep **24 MONTHS** of data on hand. If your intent is to have a historical record of your GPS units then you need to off load data or contract with Lat-Lon to maintain the data.

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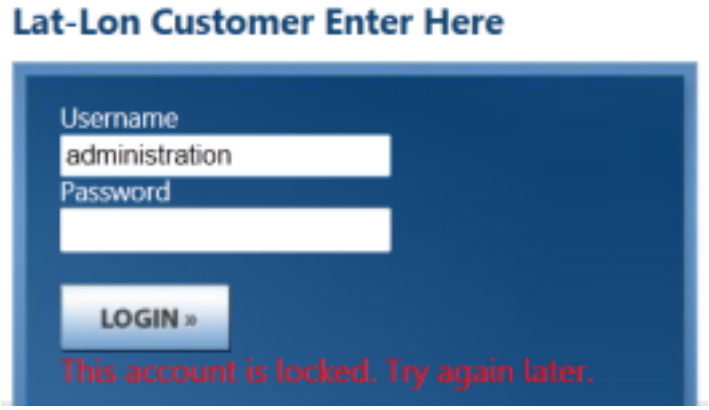
# LOGIN

## Logging-In

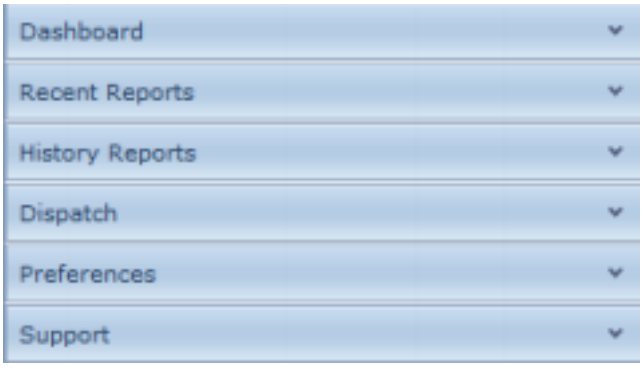
To access the website, go to http://lat-lon.com and click the Customer Login button towards the upper right corner of the page or go directly to https://login.latlon.com.


## Enter Username & Password

A Username & Password will be provided to the account Administrator by Lat-Lon. The Administrator will then create Usernames and Passwords for all Users within the account. If entered incorrectly 3 times, the site will require you to return after a 15 minute wait period.




## Main Menu Functions




Once logged into the account, there will be a menu bar along the left side that has the following options.* To see more functions within the option, use the arrows to expand (▯) or collapse (▯) the selection.

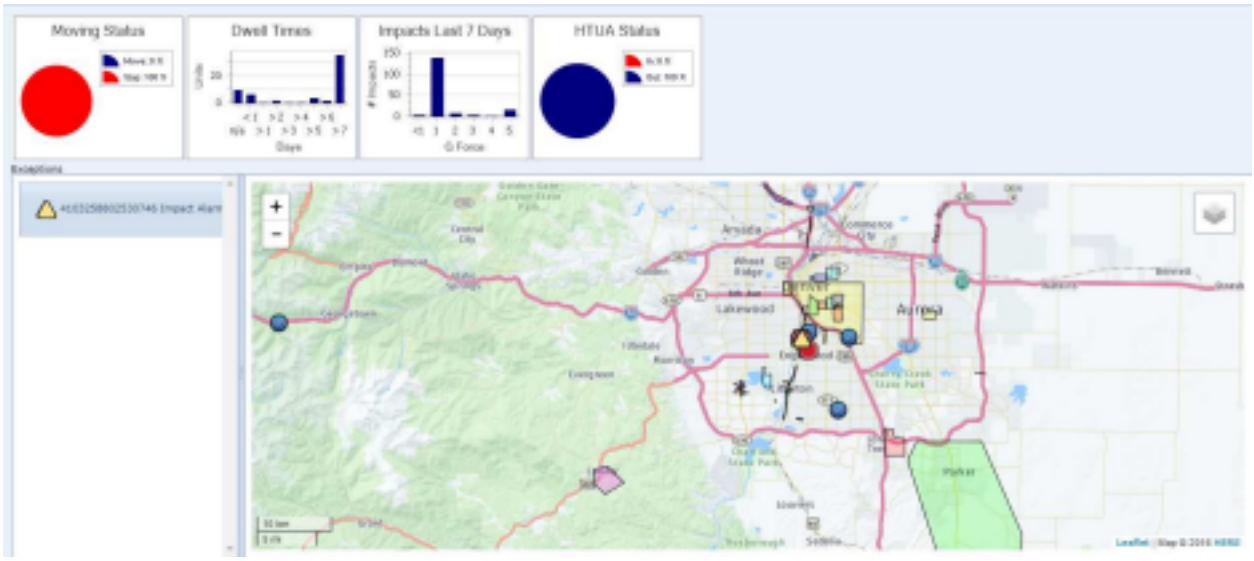
*Users without My Dashboard, Administration, or Dispatch rights will not see all options. See Administration/Users for additional information.

# DASHBOARD

## MY DASHBOARD

The MY DASHBOARD function is a great visual way to track the status of your unit(s). To create a dashboard or to manage a dashboard that has already been created, go to MANAGE DASHBOARD:

MY DASHBOARD: First, review an example of how my dashboard looks.




MANAGE DASHBOARD:

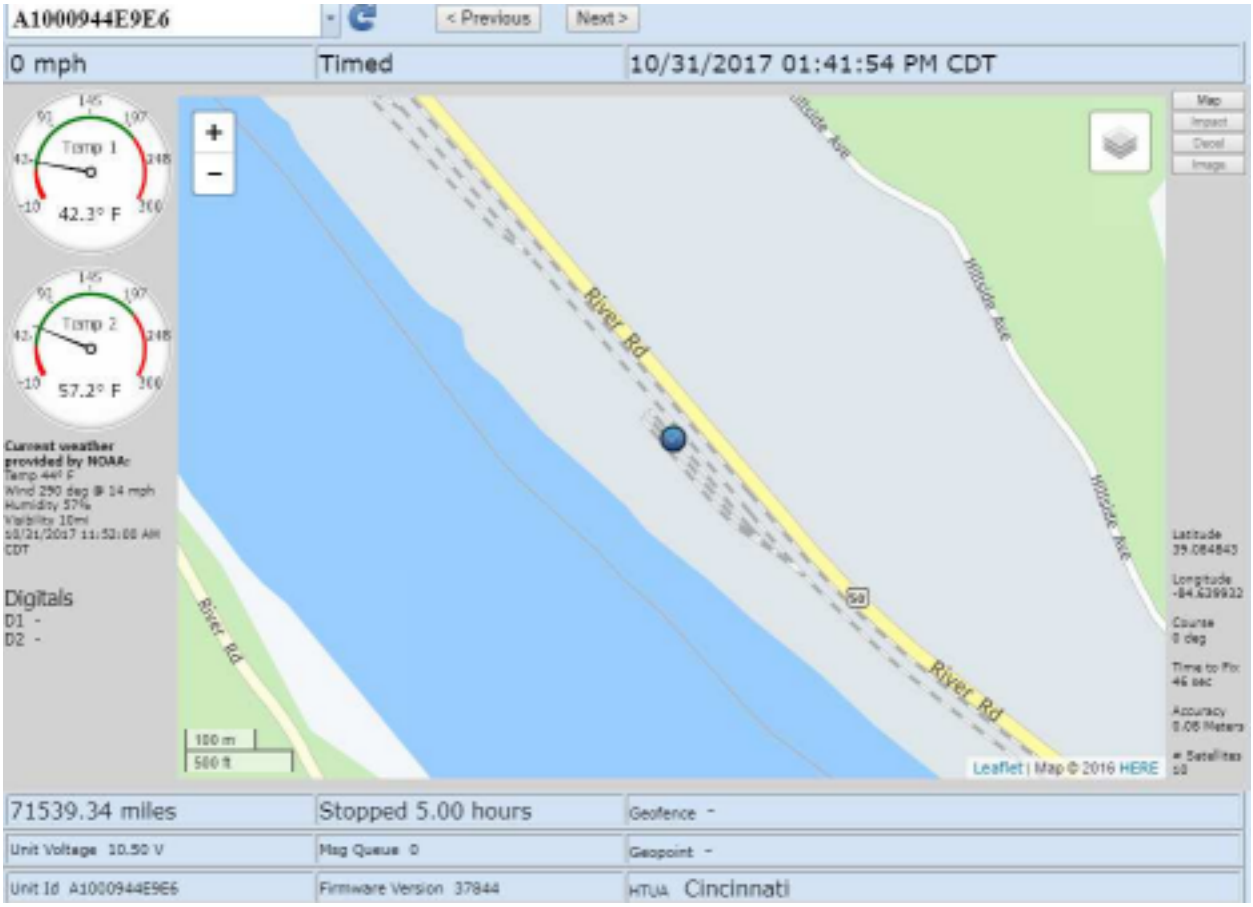
- Charts: Four different charts may be viewed on MY DASHBOARD.
- Map: Choose to see a Fleet map on your dashboard or no map at all.
- Exceptions: May be selected if exceeding set thresholds is of concern. Deceleration is available for every unit, and other exceptions will work if sensors are attached.
- Note: Exceptions will appear on the DASHBOARD if the last message received from a unit exceeded the thresholds set by the Administrator (see ADMINISTRATION section). Or disable Exceptions so they are not visible on the Dashboard.
- Once finished, click SAVE, and view under MY DASHBOARD.

## SOLAR DASHBOARD

The Solar Dashboard is for viewing a specific unit at a glance. It will display status, location, speed, sensor data, power, etc. The map view can be changed to Map, Hybrid, or Satellite using the map layer button right corner of the map image. This dashboard cannot be customized.

On the far right of the screen you have options for Map, Impact (if sensor purchased), Decel and Image (if camera purchased). If the message being shown is an Impact Alarm, Deceleration Alarm or Picture, you can press these buttons to see the graph or photo.

If you want to view the movements and data of this unit over time, press the Previous or Next buttons at the top of the page. You can easily scroll through the history of the unit.




# REPORTS


## RECENT REPORTS

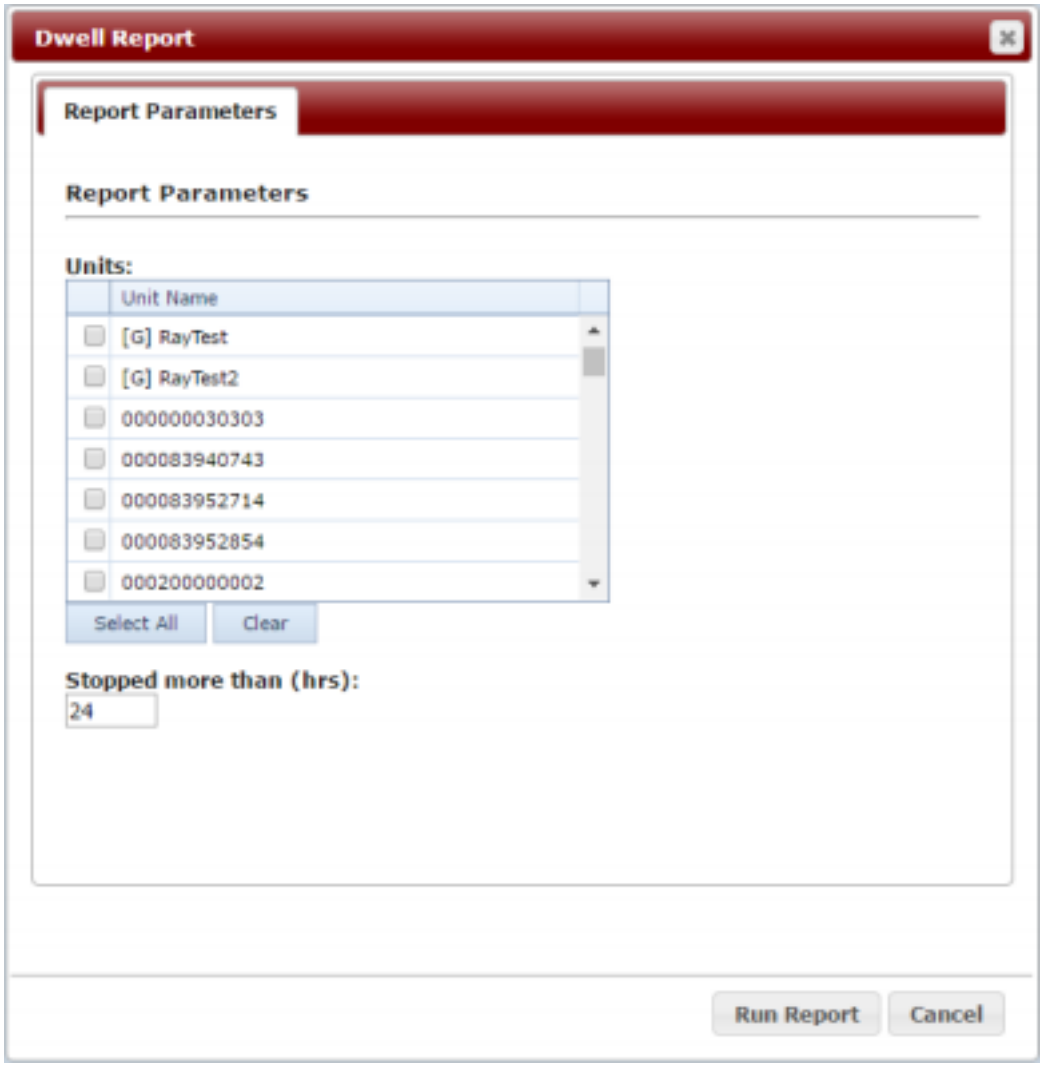
A list of the most recent reports viewed.

## SPECIALTY REPORTS

Specialty Reports are reports designed to help productivity and the management of assets. Administrators have the ability to see all Specialty Reports and to assign Specialty Reports to Users (see ADMINISTRATION/USERS Section):

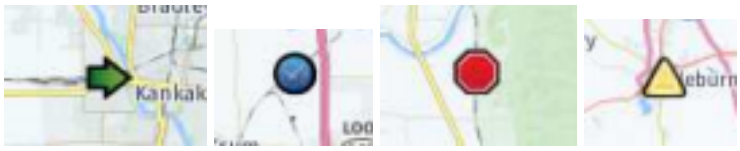
See APPENDIX III for descriptions of specialty reports available.

Some Specialty Reports run automatically for the entire fleet of units and some require that you select  specific units or a time frame. See unit selection example below:




## MAP ICONS

Each colored icon on the map represents whether the asset is moving (Green Arrow), sitting still (Blue Clock), recently stopped-Move End message (Red Stop Sign) or has an alarm such as temperature alarm, impact alarm, digital alarm, sensor alarm, etc (Yellow Triangle).

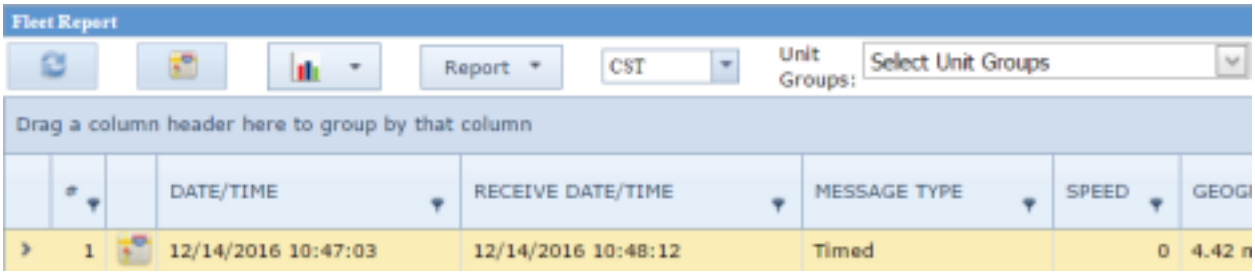


## STANDARD REPORTS

There are two standard reports (FLEET REPORT and UNIT HISTORY REPORT) with each account. An administrator may set-up custom reports as well. This is explained in more detail in the ADMINISTRATION/REPORTS section.

## Fleet Report

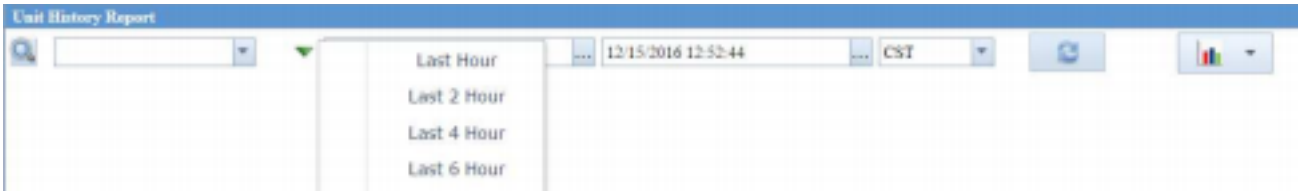
The Fleet Report is for viewing the latest message from your fleet of units, grouped units or individual unit. The Fleet Report can also be set to run only on a specific group. See PREFERENCES to create this setting. Or, after running the Fleet Report you can choose a group name in the drop down menu at the top.




The fleet report can also be grouped/filtered as explained below (options 10 and 11 in History Reports).

You are able to view the last 24 hours of a specific unit – straight from the Fleet Report by clicking on the > icon on the left of each line.

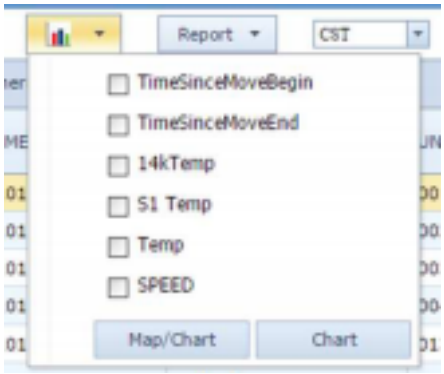
## History Reports




The Unit History Report is for viewing a specific unit or units for a specific timeframe. Select Unit History Report, and then choose the unit and time frame. Search for a unit by typing all or part of the name into the "--select unit--" box or use the drop down menu. To choose more than one unit for the Unit History Report, click on the magnifying glass icon, choose units from the list, and then click save. When choosing

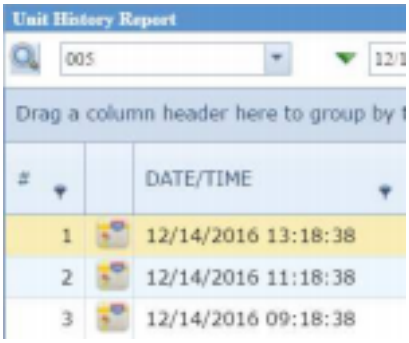
multiple units, you can also use the little pin icon to filter the units by group. There are a few ways to select a time frame: A variety of common report timeframes are entered for convenience (click the green triangle for these), type in a date along with military time, or click to select a date on a calendar. Click "Run" once you have selected units and a time range.

After running a Fleet Report or History Report you have the following options:




1. Viewing all of the points on a **ROAD view map** (by clicking the Map button at top of page)

2. Viewing data on a chart by clicking on the Chart button at the top of the page. Select data fields to view and whether you want to view a chart or a chart and a ROAD map view.




3. Viewing individual line icons on an **AERIAL view map** (by clicking on the map icons on far left of each line, see picture to left). The map is either google maps or bing maps depending on Administrator Preferences.

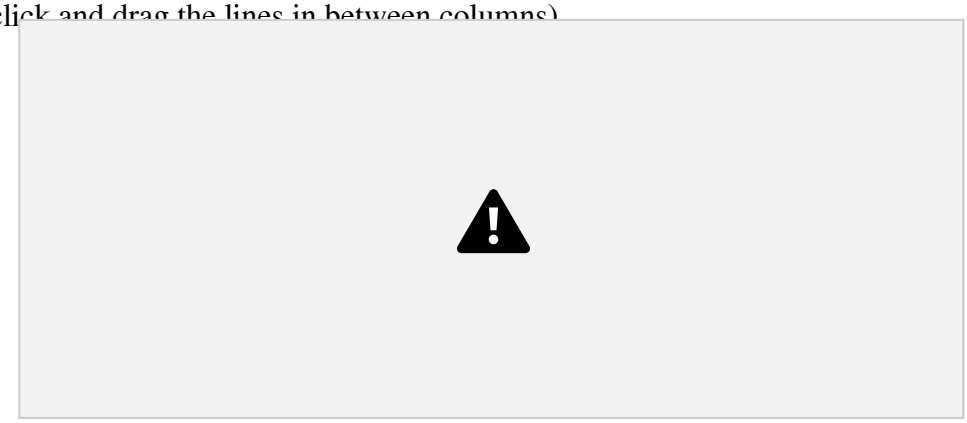
4. Easily find the icon on the map that is related to the data row by clicking on that row. A bubble will show up on the map.

5. Click on an icon on the map and the row related to that icon in the data will be highlighted.

6. Re-sort the data by clicking on column headings (an arrow will appear to symbolize ascending/descending)

7. The size of the columns can be manipulated by clicking and dragging them to be larger or smaller (click and drag the lines in between columns)

8. Rearrange column order by clicking and dragging the column to a new location between two columns



9. Save the report by clicking on Report at the top of the page and selecting Export and the file type you would like to save it as.
10. Group messages by columns. Drag the column to group by to the top of the page.

*Example Above: Grouping by Message Type column is a great way to find and view individual alarm messages like Impact Alarms, RF Triggered Messages, Digital Alarms, etc.*

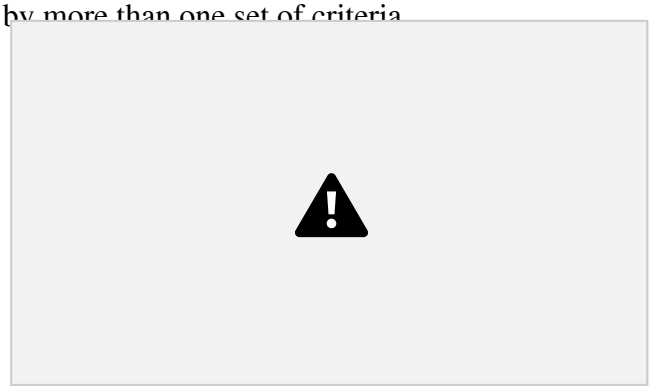
11. Filter the report: 2 options

Option 1: filter by items in the columns such as: moving units, stopped units or timed units.
a. Click on the small "pin" icon that is on the right side of each column.
b. All values for that column in the report will appear. Select the value of the messages to be displayed. All other values will be filtered out.

Option 2: filter with more details or by more than one set of criteria

Click the "Create Filter" at the bottom of the page.

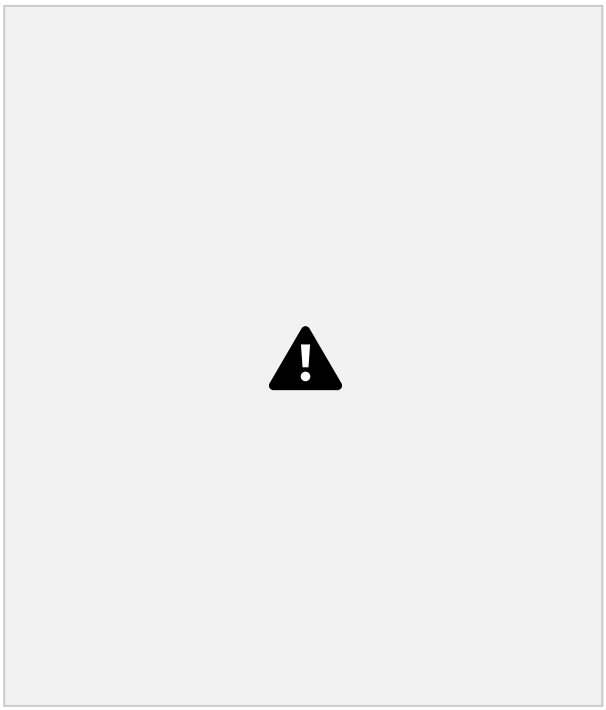
The Filter Building Screen will pop-up and many criteria can be modified and added.

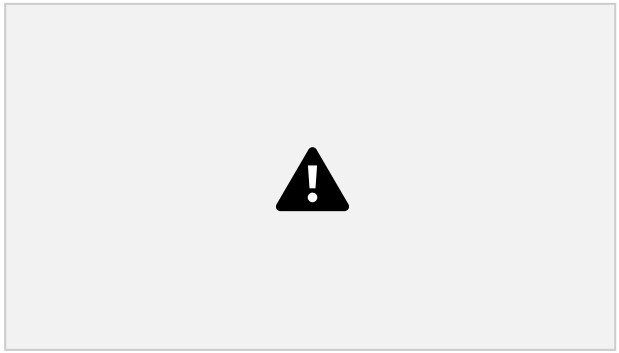


• Data can be filtered by: And, Or, Not

and, Not or, etc. by clicking on the And.

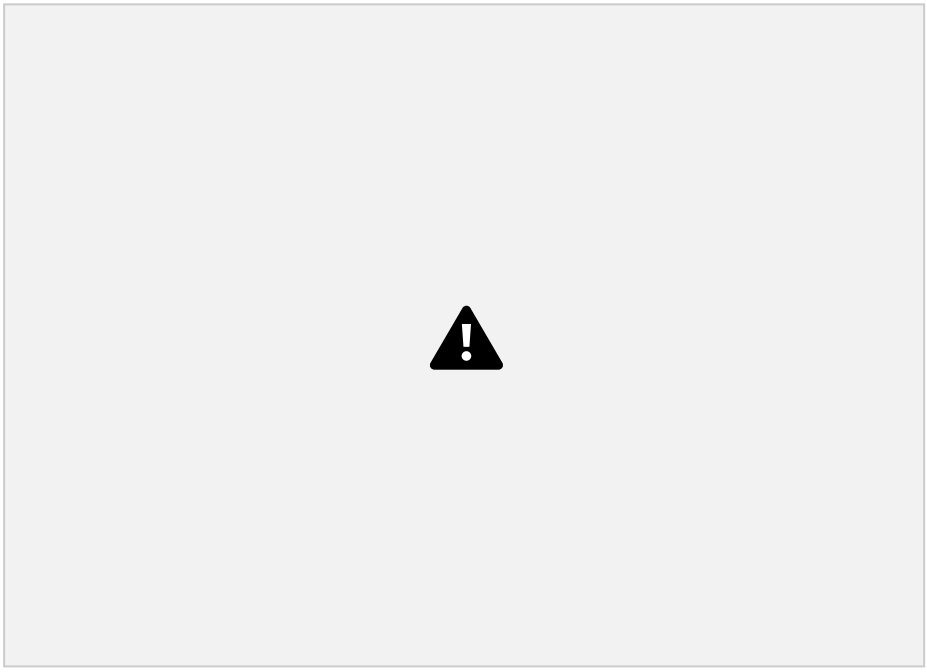
- Click on the "+" symbol. A standard criteria line will appear with a filter. This line is intended to be modified. The "#" is a drop down menu of all filterable fields from the report data.
- Choose the field that you want to filter on, choose EQUALS, DOES NOT EQUAL, IS GREATER THAN, etc.
- Then, fill in your value of what you want to filter.
- More criteria can be added by clicking on the "+" or execute the filter by clicking "OK"
- To remove a filter, click the "X" beside the criteria line.
    - Example below: Filtering by Firmware





**REPORTS FOR CUSTOMERS WITH IMPACT DETECTION** After running a report (such as the Unit History or Fleet Reports named above) you may see an Impact Alarm in the Message Type. That line of data will contain impact information such as a Chart and G force data in the XYZ axes. More information on how to read G force data is in your Installation/Users Manual.

To view the chart (raw G force data – 500Hz) click on the chart icon. 
If you would like to download the raw data, click on one of the icons at the top of the chart. You can export to Excel, PDF, Word and CSV. This gives you all of the G force points that make up the chart.

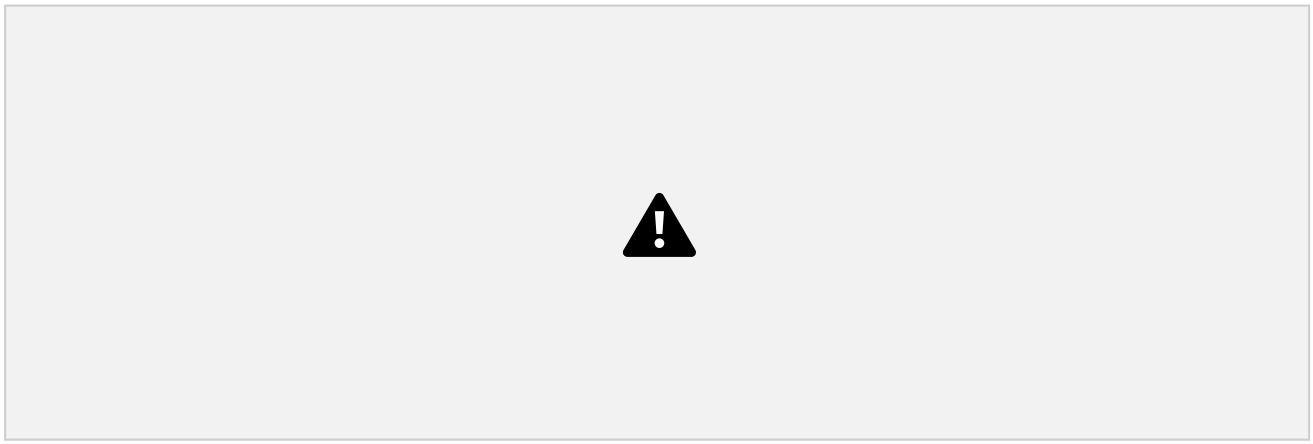


There are also specialty reports specific for you: Impact Filtering Report and Impact Report. See descriptions in APPENDIX III.

## REPORTS FOR CUSTOMERS WITH MESH RF SENSORS

For more information on the Mesh RF Sensor, view the STU/E Install Manual.

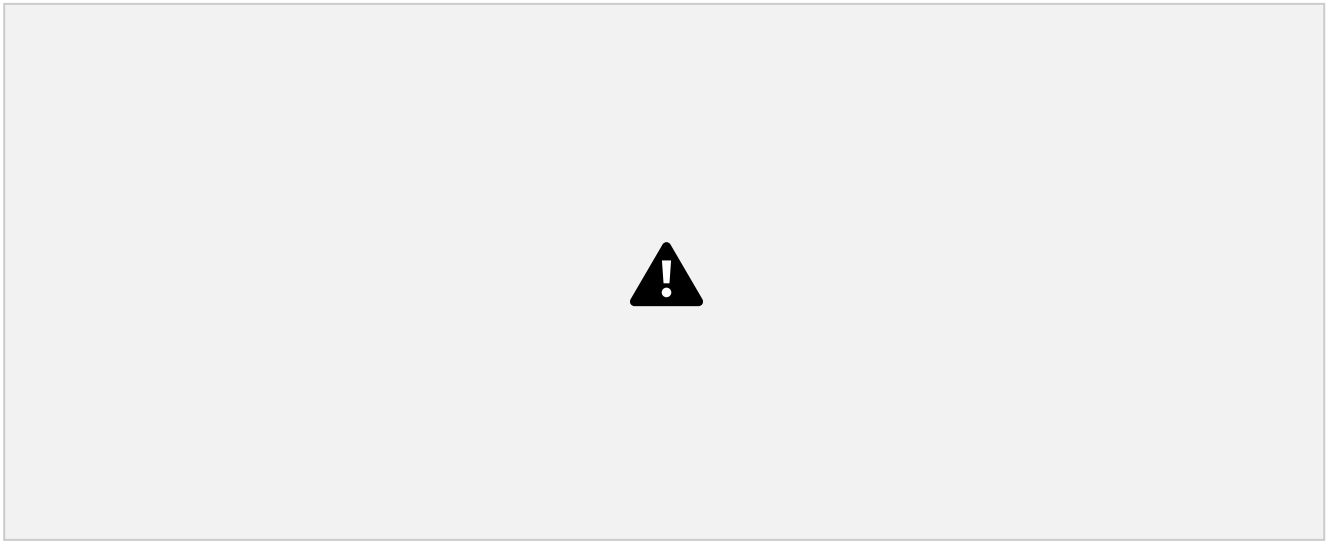
On our website you can view Mesh RF Sensor data from two sides, the Mesh RF Sensor or the STU. When viewing from the Mesh RF Sensor side, you only see information that the Mesh RF Sensor sent to the STU along with the GPS location (which is derived from the GPS inside of the STU). Below is an example of a Unit History report for a Mesh RF Sensor.



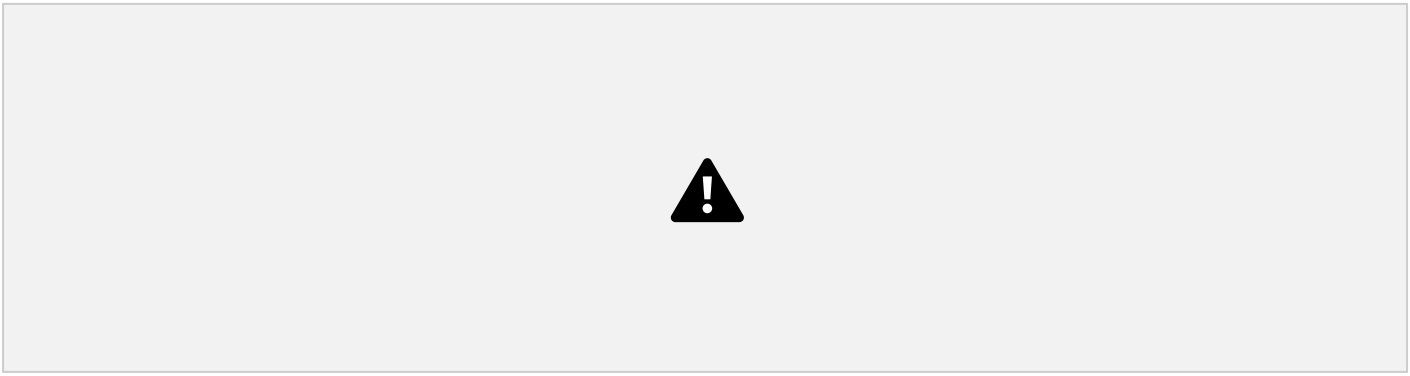
When viewing data from the STU side, you will see ‘regular’ STU data along with Mesh RF Sensor data. As an example, notice below that some rows have no S1_Serial_Number and others have no Batt_Volts. Battery Voltage is only showing when the STU is reporting its ‘regular messages’, not when it is reporting a Mesh RF sensor message.

Regular STU Message

Mesh RF Sensor Message from STU



In a more zoomed in view of the image above, you can see that when the STU reports a message from the Mesh RF Sensor, it has a message type of ‘Sensor Timed Report’ while the actual Mesh RF Sensor had a ‘Timed’ message type.



The chart below shows corresponding STU and Mesh RF Sensor messages for when the STU is reporting a Mesh RF Sensor message. Just like in the above example where the STU had a message type of ‘Sensor Timed Report’ and the Mesh RF Sensor had a ‘Timed’ message type.

| **STU Message Type** | **Sensor Message Type** |
|---|---|
| Sensor Timed Report | Timed |
| Sensor Move Timed | Move Timed |
| Sensor Triggered | X Tilt Alarm |
| | Y Tilt Alarm |
| | Digital 1 Alarm |
| | Digital 2 Alarm |
| | Analog Alarm |

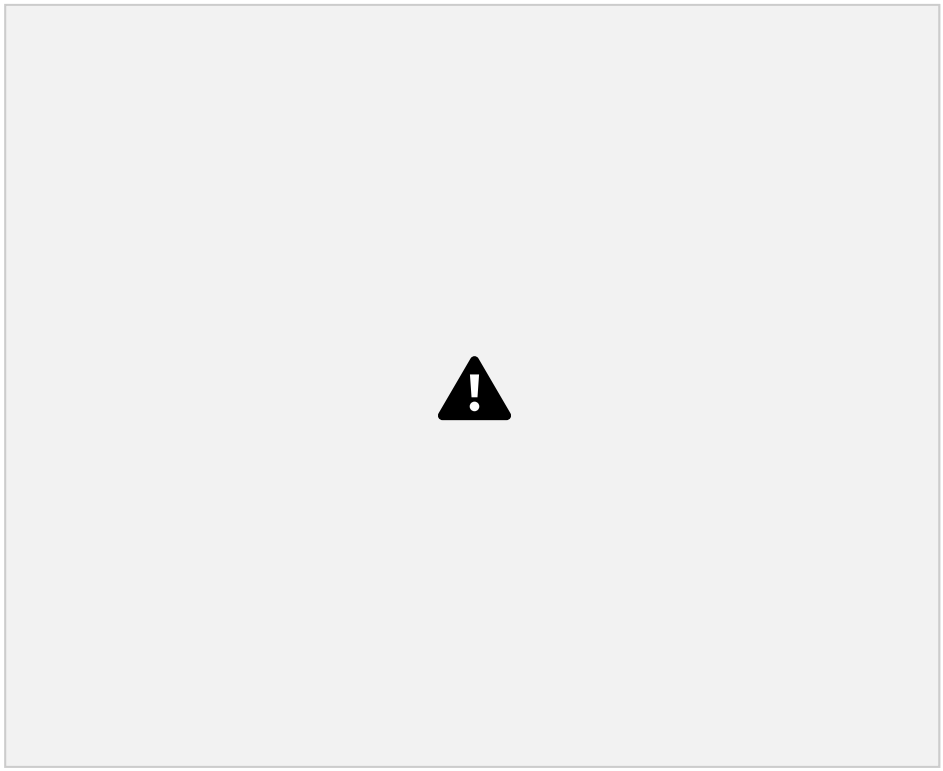
**What data to expect when running specific reports:**

- BOTH: Over Speed Report, Fleet Report, Unit History (with a STU selected), My Dashboard
- ONLY STU: Solar Dashboard
- ONLY MESH RF: Unit History with a Sensor selected
- For specialty reports it will depend on the fields selected to be displayed in the report.

## SCHEDULED REPORTS

Scheduled Reports is for setting up any of your reports to be emailed automatically at a scheduled frequency. This is great for large reports that do not process fast on the website.

To create a scheduled report click the ADD button.



Report Parameters Tab:

1. Choose which report you want emailed
2. Name of the attachment that will be sent
3. File Format (Excel, Word, PDF, etc)

Schedule Tab:

1. The frequency of the report (once, hourly, daily, monthly)
2. If you choose "Daily" for example, you will then be given a choice of which days you want the report to be emailed.
3. Choose a start date/time of when the report should run.

Recipients Tab:

1. Check the check box by the USER(S) that you want to receive the report. Please note that the user must have an email address in their user account.

When finished with the tabs, click "Create Scheduled Report" at the top of the page.

# DISPATCH

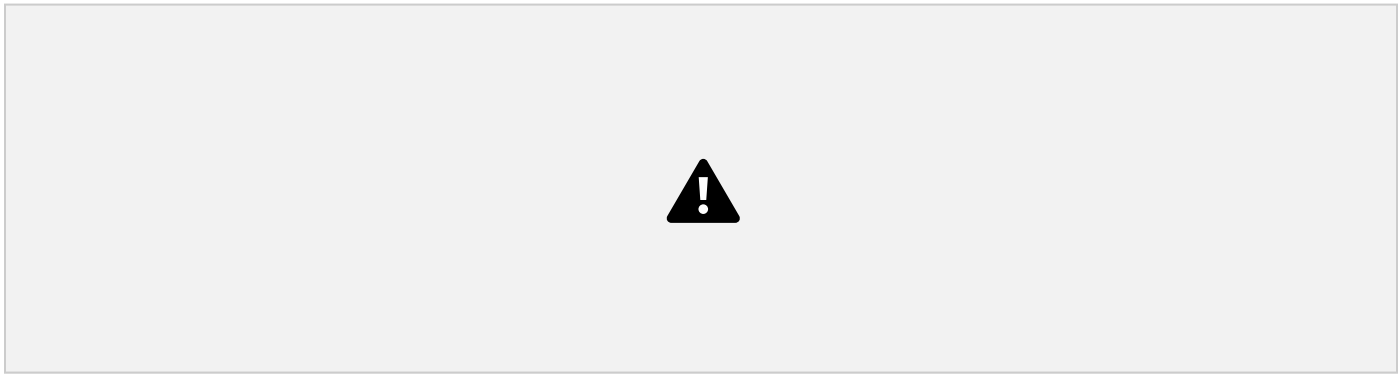
## Dispatch Page

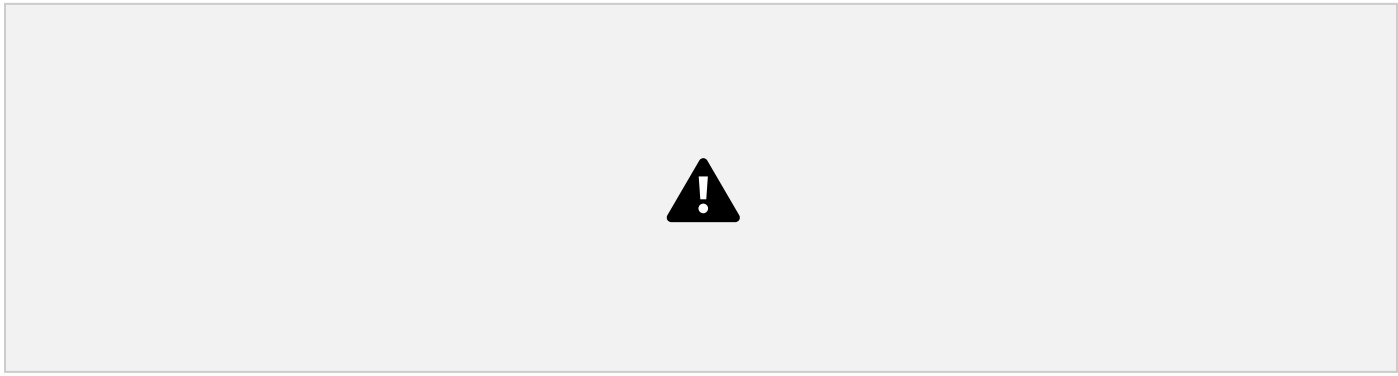
The Dispatch Page can be a great tool for anyone that owns more than one Lat-Lon unit. The Dispatch Page is a map of your fleet that automatically updates every minute, and never times out. Icons on the page help you determine if your asset is moving, stopped, or recently had an alarm. The Dispatch Page has options to:

1. Choose to view only GROUPS of units (GROUPS can be set up by the Administrator under Administration/Unit Groups). This option is great for large fleet owners.
2. Zoom into a specific unit on the map with Track Unit
3. Show Labels
4. Show Geo-items
5. Filter Icons by Message Type (Moving, Alarm, Timed)
6. Find a GeoFence
7. Zoom to a specific address with the magnifying glass at the top right of the page 8. Change the map view to Satellite or Hybrid View at top right of the page

Additional information about the unit on the Dispatch page can be seen by putting your cursor over the top of the unit. A bubble will appear with information. The bubble data can be changed by the administrator for the entire company and each user can change what data their bubble shows as well. See the PREFERENCES section for more information.

See the picture below:

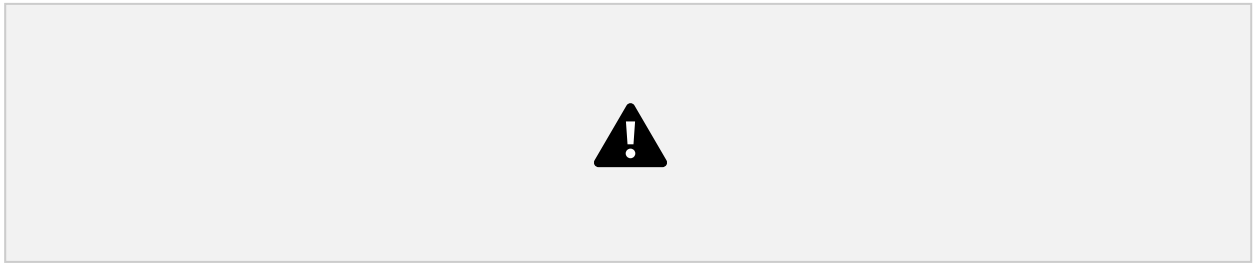




## Alerter Page

The Alerter Page can be a great tool for anyone that owns more than one Lat-Lon unit and is similar to the Dispatch Page. First, the Alerter page must be allowed by the ADMINISTRATOR to appear under the dispatch menu. Next, click START in the upper left corner of the Alerter Page to begin data scrolling. The Alerter Page is a scrolling fleet report of data that automatically updates every minute. During Alarm Type Events (*temperature, *digital alarms) a sound will be heard (please call Lat-Lon regarding audio alarms for your specific events). Audio alarms require computer speakers and sound card. To stop the audio alarm, the exception must be acknowledged.

*Temperature sensors or digital wiring is required for these 2 alarms to sound.



# ADMINISTRATION

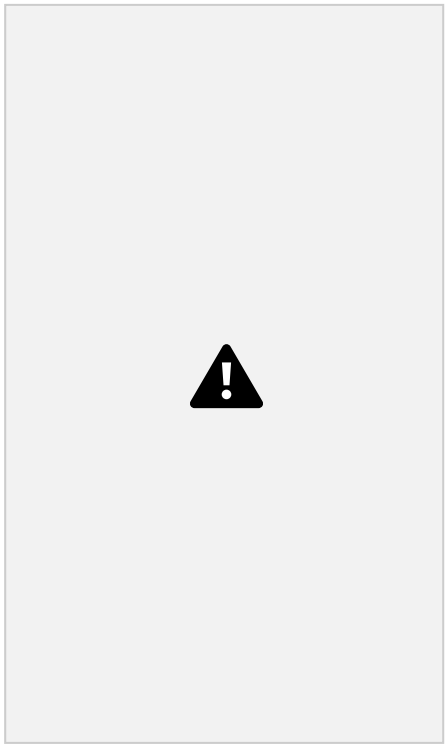
## Account Setup

An administration account will be established by Lat-Lon when the unit(s) is activated. The administration account will be assigned a login and password and allows complete administration authority to the account. The administrator will be able to perform the following functions:

1. View all data
2. Name units
3. Set-up additional users (including updating multiple users)
4. Assign user logins and passwords
5. Set-up groups of units for users
6. Create reports
7. Set-up alert templates
8. Change Unit Configurations
9. Set up Adaptive Configurations for units

10. Create Geo-fences, Geo-points, and Tripwires
11. Change Unit of Measures for the company data
12. Determine which details are available on the Lat-Lon Droid or Apple Apps
13. Reset Accumulated Mileage fields
14. Customize Data
15. Manage Digital Sets (typically for Locomotive Monitoring Units)
16. Assign schedules for Driver/Operators

**PLEASE WRITE DOWN THE LOGIN AND PASSWORD FOR THE ADMINISTRATION ACCOUNT AND STORE IN A SAFE PLACE**. If you forget your password there is an "I forgot my password" option on the main login page. If you still need
assistance, please call Lat-Lon at 303-937-7406.



## Administration Account Menu

The Administration drop down menu displays 14 functions that
will be discussed in detail in the following sections:

## Update Multiple Users

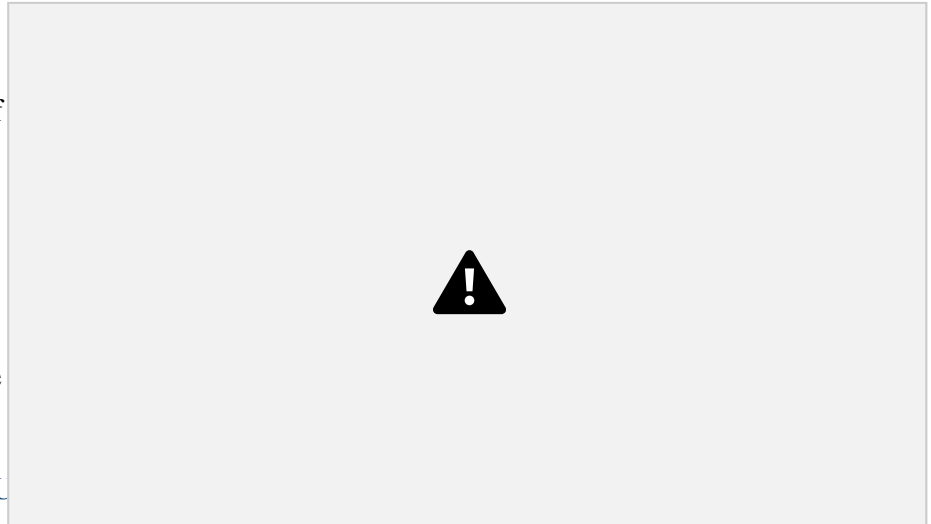
Please review setting-up "users" section below prior.

This is a useful tool if adding new reports, alerts, or units to
multiple users.

1. Select the users you wish to make changes to:

2. Click "Assign" or "Remove"

3. If Assigning, begin by assigning units to all of the users selected.
4. Click on the "Reports" tab and assign all reports to the users



selected.

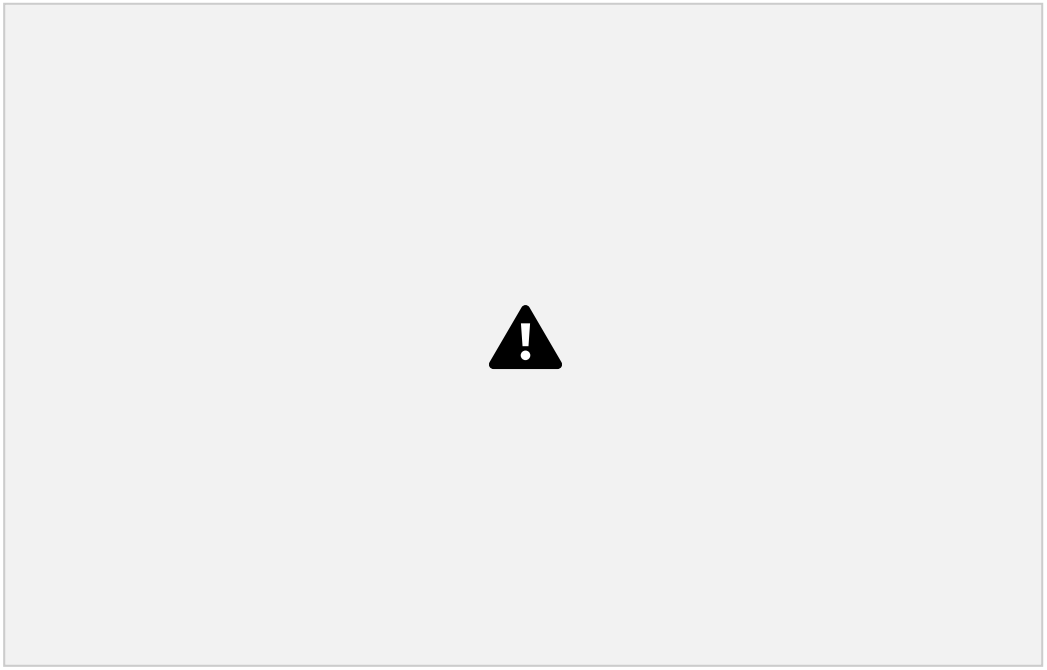
5. Click on the “Alerts” tab and assign all alerts to the users selected.
6. Once all three tabs are correct, click “Update” to save the changes. If users need individual customization, changes can be made under Administration/Users.

## Users

Setting-up “users” is an important part of using the Lat-Lon website to its full potential. Users can be set-up to have privileges or restrict the data in many ways. This is useful not only in terms of security, but also when it comes to accessibility and data management. With “users” you can establish specific fleets of cars, only pertinent units, reports, alerts, and additional functions. Used properly, creating new users can be valuable in terms of both time and data management.

**Under this section an Administrator can also edit his/her own login/password.**

Under the Users section click “New User”



Notice the 5 tabs across the top: Basic, Units, Reports, Alerts and Permissions

**<u>Basic Tab:</u>**

***User Name***: Name of group or user

***Login:*** User login

***Password***: User password

***Email:*** Email address or Cell Text Message Address to receive alarms (SEE ALERTS section for more info).

***Time Zone***: Default time zone for the user

***Allow Dashboard:*** Check to enable user to see the Dashboard. This function is a great visual way to track the status of assets and sensor information.

***Allow Dispatch***: Check to enable user to see the Dispatch Page. The Dispatch Page is a map of all units assigned to that user and updates automatically. See the DISPATCH PAGE section.

***Allow Alerter***: Check to enable user to see the Alerter Page. The Alerter Page is a text only view of information from all units assigned to that user that updates automatically. See the ALERTER PAGE section.

***Show Geo-Items on Maps***: Check to enable user to see geo-fences, geo-points, and tripwires on maps.

***Report Begin Date***: User will **not** be able to see data in a report before the date that you assign here. This is helpful if reusing units with different customers who want visibility in transit. If no date is assigned then the user will see all data history.

**Additional Tabs:**

- ***Units***: Unit(s) and/or groups of units seen by the user
- ***Reports:*** Report(s) to be assigned to the user. See APPENDIX III for descriptions of specialty reports.
- ***Alerts***: Alerts assigned to user. Email address and/or text able phone number required on Basic tab of User set-up to receive alerts. You can send alerts as emails or as text messages to a cell phone by adding an email address to the user profile. Cellular service providers assign an email address to each cell phone number. Find a cellular provider in the list below to determine the cellular phone's email address. To use both email and text alert, separate the two with a comma.

  *Example: support@lat-lon.com, 1234567890@vtext.com*

  ATT - phonenumber@txt.att.net Boost – phonenumber@myboostmobile.com Cingular – phonenumber@cingularme.com Cricket - phonenumber@sms.mycricket.com MetroPCS – phonenumber@mymetropcs.com Nextel - phonenumber@messaging.nextel.com Qwest - phonenumber@qwestmp.com Sprint - phonenumber@messaging.sprintpcs.com SunCom - phonenumber@tms.suncom.com T-Mobile - phonenumber@tmomail.net Tracfone – phonenumber@mmst5.tracfone.com US Cellular - phonenumber@email.uscc.net Verizon - phonenumber@vtext.com Virgin - phonenumber@vmobl.com VoiceStream - phonenumber@voicestream.net

- ***Permissions:*** Assign administrative permissions to a user.

Review all tabs: Basic, Units, Report, Alerts and Permissions then SAVE.

*Note: See "Alerts" below to set up your Alert Templates. If you do not add an Alert Template to a user then no ALERT emails will be sent to that user's email address.

**ADMINISTRATORS MUST SET THEMSELVES UP AS USERS IF THEY WANT TO ADD EMAIL ADDRESSES AND ALERT TEMPLATES FOR THEMSELVES.**

## Units

Under the Manage Units screen there is the option to “Find” or search for a specific Unit ID or Unit Name. To see the entire fleet of units, leave this blank and click “Find.”

The first column heading is “Unit Id”. This is the Lat-Lon serial number. To rename the Unit Name to an asset number or title click the **EDIT** button displayed on each line. This will allow you to update the Unit Name, add a note, or add Unit Information that can be added to reports (see below). There is also a shortcut on this page to add a unit immediately to a UNIT GROUP. For more information on Unit Groups see the UNIT GROUPS section of this manual.

Once finished, click save.

### Unit Info and Unit Info 2:

The unit info section is a great tool to use if you want to make notes on a unit that can be added to a report. This Unit Info section can have up to 155 characters. This Unit Info “field” can be added to Reports – see REPORTS in the Administration section.

### Unit Configurations & Sensors:

You are able to submit configuration changes anytime, but STUs only listen for configuration changes when they are reporting. If your unit is not moving and reporting Timed Reports every 1 hour (default), then it will accept the configuration changes during the Timed Report. If you want to set up an Adaptive Configuration, a configuration that changes when certain parameters are met and changes back when they are not met, go to ADAPTIVE CONFIGURATION. To set up regular unit configurations, read below.

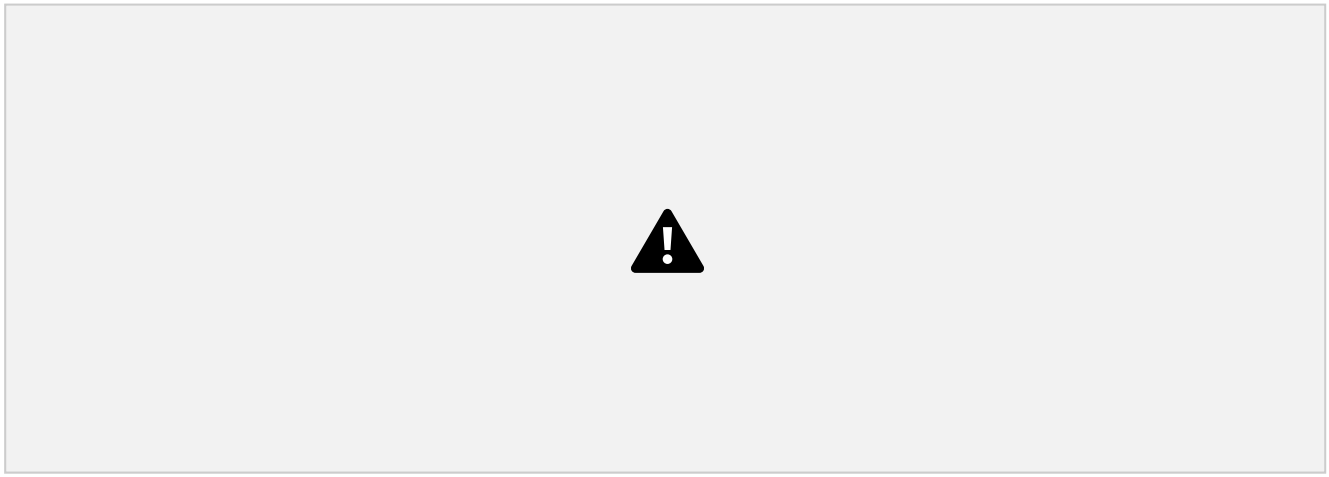
Click “Configure” on each unit’s line.

*How to Change Configuration:*
Administrators are able to change the following (tabs and changes are dependent upon sensors purchased):

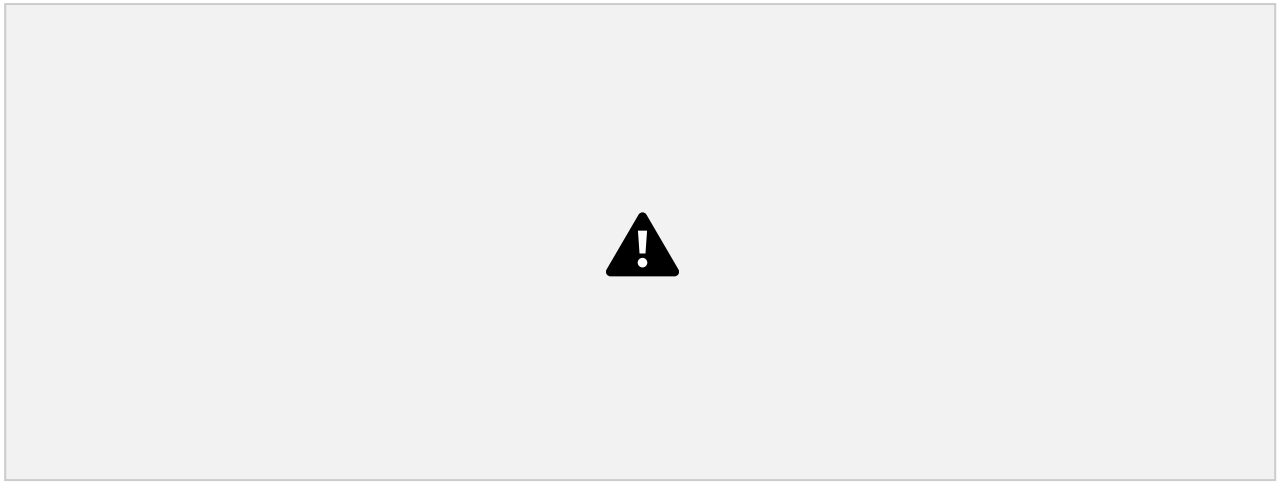
- Operating Rules (Move Timed Messages, Timed Messages)
- Digital Alarms
- Analog Alarms
- Deceleration
- RF Sensor Options
- Impact Alarm Thresholds
- Commands
- Status

***Status of Changes:***
Configuration changes will only be completed when the unit is reporting. When changes are made, a blue box will highlight the change. After clicking "Save", a red box will highlight the changed value until the configuration change takes hold. Once the change is accepted, the red box will disappear and the value shown is the correct value. See images below for an example:

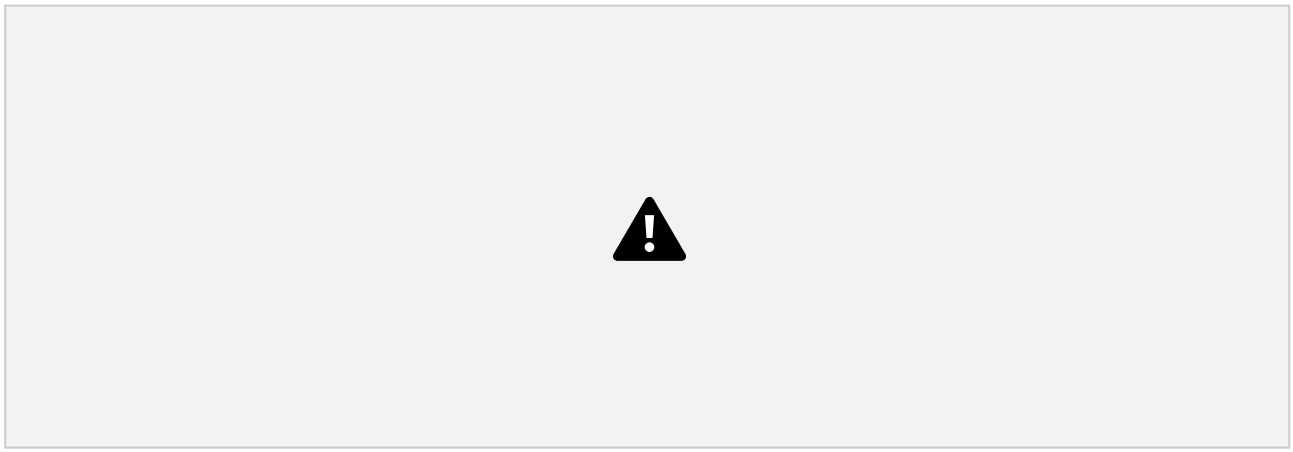
Value was changed from "600" to "700".



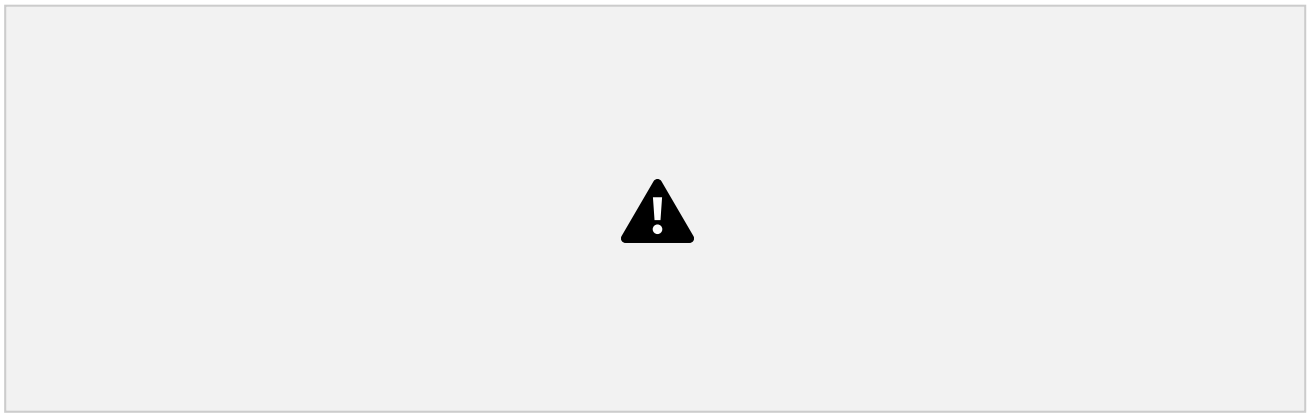
The "Save" button was clicked.



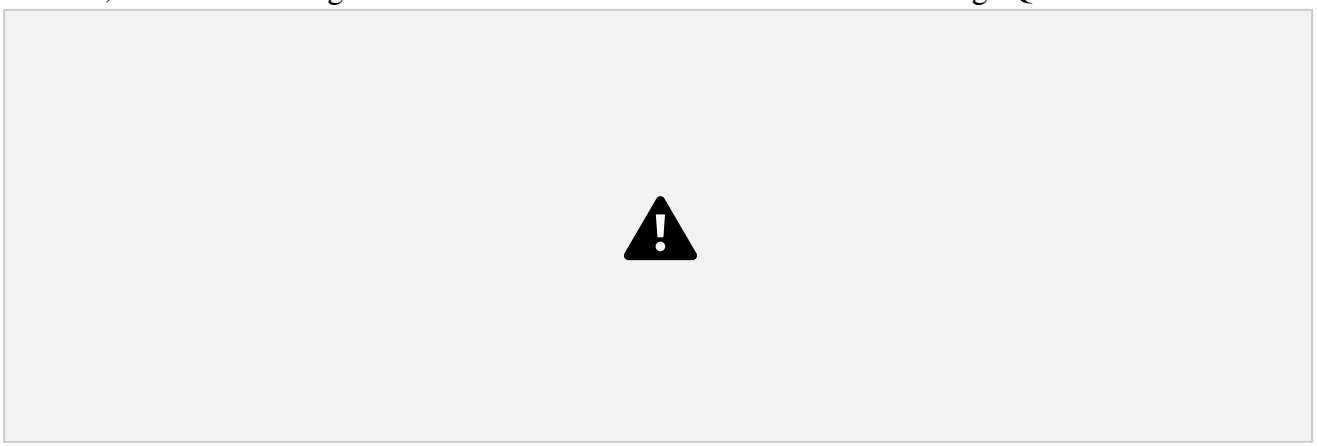
The configuration has been saved by the unit.



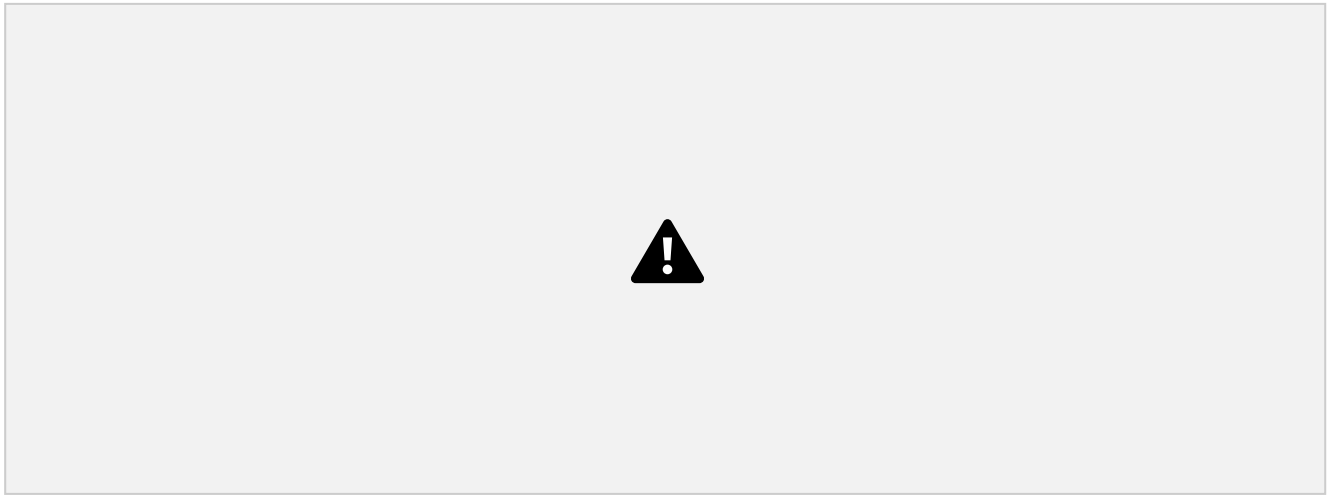
***Commands Tab***:
An administrator can submit a PAGE to the STU under the configuration page for each unit. Standard STUs are awake listening for a PAGE during normal reporting periods. This is up to every 10 minutes while moving and every 2 hours when stopped. If the unit does not have power, paging the unit will not be effective. Click "Page Unit" and a successfully paged message will appear. A "Page" message will show up in the unit history.



The "Clear Message Queue" will eliminate all of the unit's stored messages. This is a powerful tool and once this is complete, the stored messages can not be restored. Once the "Clear Message Queue" is selected, a confirm message will be shown. Click the "Confirm Clear Message Queue" to continue.



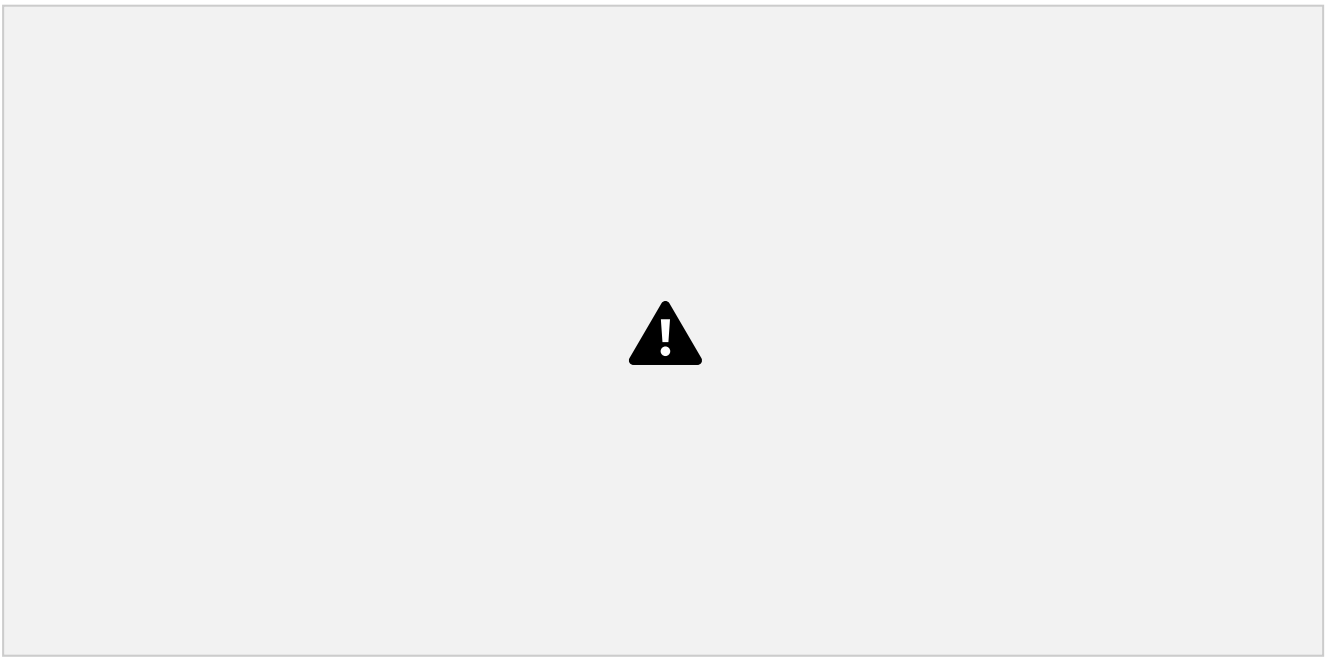
A confirmation message will appear next to the "Clear Message Queue" when complete.



***Operating Rules Tab:***

**Time between GPS fixes to check for movement:**

When the STU voltage is nominal the GPS will get a fix every second. This setting is for when the unit goes into Low Power Mode. If the unit is extremely low in power, messages may not contain GPS coordinates or information from RF Sensors.



**Move Timed Reports:** Messages scheduled to send while unit is moving. Default is 3600 seconds (every hour) but the unit can be set for up to every 10 minute Move Timed reporting.

**Timed Reports:** Messages scheduled to send while not moving if no other changes (such as sensor changes) have taken place. Default is 7200 seconds (every 2 hours) but the unit can be set for up to every hour Timed reporting.

**Distance to trigger Move Begin message:** Minimum distance unit has moved before starting "Move Timed Reports".

*Remember that this is a solar powered unit. Setting the Move-timed reports every 10 minutes requires more energy than having its call in times further apart.

**Additional Information about Operating Rules:**

If your unit is going to be in the dark (such as inside of a ship) for a significant period of time, you can follow the recommendations below to help the unit survive without sun for as long as possible. In Lat Lon testing, we found that a unit with a **fully** charged internal battery would live for 48 days with no sun.

Note: In the future we will have this option more automated. For now, it is must be done manually through the website.

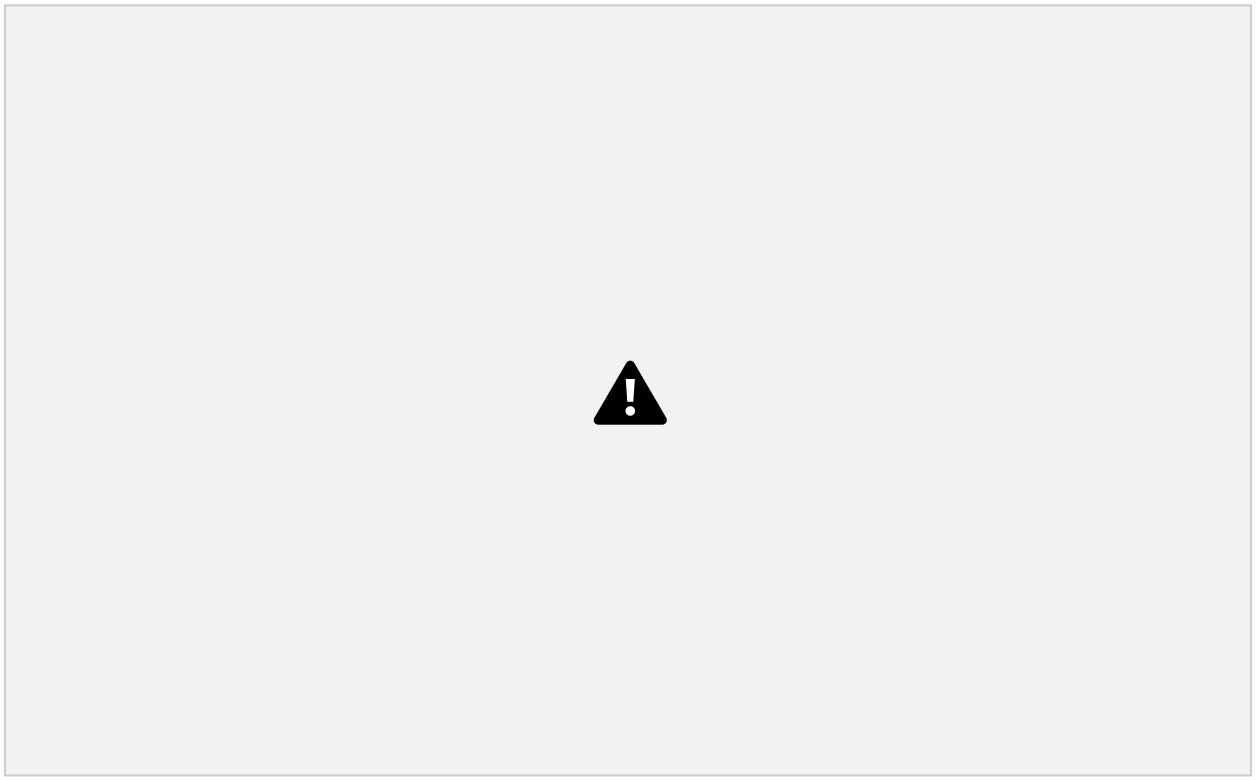
These settings are recommended for impact detection units where impact detection is the most important aspect and real time messaging is not important.

SET **TIMED BETWEEN GPS FIXES** TO: 1800 seconds (30 minutes)
SET **TIMED REPORTS** TO: 604,800 seconds (7 days)

Once the unit is back outside in the sun, you can set these configurations back to a normal/standard setting.

***Deceleration Rules Tab:***

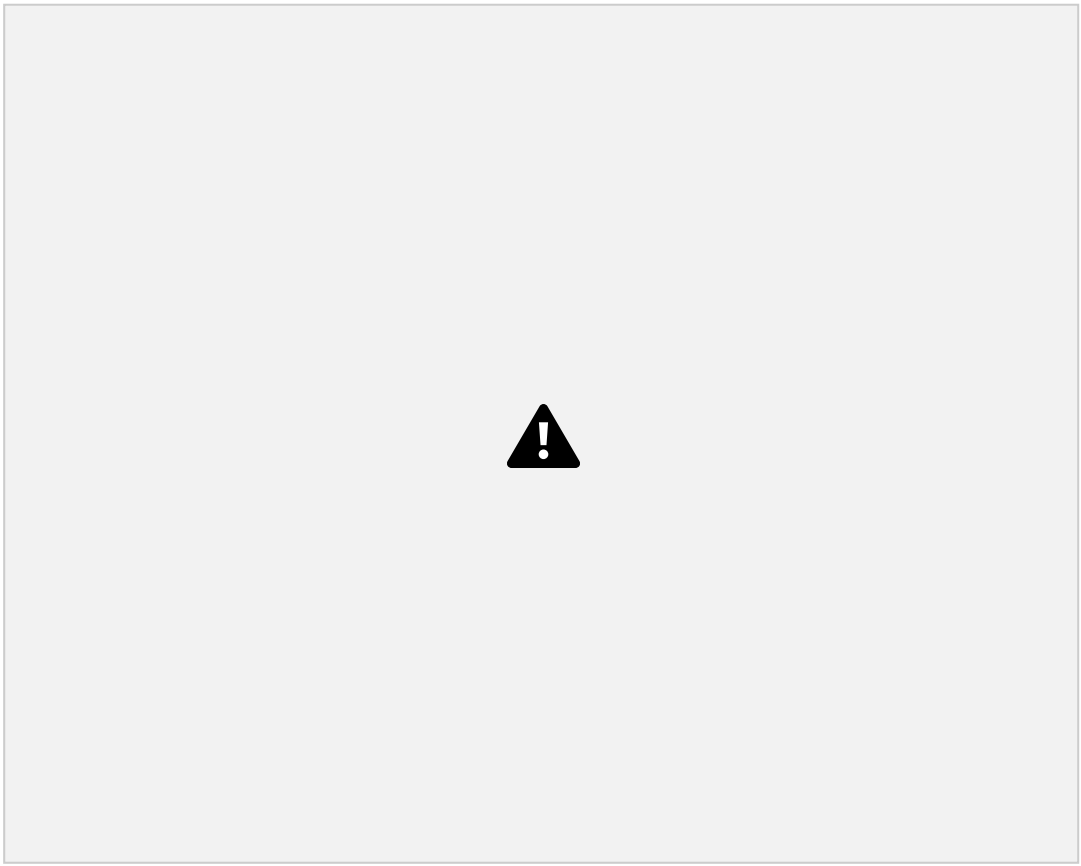
**Deceleration Alarm:** The deceleration alarm is enabled once the unit is going the set speed to keep GPS powered or less. The 1st box is the speed value that if below, the unit will start monitoring for deceleration alarms. The 2nd box called "speed drop" is the value that must be seen in order to report a deceleration alarm. In this example if the asset is going under 15 MPH and sees a drop in speed of more than 5 MPH in 2 seconds, a deceleration alarm will be sent out.



***Impact Tab:***

Change impact G force thresholds for X, Y & Z in Filtered (10Hz default) and Unfiltered (500Hz). The Lat-Lon accelerometer samples for impacts 500 times per second; this is the unfiltered value (500 Hz Value). The Filtered value is a filter of these 500 samples. The default is a 10Hz filter but can also

be changed to 5, 15, 20, 30, or 50Hz.
Change impact MPH thresholds for X, Y & Z in DV (delta velocity)
Remember that these STU units are solar powered and setting a threshold too low could cause the unit to use up all of its energy transmitting very small G force impact data that is possibly a non-damaging event.



***RECOMMENDED DEFAULTS FOR THE IMPACT TAB:***
*XYZ FILTERED THRESHOLDS: 1 G*
*XYZ UNFILTERED THRESHOLDS: 5G*
*XYZ DV THRESHOLDS: 25 MPH*
*FILTERING: 10HZ*
*IMPACT ALWAYS ON*

***Analogs/Digitals Tab:***
Change Digital Alarms for up to 4 **WIRED** digital sensors or 4 ANALOG sensors or a mix of both. (Analogs are typically temperature sensors).

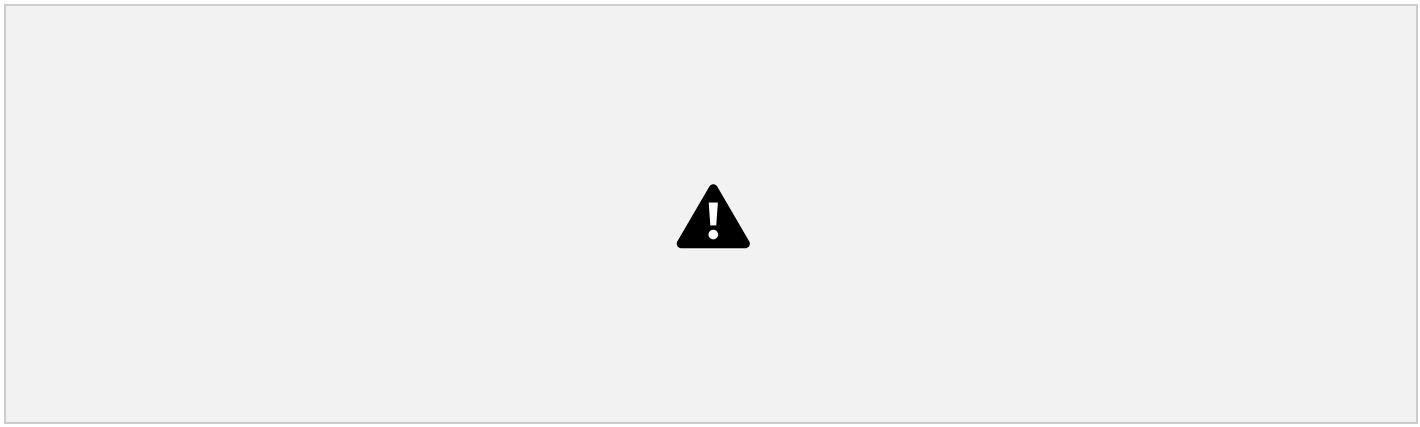
*Note, s only have a choice for TWO Digitals or TWO Analog sensors or a mix of both.

Administrators can disable the digital alarms, alarm on open, alarm on closed or alarm on both.

There is also a choice to set the "debounce" for each digital. Debounce is a tool used to set the number of seconds the system sees a change in state before alarming.

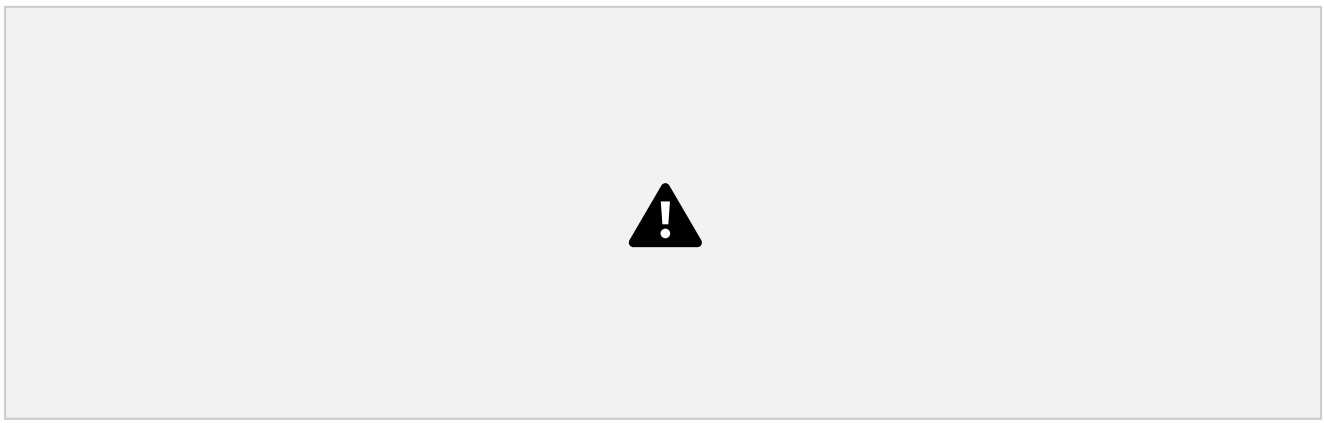
***Analog (Temperature):***
Change the temperature thresholds for **WIRED** temperature sensors. Administrator can disable the temperature alarms or set the High threshold and/or Low thresholds for a temperature alarm.

There is also a choice to “Offset” the temperature sensor(s). This tool can be used to help offset any small temperature inaccuracies seen from the thermistor readings.



***RF Sensor Tab:***
This tab is for both RF Sensors and Mesh RF Sensors. Verify RF Sensor serial numbers match up with corresponding unit (up to 31 Mesh RF Sensors can be assigned to a STU).
Change what triggers an RF Trigger alarm:

- Digital Closing • Y Tilt Threshold
- Digital Opening • Analog Threshold (Temperature) • X Tilt Threshold • Disable Alarms



**Digital 1** = reed switch

**Digital 2** = external wired digital input

**X-Tilt** = analog value read when x-axis is tilted **Y-Tilt** = analog value read when y-axis is tilted (see STU/E install manual for more information on tilt) **Analog** = analog sensors, ie temperature probe

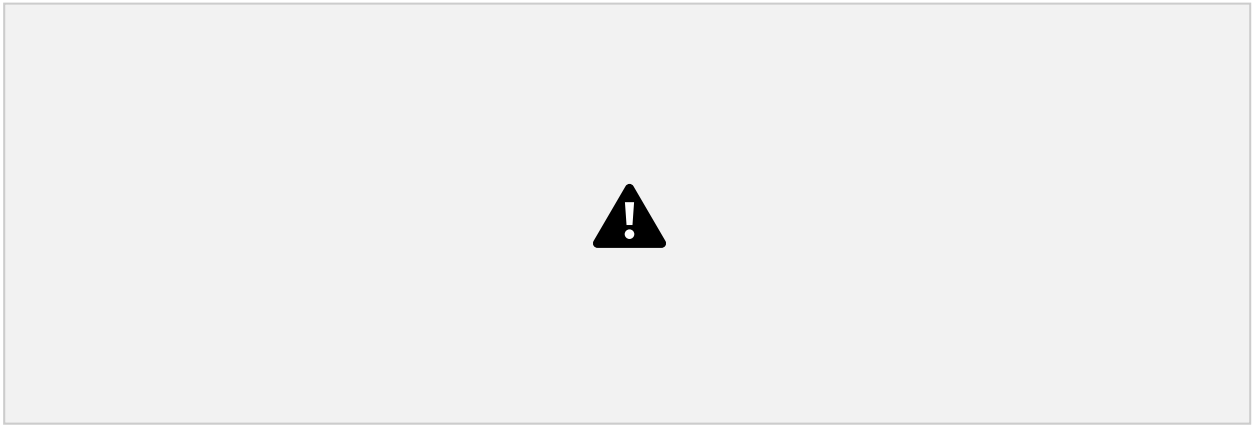
**Note:** If sensor is installed on a hatch with advised orientation, the analog till value when the hatch is opened will go from:

- 500 to above 600 on the Y-axis with a Mesh RF Sensor
- 500 to below 400 on the X-axis with an RF Sensor

**Hysteresis**: A buffer value for analog alarms. Helps eliminate false alarms between slight value changes. See chart below on how the hysteresis works with alarms. If you look at the second row, there will be a high alarm if the value starts below the threshold minus the hysteresis and then goes above the threshold, however no low alarm will be made until the value goes above the threshold plus the hysteresis and then goes back under the threshold, as in row four.

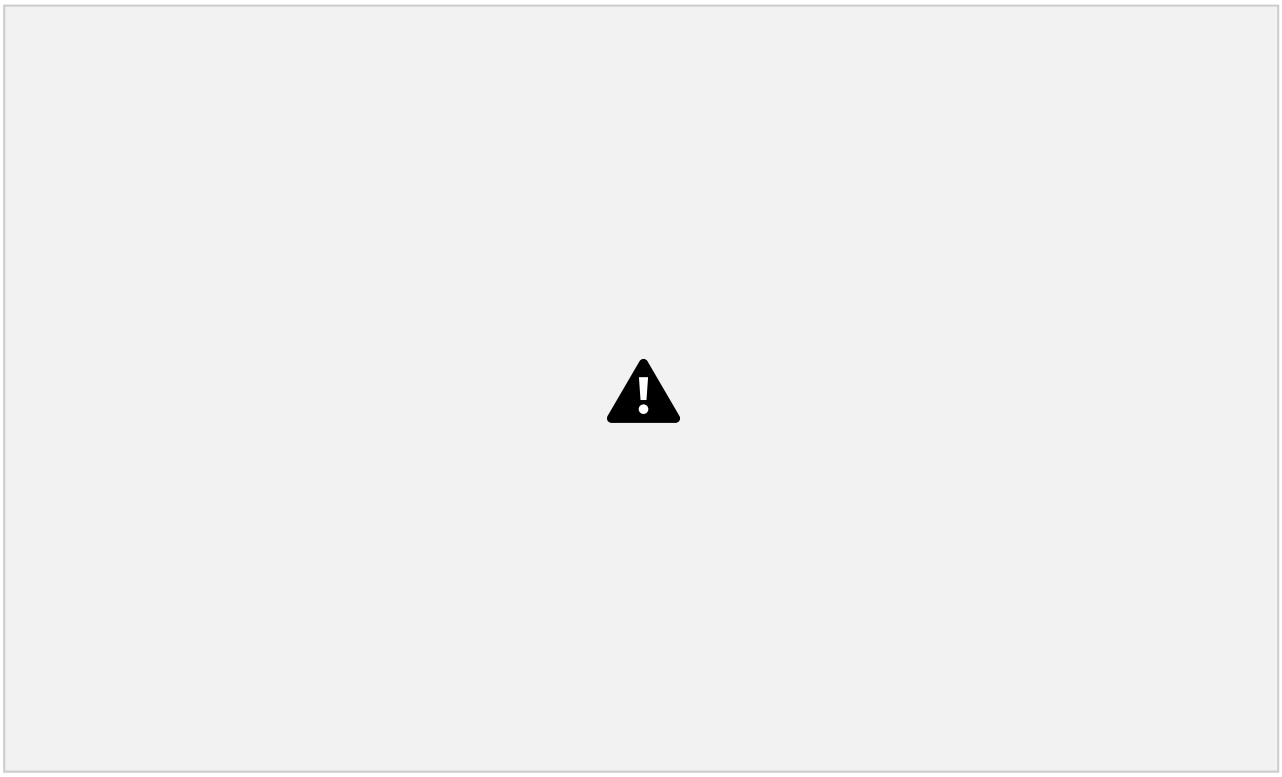
| Threshold - Hysteresis | Threshold | Threshold + Hysteresis |
|---|---|---|
| No Alarm | | |
| | High Alarm | |
| | | No Alarm |
| | Low Alarm | |
| No Alarm | | |
| High and Low Alarm | | |

***Status Tab:***
Verify whether a configuration submittal was successful or not. Or view a history of configurations or firmware updates that have been submitted to a particular unit. Remember that with solar units, the unit is only going to accept a new configuration when it is awake to send out a message.



## Adaptive Configuration

Adaptive unit configurations are unit configurations that will change automatically when defined criteria are met and go back to ‘normal’ when they are not met. If you want to set up unit configurations that are not adaptive, go to the UNIT CONFIGURATIONS & SENSORS section.



An Administrator is able to set these up by going to Adaptive Configuration under Administration. Click the New Adaptive Config button to create a new adaptive configuration. Name and place any notes about the adaptive configuration, select units to be included, choose criteria that when met will

change the unit's configuration. For the configuration, set what configuration you want when the criteria are met and when it is no longer met.

Examples: Increase reporting frequency when temperature is between certain values. Increase or decrease reporting frequency when unit is in a geo-fence. Turn off impacts at certain locations.

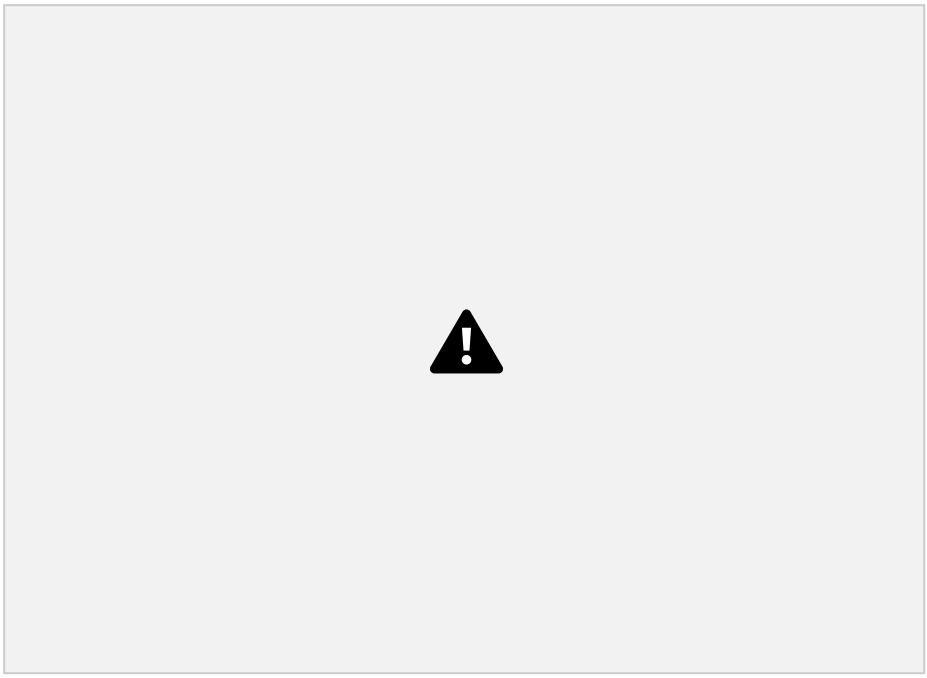
## Unit Groups

Unit Groups are designed for customers that want to split their units into various sub-groups. For example, units can be grouped into geographic regions or organizationally for different departments. Units can be assigned to a UNIT GROUP and those groups can easily be added to users. Unit Groups can also be a great tool when viewing the Dispatch Page. If you have a large fleet of units, it will be easier to track them on the Dispatch page if viewed in Groups.

To create a Unit Group, Click on "New Unit Group" - under Unit Groups:

Name the group, make any notes needed, and move units from entire list of company units on the left

to the right box using “>>” arrows. Click the SAVE button when finished.



Note: Unit Groups can be distinguished from single units by the word “group” after its name.

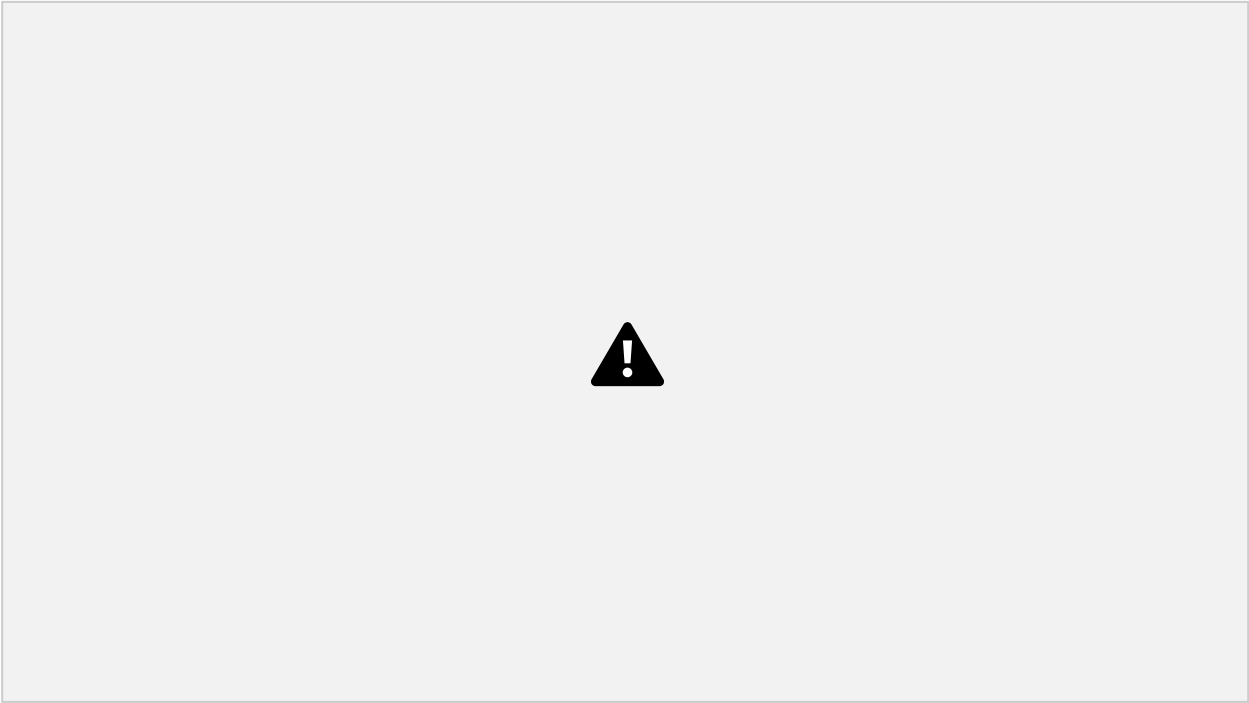
## Reports



Lat-Lon provides two standard reports “Unit History Report” and “Fleet Report”. Each of these reports can be edited under Manage Reports. In Manage Reports, you can also create new customized reports or edit other existing reports. Note: Click “Edit” to adjust an existing report. You can either “Save” it to update the report or “Save As” to have a separate, modified report. Click: “Add” (to create new report from scratch), or “Delete” to remove the report permanently for all users.

Add:

The Add button displays a screen that walks the administrator through the process of creating a report.



Step 1: Name your report and then check the box if you ONLY want the last message from each unit.

Step 2: Select the fields you would like displayed in the report. Field names can be sorted by clicking on the field and clicking the Move Up or Move Down button. The fields can also be renamed by selecting the field and then entering a new name for the field. Choose to sort the report by any of the fields by clicking on the drop down menu under "Sort By." Default sorting is by Date/Time for a history report and Unit Name for a Fleet Report.

Step 3: Select criteria for any of the fields: The example shown above is to display where the speed is greater than 74 miles per hour. Selecting criteria in this step is not required for the reports to return data; it enables the filtering out of irrelevant data. Click Save And or Save Or and repeat this step as many times as necessary.

Step 4: Click Save when finished.

**See APPENDIX I and APPENDIX II for a detailed description of fields**.

## Alerts

Lat-Lon defines an Alert as an e-mail message generated by Lat-Lon's server computers that can be sent to a user's e-mail or as a text message to their cell phone. For convenience, the Lat-Lon Website SUPPORT TAB and this manual under USERS contains cellular provider email addresses for sending text messages. Customers are required to research or call their cellular provider so that their cell phone number can be typed as an email address (for text messaging) and understand any cost it may incur.

For effective Alerts, Administrators must:

1. Create an Alert which will define trigger(s), applicable user(s), and message(s) to be sent. Some fields such as our outside weather data cannot be used in the alert criteria. 2. Verify the User(s) assigned the alert under Administration/User, and the email/text in the User(s) set-up is correct.

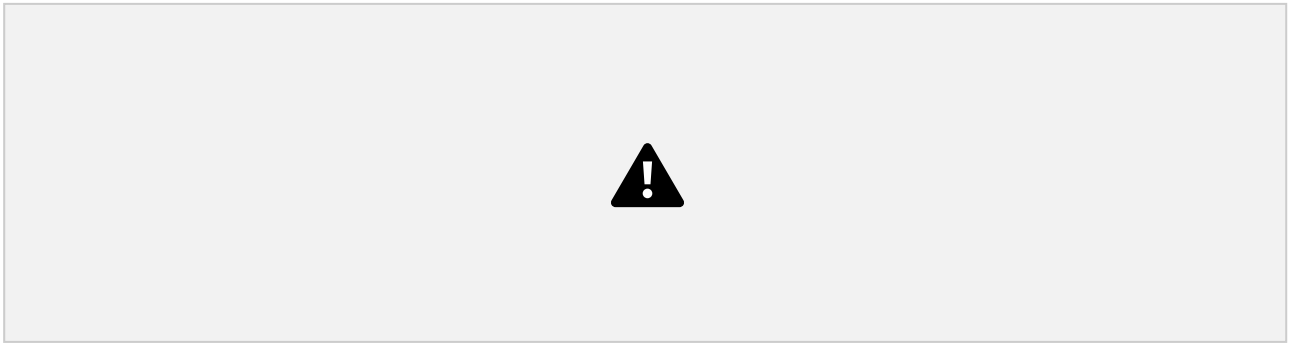
3. Verify the applicable Unit(s) in the Alert.

<u>To create/edit an Alert:</u>
Select Alerts from the Administrator Menu, click New
Alert or click to Edit an existing alert:

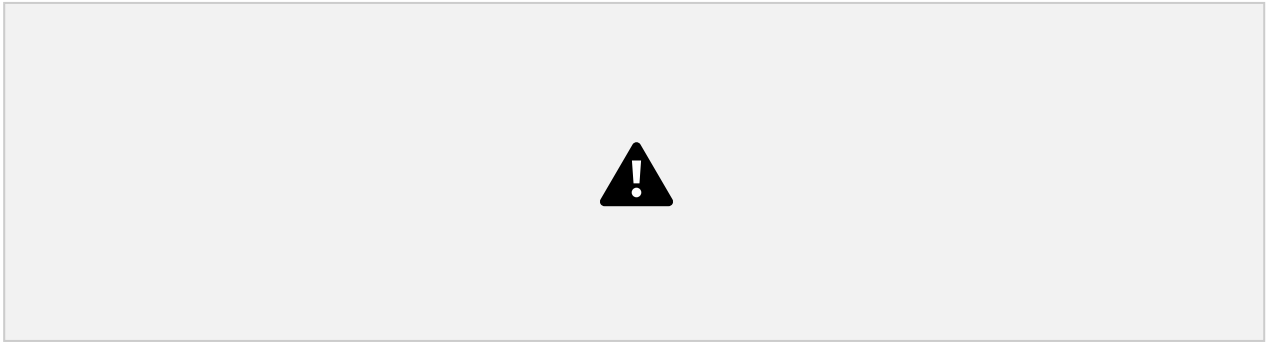
Please go through each of the following tabs:

***Basic tab:*** Create the name for the Alert and any notes needed
***Units tab:*** Add Units to the Alert
***Users tab:*** Add Users to the Alert. If you have not created a User yet, skip this tab and go to Administration/Users after you have finished your alert. You can add a User to an Alert **or** an Alert to a User.
***Criteria (And) tab:*** An Alert will be sent when ALL of the criteria on this tab are met.

*Example below: An alert will be sent if the Speed is greater than 1 and the Sensor1 Y Tilt is greater than 300.*



***Criteria (Or) tab:*** An alert will be sent when ONE of the conditions on this tab is met. See example below:
*Example: If the Analog 1 temperature is less than 35* ***OR*** *Analog 2 temperature is less than 35 an alert will be issued.*



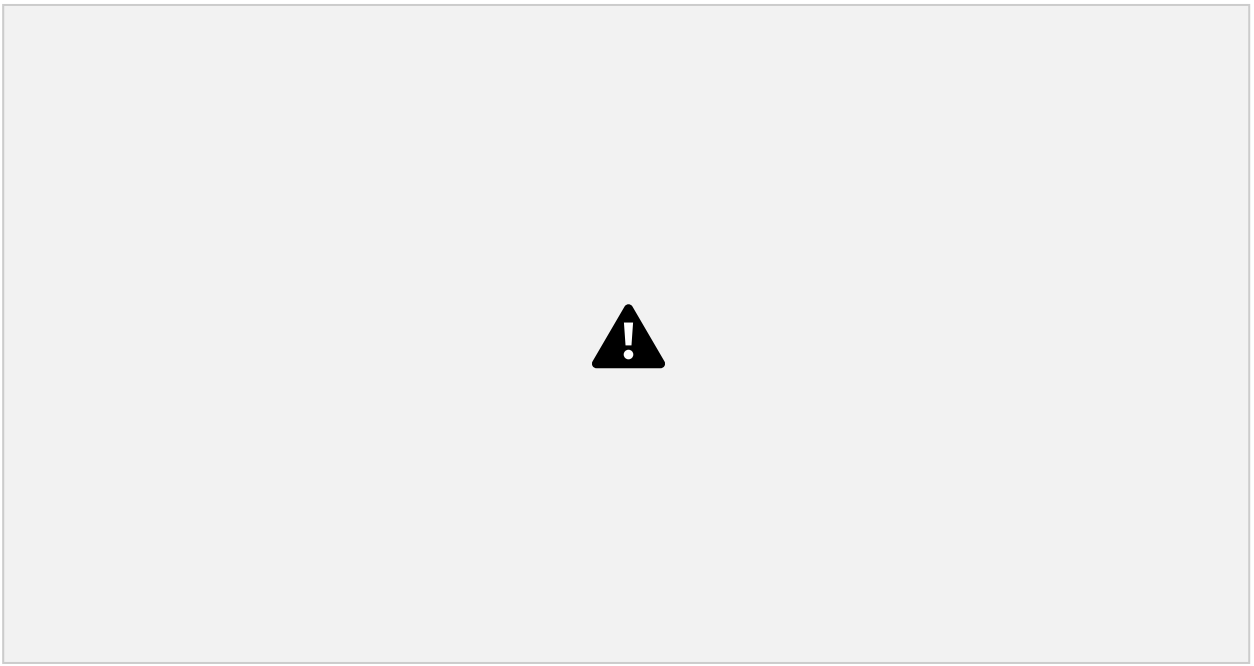
***Note: when creating your criteria, remember that all fields or values may not relate to your specific unit type or sensor type. Consult the Appendix I and II at the bottom of this manual for help with field information.***

***Throttling tab:***
Throttles for the number of email alerts you receive can be set. For example, if you want an emailed alert on EVERY message that meets the criteria you will leave the top line on this tab as your choice.

***Message tab:*** Create alert message by adding fields to the Subject and Body. Use your “return” key to manage the placement of the fields in the body section. Fields will appear in the order added, and can

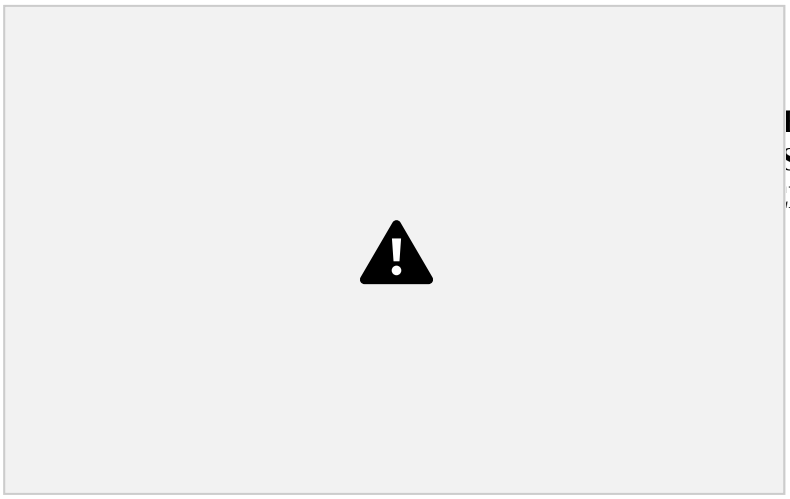
be removed by deleting. Addition text can be typed anywhere in the subject or body. These additional typed words will show up on the alert email or text message.

Remember that if this alert message will be sent to a cellular phone, the message is likely to be truncated after 160 characters.



***Preview tab:*** Click the preview button on the Preview tab. This allows you to see what your email or text message will look like.
Note: To preview requires an assigned user with email/cell phone address under Users tab. If a user has not been assigned to this alert, the preview button will not work.
Click SAVE

***ADMINISTRATORS MUST SET**



**EY**
**S AND**
**LVES.**

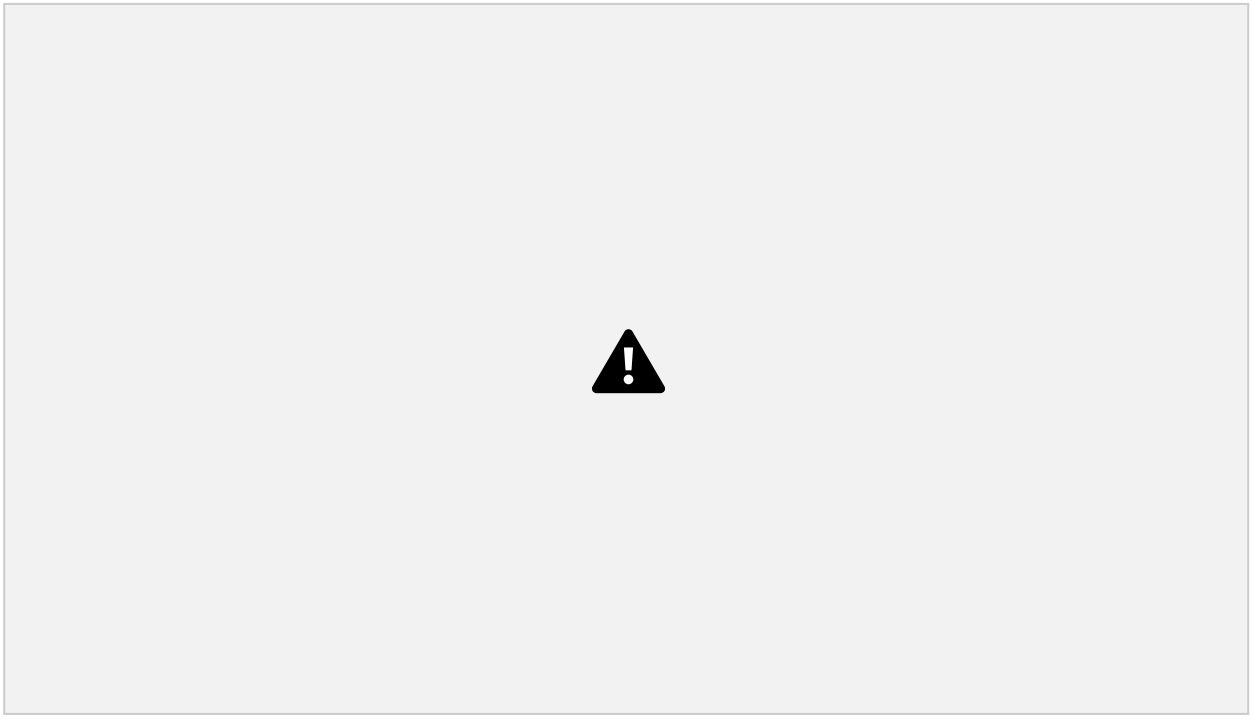
## Reset Accumulated Mileage

Reset the accumulated miles field that appears in reports.Highlight the unit to reset and enter the new value on the right, click SAVE when finished.

*Example: Adjusted accumulated mileage reset to 12345.*

## Mobile Report

The Mobile Report allows Administrators to control what data appears on the mobile apps (Android and IOS).
Step 1: Select Mobile Report
Step 2: Select the data to appear in the report by moving each field from the left column to the right.
Step 3: Determine the order of the fields with the Move Up/Move Down buttons. Step 4: Click Save
Step 5: Review the appropriate app for adjustments. Apps can be downloaded to your Android or IOS phone for the price of $9.99.



## Units of Measure

Only the administrator can change the Units of Measure. This change will affect the entire company's data.

Default Units of Measure are:

- Speeds: Miles per Hour
- Distances: Miles
- Temperatures: Fahrenheit
- Fuel Level: Gallons

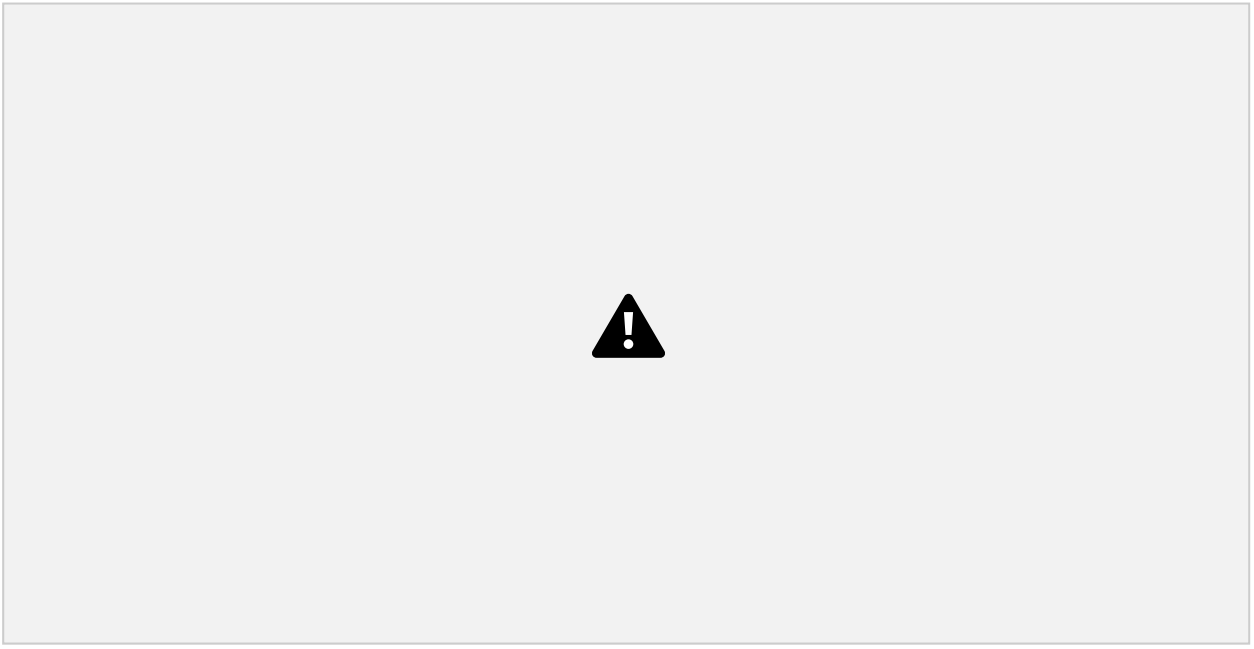
## Customize Data

In this section you can customize the names for messages types, sensor names and sensor values. Customizing the data, especially for users with multiple sensors, will help remove some of the confusion about what each sensor is monitoring and what its value means. Create a new column and with new data relevant to users.

Step 1: Click on Customize Data.

Step 2: Click on NEW.

Step 3: Name the new Customize Data template and enter notes for clarification. Please note there are 4 Tabs for Customizing Data.

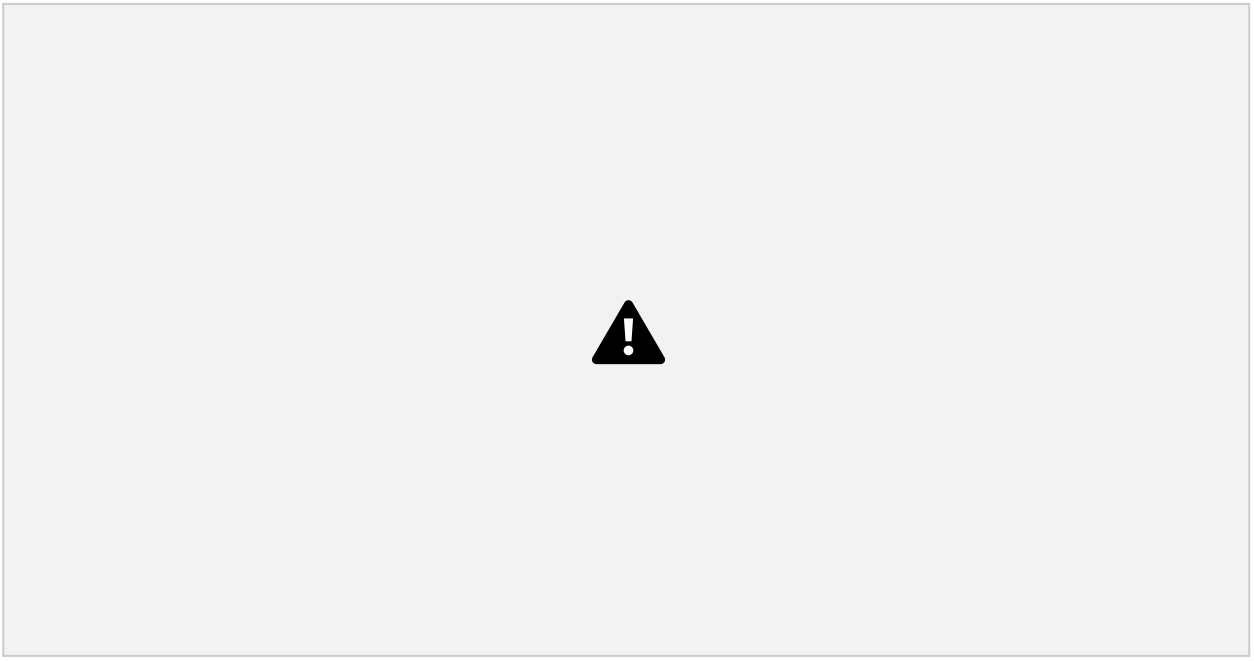


Step 4: Units – assign the units that this customize data will apply to by moving them from the left column to the right by means of the arrows.

Step 5: Message Type: is creating the new column for information and the message that will be

returned in the column. Type the new column name in at the top of this page. **The new column name cannot contain any special characters and cannot contain any spaces** ("__" underscore is not considered a special character and can be used in lieu of spaces). In the example below, notice that the name is Impact_Example. Then, scroll down through the different messages types (renaming the ones that pertain to your unit).

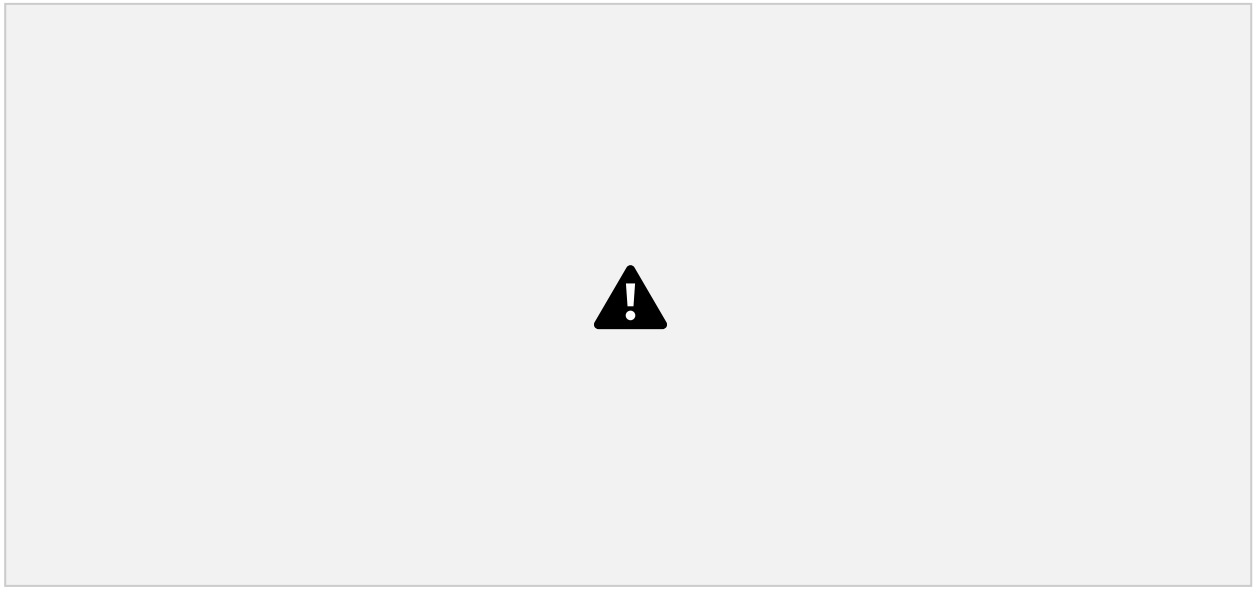
Note: Some of the Default Field Names will not pertain to your unit. Make sure to consult the Appendix at the end of this manual for fields that are related to your Solar Tracking Unit.



*Example: The standard message type for an impact is Impact Alarm, but you may change it to read Damaging Event in your new column, Impact Example.*

Step 6: Sensors being renamed will appear in a new column. Under the sensor tab you will see an option for "New Sensor Name." You will also see a choice to change the value of your sensor. Depending on what sensors you have, some sensors default by saying OPEN or CLOSED and some sensors default by saying "1" or "0". Type in the new value for applicable sensors.

*Example: The standard name of a wireless sensor on a hatch or door is S1_Digital. Now you can change that to Hatch Alert. Plus, wireless sensors normally call out "1" for closed and "0" for open; you can change those to Hatch Open / Hatch Closed. Please review Unit Configuration to determine the appropriate status label.*

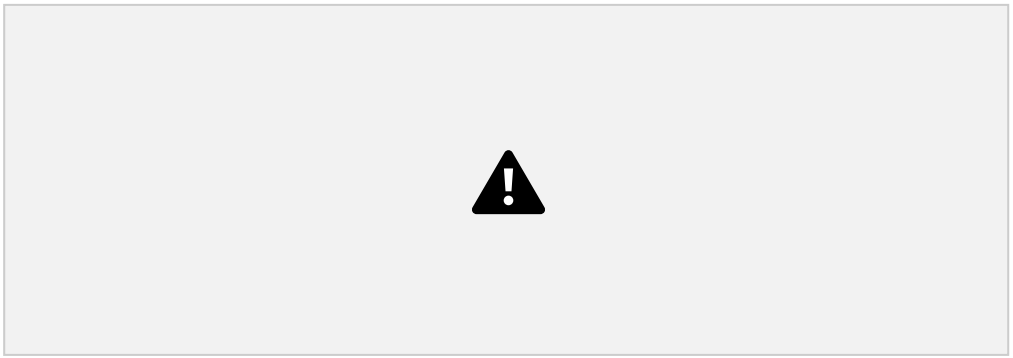


Step 7: Click SAVE after reviewing all 4 tabs.

**REMEMBER: This new customized field will be available to add to a report after the unit(s) next message is received. This new field will need to be added to reports through the Administration/Report section when you are finished with your template.**

## Geo-Items

Virtual points, lines, and areas to help quantify exactly where your assets are. Use them to help you know when an asset leaves an area, is at a location, or is close to arriving. Use in conjunction with adaptive device configurations (see ADAPTIVE CONFIGURATION) to change reporting frequency based on location. There are three different types of geo-items: Geo-fences, Geo-points, and Tripwires.



Choose map or satellite along with types of geoitems you want shown

Click on a Geo-item to view its name

Geo-point

Tripwire

Geo-fence

### Geo-Fence

Geo-Fences are virtual fences created on the screen to establish boundaries and identify if assets are inside/outside of them. They enable you to receive additional location information in messages within the Geo-fence column. A unit is either within a geo-fence or it is not. Geo-fences in this section are unlimited. Geo-fences are passive and reside on the backend servers. You will only know if a unit is in a geo-fence if it calls out from inside the fence. Proceed to 'Creating Geo-Items' to learn how to create a geo-fence.

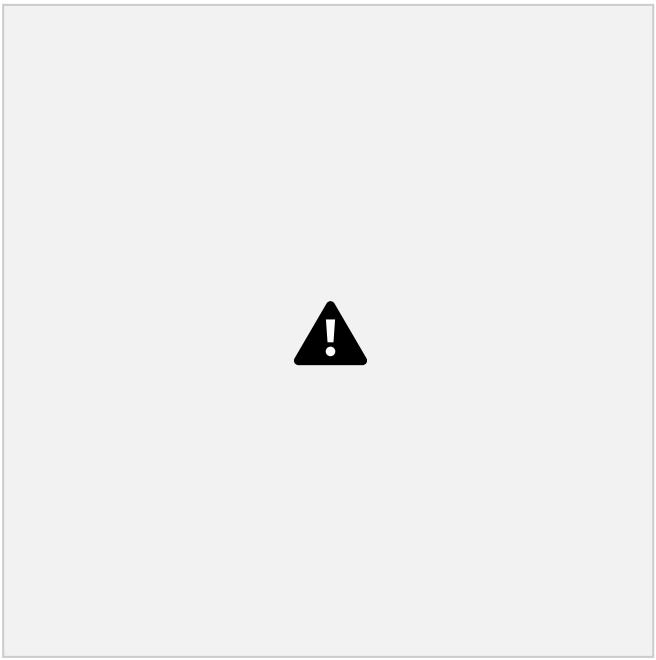
## Geo-Point

Geo-points are virtual points established in the system that represents locations of importance. They allow you to receive extra information during a regular message in an additional column called Geo point. This column is a field that will need to be added to the desired report(s). You will receive information as a unit approaches within 60 miles of a geo-point. *Example: "Unit2 is 2.5 miles NW of Milepost 50."* Proceed to 'Creating Geo-Items' to learn how to create a geo-point.

## Tripwire

Tripwires are virtual lines that allow you to know when an asset crosses a location. The Message Type received is Geo Cross and the tripwire name will be under Geofence. Tripwires are active and are synced with the unit (see notes below on syncing). This allows the unit to call out an extra message when it crosses a tripwire. It will report a "geocross". *Example: Set up a tripwire to get alerted when an asset is close to arriving so you can be prepared*. Proceed to 'Creating Geo-Items' to learn how to create a tripwire.

## Creating Geo-Items



Step 1: Click Geoitems under the Administration Tab

Step 2: Zoom into the area of the map where you want to place the geoitem

Step 3: On the top left side of the map select the type of geoitem you wish to create

Step 4:

- Tripwire - Click the left mouse button to place your first point and then click again for the second point. The points must be between 25 and 2640 feet (1/2 mile). The two points will connect to form the tripwire line. See **IMPORTANT** note below.
- Polygon Geofence - Click the left mouse button to place a point, and continue to click and place up to a total of 12 points. To finish, click the first point
- Rectangular Geofence – Click and drag to draw a rectangle. Release mouse to finish drawing
- Geopoint - Click the left mouse button to place a point

Step 5: Name the GeoItem and click Add Geoitem. When adding a geo-fence you can also select the geo-fence type.

To EDIT a geoitem, click the edit button to the left of the geoitem. Click update to save your edit or cancel to not save your edit.

To DELETE a geoitem, click the delete button to the left of the geoitem. A pop-up will appear to make sure you want to delete the geoitem.

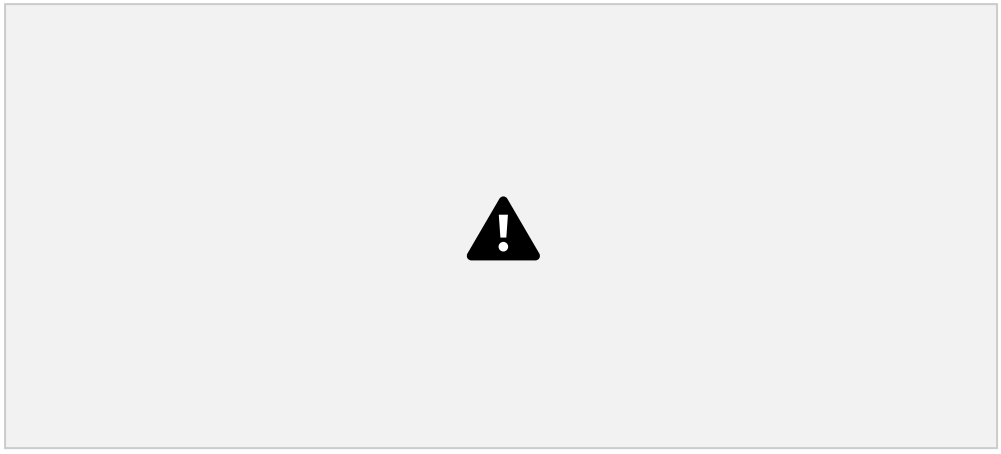
**IMPORTANT**: Click Sync Geoitems with Units after creating new tripwires, this will send the Tripwire information to your STU. Tripwires will work not work until you do this. Each time you create a new tripwire, the entire list of tripwires must be re-synced.

**Note:** Remember to update desired reports for the location reference with the field called "geofence". Also, if you have a list of more than 10 Geo-Items to be added, please contact us with the GPS coordinates and we can upload them for you.

### Driver/Operator

Was designed for customers that want to keep track of the schedule (per unit) of a driver or operator.

1. Create a Driver/Operator by filling in their name. Click SAVE
2. Go back to the main Driver/Operator page, find that driver and click SCHEDULE. You can then choose the Lat-Lon unit that he is driving or operating and the start time and end time of his schedule on that unit. Click SAVE



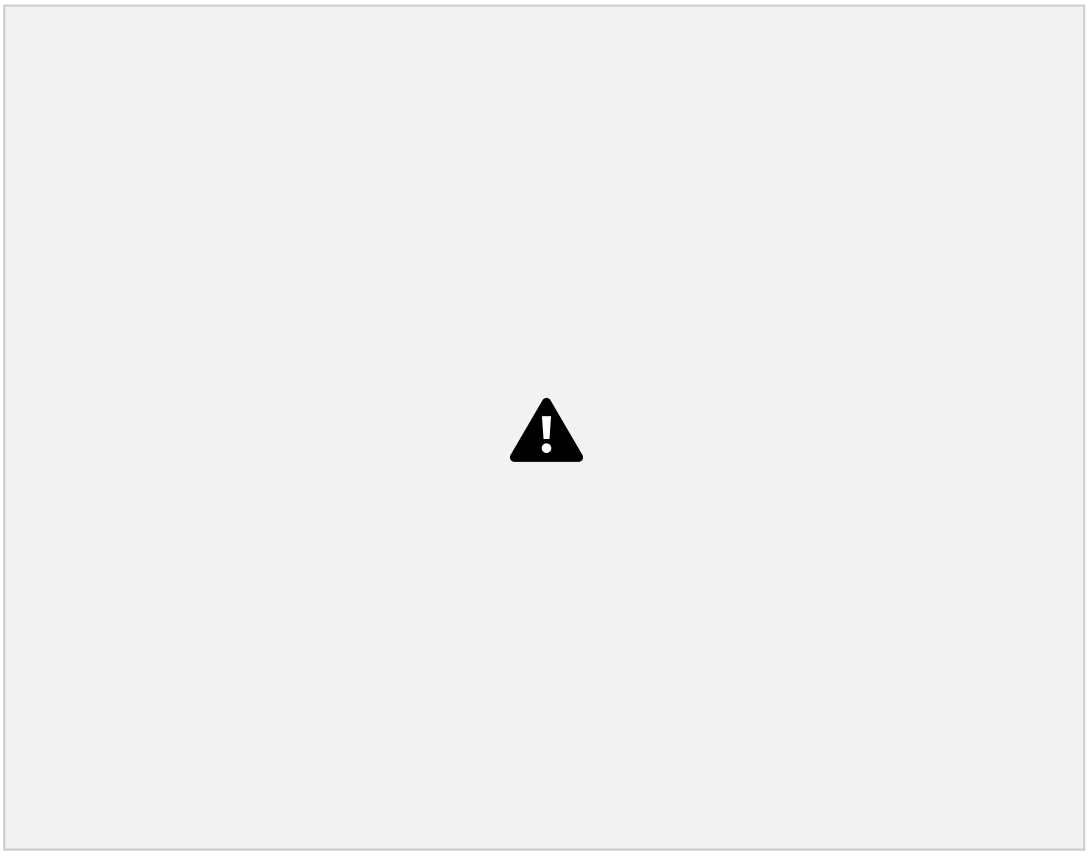
3. Once the schedules are created, you can go to Administration/Reports section and add the field called Operator_Name to any of your reports (see REPORTS section for adding fields to reports). The operator name then automatically shows up on the reports you assign it to. Allowing you to quickly see who was operating the asset during different historical time periods.

## PREFERENCES

### Manage Preferences

Preferences are designed to save steps or control the look of your website. Users and administrators

have the ability to change parameters under this section.



The parameters that you can set are listed below:

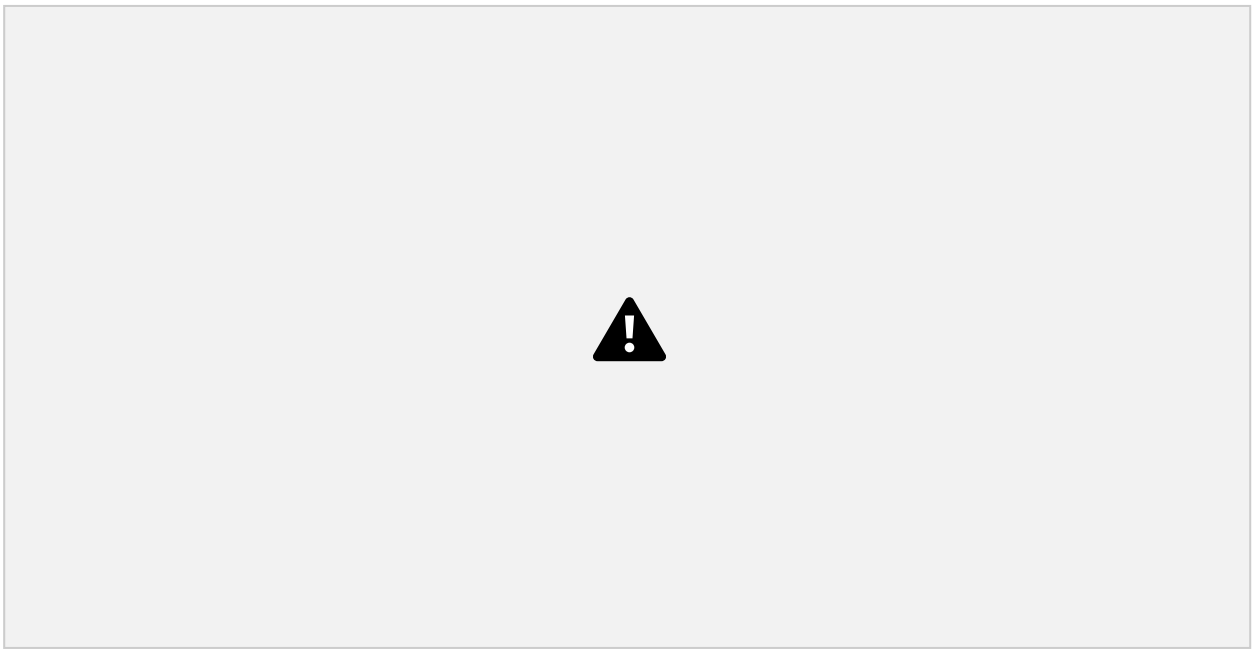
***Start Page:*** This is the landing page that will appear per user upon logging in. Dashboard and Dispatch are only available to users that have been approved the respective Dashboard or Dispatch rights by their Administrator. If using the Fleet Report to start, the report will generate immediately upon logging in.

***Display Time Zone:*** Time is automatically changed from Standard Time to Daylight Savings Time.

- GMT: Greenwich Mean Time
- AST: Atlantic Time
- EST: Eastern Time
- CST: Central Time
- MST: Mountain Time
- PST: Pacific Time
- AKST: Alaska Time

***Date Format:*** Choose the preferred appearance of date and time.

***Report Display:*** Data Only will return data only after running a report with an option to map if desired. Map and Data will automatically return both the map and the data and may take a brief moment longer than data only.



***Pop-up Map Provider:*** For mapping a single data point, the map pop-up may be Bing or Google depending on preference. Click on the map icon in the data line to view.

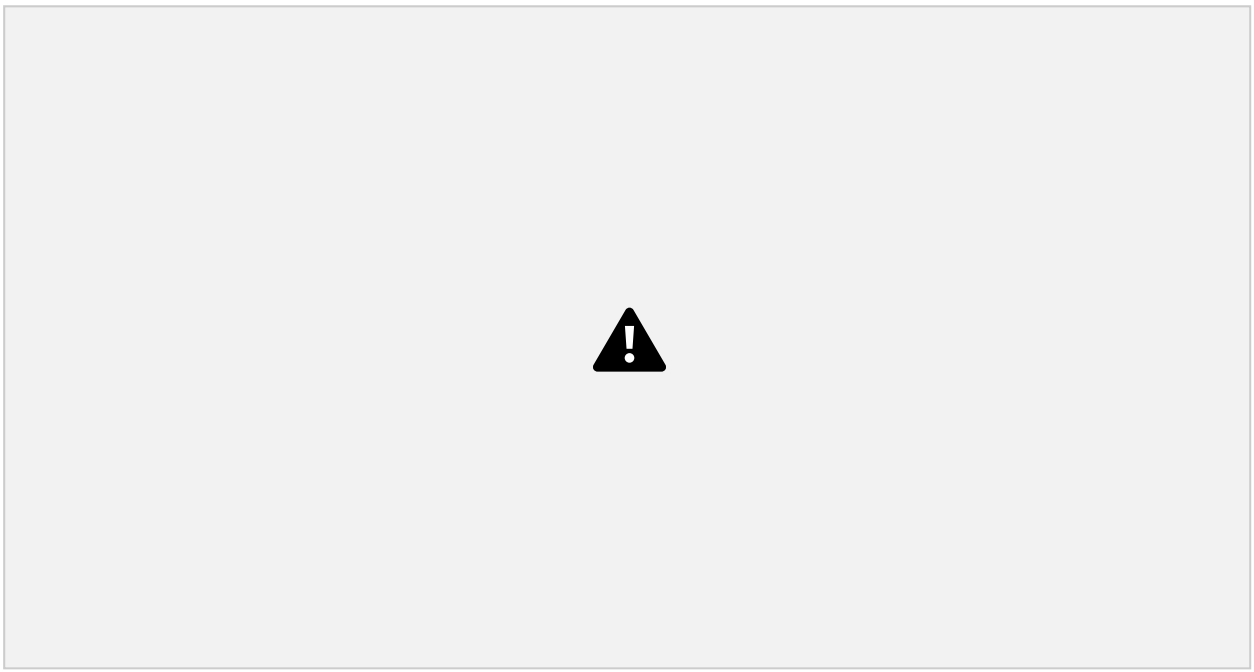
***Allow Data Grouping on Report Grids:*** Data Grouping is a way of segmenting data in a report (see History Reports page 11, #10).

***Allow Data Filtering on Report Grids:*** is a way to filter data in a report (see History Reports page 12).

***Show Geo-fences, Geo-points, and Tripwires on Maps:*** When checked, the user will see all Geo points, Geo-fences, and Tripwires under that Administrator.

***Fleet Report:*** Choose to run the Fleet Report on All Units or on a Selected Unit Group.

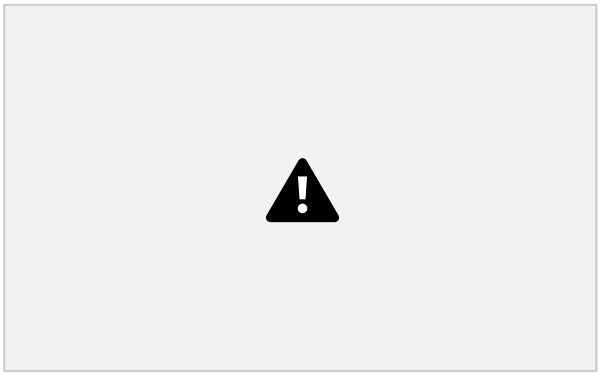
## Define Fields Shown in Map Information Bubbles



Administrators can define the Dispatch/Report Bubble information shown in maps for the entire company OR users can define their own Bubble information (if Dispatch &/or Reports are allowed by administrator) under their user preference page.

Default Bubble information shows:

- Unit Name
- Date/Time of event
- Event message
- Speed



## LOGOUT

Remember to logout. The program will automatically log off after 60 minutes to prevent unwanted visitors to the website unless you are on the Dispatch or Alerter page which do not time out. Manually logout by Clicking the "Logout" link on the Left Side Banner near the Lat-Lon logo.

## APPENDIX I: DATABASE FIELD DEFINITIONS - STANDARD

| Field | Description | Valid Entries / units |
|---|---|---|
| ACCUMULATED_MILES | Accumulated miles | Miles or Kilometers |
| BATT_VOLTS | STU Battery Voltage | <3.0 (empty) – >3.5 (full battery) |
| CAP_VOLTS | STU Capacitor Voltage | <3.5 (low power) – >4.4 (full charge) |
| CAP_VOLTS_MAX | Maximum STU Capacitor Voltage for the day (reported once a day in daily health messages) | see daily health messages) (battery voltage ) - <3.5 (low capacitor voltage) – >4.4 (full charge) |
| CAP_VOLTS_MIN | COURSE (also Minimum STU Capacitor Voltage for the day (reported once a day in | (battery voltage ) - <3.5 (low capacitor voltage) – >4.4 (full charge) |

HEADING) Course or direction unit is moving 1-360 degrees

DECELERATION ID Chart for Deceleration Alarms. Also See Speed Drop Field

DECODE DATE/TIME Date and Time Message was Decoded

Here is the chart icon that will show up in the reports for this field



DEWPOINT Weather: how saturated the air is Degrees Fahrenheit ELEVATION Elevation during message Feet FIRMWARE Version of firmware

GEOFENCE Geo-fence

GEOGRAPHY Miles and direction from nearest town

GEOPOINT Geo-point

GPS RUN TIME STU only reports this field once a day. Shows how long the GPS has run. 0 – 60,000 min

HDOP (quality of GPS fix based on Horizontal Dilution of Precision satellite geometry or where the satellites are in relation to each other in the sky) in meters

HEADING Direction that the unit is moving N, S, E, W HTUA High Threat Urban Areas geo-fences HUMIDITY Weather: humidity Percentage

INTEGRATED_INPUT_CURRENT Total current received from solar panels for the day (reported in daily health reports) mA/h

LATITUDE Latitude of GPS coordinates LONGITUDE Longitude of GPS coordinates LOCAL_DTTM Local Date/Time of the unit's location

LOCAL_DTTM_TZ Local Time Zone of the unit's location Maximum current received from solar panels during the day (reported in daily health messages) UNITS

MESSAGE_IN_QUEUE Number of stored messages not yet sent

MESSAGE_TYPE Reason the message was generated by the unit

Move Timed
Deceleration
Move Begin
Move End
Daily Health

Messages from Optional Sensors: Impact Alarm
Digital 1 Alarm
Digital 2 Alarm
Analog 1 Low Alarm
Analog 2 Low Alarm
Analog 1 High Alarm

Timed

Analog 2 High Alarm
RF Digital Alarm (wireless sensor)
X-Tilt Alarm (wireless sensor)
Y-Tilt Alarm (wireless sensor)
Analog Low Alarm (wireless sensor)
Analog High Alarm (wireless sensor)

MILE FROM PREV MSG Miles from previous message Miles or Kilometers NEAREST GEOPOINT Miles and direction from nearest Geopoint

NEAREST RR Nearest Railroad

RADIO RUN TIME STU only reports this field once a day. Shows how long the cellular modem has run. 0 – 60,000 min

RECEIVE DATE/TIME Date and Time Servers Received Message

RF RUN TIME STU only reports this field once a day. Shows how long the RF Receiver has run. 0 – 60,000 min

RSSI Received Signal Strength Indicator (regarding the cellular modem) (serial numbers that start with a number): -99dBm or better by unit SECONDS FROM PREV (serial numbers that start with a letter): -105dBm or better. The lower the #, the better. No coverage at all = -110dBm

SATELLITE IN VIEW Number of GPS satellites in view

MSG Seconds since unit last reported Seconds SPEED Speed of unit at time of GPS coordinates Sudden Drop in Speed, Standard setting:

SPEED_DROP drop of 5mph or more within 2 seconds = deceleration alarm MPH or Kilometers per Hour

SOLAR_CURRENT_INPUT 0=no sun, 230-255=full sun mA

SYSTEM_RUN_TIME Shows how long the system has run, a drop indicates a unit reset Minutes

TEMPERATURE Temperature_1 or Temperature_2 Weather: not to be confused with which are sensor temperatures Outside temperature in Fahrenheit

TIME SINCE MOVE BEGIN Time since a Move Begin message Time in hours TIME SINCE MOVE END Time since a Move End message Time in hours TIME_TO_FIX Not applicable to the x15500 N/A UNIT_DATE/TIME Unit Date and Time UNIT_ID Unit Serial Number

UNIT INFO Info typed by customer for an individual unit. Info typed shows up in the reports Text

UNIT_NAME Unit Name

VISIBILITY Weather: visibility Miles WIND DEGREES Weather: course of wind 1 – 360 degrees WIND SPEED Weather: speed of wind MPH or Kilometers per Hour

# APPENDIX II: DATABASE FIELD DEFINITIONS – SENSORS

**Field Description Valid Entries / units** X_G_10HZ also called "filtered" X axis G value filtered at 10Hz G Force Y_G_10HZ also called "filtered" Y axis G value filtered at 10Hz G Force Z_G_10HZ also called "filtered" Z axis G value filtered at 10Hz G Force X_G_Unfiltered X axis G value sampled at 500Hz G Force Y_G_Unfiltered Y axis G value sampled at 500Hz G Force Z_G_Unfiltered Z axis G value sampled at 500Hz G Force X_DV X axis change in velocity during impact In mph or Kilometers per Hour Y_DV Y axis change in velocity during impact In mph or Kilometers per Hour Z_DV Z axis change in velocity during impact In mph or Kilometers per Hour X_DS X axis change in position during impact Inches Y_DS Y axis change in position during impact Inches Z_DS Z axis change in position during impact Inches

Impact_ID Impact Chart/Graph. Only Available in Firmware versions 37734 or higher. Here is the chart icon that

will show up in the report for this field

Impact_Duration The length of the impact sample Milliseconds STU only reports this field once

Impact Run Time has run a day. Shows how long the impact Resets daily to 0, units in minutes

S1 Digital RF Sensor 1 reed switch or digital alarm 1=closed switch, 0=open switch S1 Digital Change RF Sensor 1 digital change since last RF Sender transmission 1=change,0=no change

S1 TX DTTM Transmission Date/Time of RF Sender This is important to look at so that you know which RF transmission the STU is using for data message

S1 Low Voltage Digital of RF Sender voltage 1=low voltage, 0=voltage okay S1 Voltage Actual voltage reading from RF Sender 3.64V=low,2.6V=dead battery Serial number of RF Sender

S1 Serial Number assigned to STU via serial 6 to 16 digits (Senders are specifically number)

S1 T Change RF Sensor 1 temperature change since last RF Sender transmission 1=changed,0=no change

S1 Temperature Temperature from RF Sensor 1 In degrees Fahrenheit or Celsius

S1 X Tilt RF Sensor 1 tilt/analog x axis reading from RF Analog #: Typical reading for something like a hatch is <400 = open hatch. accelerometer

S1 X Tilt Change RF Sensor 1 tilt change since last Sender transmission 1=changed,0=no change

S1 X Tilt Digital RF Sender 1 X axis has tilted into a higher or lower reading position 1=higher position,0=lower position

S1 Y Tilt RF Sensor 1 tilt/analog y axis reading from accelerometer Analog #

S1 Y Tilt Change RF Sensor 1 tilt change since last RF Sender transmission 1=changed,0=no change

S1 Y Tilt Digital RF Sender 1 Y axis has tilted into a higher or lower reading position 1=higher position,0=lower position

STU_ANALOG_1 Reading from wired sensor (Typically Depends on sensor (If temperature probe than in Fahrenheit or Celsius) Temperature)

STU_ANALOG_2 Reading from wired sensor (Typically Depends on sensor (If temperature probe than in Fahrenheit or Celsius) Temperature)

STU_ANALOG_3 Reading from wired sensor (Typically Depends on sensor (If temperature probe than in Fahrenheit or Celsius) Temperature)

STU_ANALOG_4 Reading from wired sensor (Typically Depends on sensor (If temperature probe than in Fahrenheit or Celsius) Temperature)

STU_A2D_1 A2D reading from wired sensor A2D value STU_A2D_2 A2D reading from wired sensor A2D value DIGITAL_1 Wired digital sensor Open or Closed DIGITAL_2 Wired

digital sensor Open or Closed DIGITAL 3 Wired digital sensor Open or Closed DIGITAL 4 Wired digital sensor Open or Closed

# APPENDIX III: SPECIALTY REPORT DEFINITIONS

**Start Stop Report**

**Features:**
The Start Stop Report has a list of each start and stop the unit makes during a trip with summary data of moving time, and stopped time between cycles. The report can be adjusted to show stops greater than "x" minutes to help managers filter out traffic stops or other short delays in transit.

**Key Benefits:**
This report provides managers a Detailed Time Card for employees. This report can also be used as an auditing tool for verifying deliveries or billable service hours. This report can also be used to verify route deliveries.

**Begin - End Report**

**Features:**
The Begin / End Report lists the first movement and last movement of the timeframe for a unit or fleet along with elapsed time, total mileage, start location and end location.

**Key Benefits:**
This report provides managers a Detailed Time Card for employees. This report allows managers to monitor trends in employee hours.

**Pooling Report**

**Features:**
The Pooling Report lists the number of units at a given location with summary data of oldest and average hours the units have been at that location. This is best used along with geo-fences.

**Key Benefits:**
This report provides managers a list of units available at a location or can identify units a customer has not released.

**Dwell Report**

**Features:**
The Dwell Report is a Fleet Report showing units that have been sitting (stopped) over a specified amount of time. The amount of time is input by user. For example show me all the cars that have been stopped more than 24 hours.

**Key Benefits:**
This report provides managers a list of units not moving and how long they have been sitting.

**Over-Speed Report**

**Features:**
The speed report displays all occurrences of speeding past a defined speed threshold.

**Key Benefits:**

Managers can quickly and easily run reports and check for speeding for the fleet for safety reasons.

**Email Alerts Report**

**Features:**
The alert report is a detailed list of all of the alerts that were generated.

**Key Benefits:**
This is an easy report for a summary of all alert emails that have been sent out.

**Geo-Fence Report**

**Features:**
The Geo-Fence report shows you which of your units/assets have visited saved locations set up in the administration website. Select any saved location (geo-fence), timeframe, unit or fleet, and run the report.

**Key Benefits:**
The Geo-Fence report can help track activity at delivery sites to show who and for how long workers were at that location. This report can also aid in detecting side jobs. The location report can show companies when their locomotive, railcar, truck, trailer, van made their deliveries.

**Overdue Units Report**

**Features:**
The Overdue Units Report provides a listing of units that may need attention. The user is able to enter the number of days units have not reported for the fleet. Units can be analyzed to determine if there is a problem. Problem units can be damaged, vandalized, in cell hole, or under mechanical failure. Appropriate maintenance can then be scheduled.

**Key Benefits:**
The report allows users to quickly see if any units haven't reported and where they were when they stopped reporting. This is a good exception report for customers with large fleets to maximize uptime for the fleet.

**Unit Accumulated Mileage Report**

**Features:**
The Unit Accumulated Mileage report allows a choice of 1 or multiple units over a specified time period.

**Key Benefits:**
The report allows a user to analyze mileage for a trip or for longer (i.e. maintenance reasons). It gives the mileage of each unit over a specific time period.

**User Log Report:**

**Features:**
Report gives you the User Name, Login Name and Login Date/Time for each User in your website account.

**Key Benefits:**

Ability to keep track of who is using the Lat-Lon website and at what times.

**Progress Report:**

**Features:**
The Progress Report allows a choice of 1 unit or multiple units of X period of time. It gives details of Move Begin Date/Time, Move End Date/Time, Moving Time, Distance Traveled in the time frame, and the Start Location and Stop Location throughout the time frame. Each unit's information is then totaled throughout the report. The Unit Group Total is given at the end.

**Key Benefits:**
The overall progress of an asset can be tracked. Specifically, how long an asset is moving, how long it is stopped and where. Great for determining areas of a route that may be problematic.

**Mileage by State:**

**Features:**
The Mileage by State Report allows you to choose 1 unit or multiple units over a specified time period. The report returns the state, month of travel, unit name and distance traveled in that state. It gives you a Monthly Total as well as a State Total.

**Key Benefits:**
Can be used for tax purposes, mileage purposes or just general knowledge of how many miles an asset travels per state.

**Impact Report:**

**Features:**
The Impact Report allows for a choice of 1 unit or multiple units over a specified time period. The first report that comes up is a summary. It gives you total impacts seen per unit, speed, and G force information for the HIGHEST G forces seen in the report. Clicking a small "+" next to each Unit Name gives specifics about each impact that unit had. Bolded numbers allow for quick reference on the highest G force seen and highest Delta Velocity seen for all data.

**Key Benefits:**
**A**llows for a quick analysis of impacts in a fleet over time.

**Impact Filtering Tool:**

**Features:**
The Impact filtering tool lets you select 1 unit, a specified time period, and impact filtering G 10 Hz values for all three axes. Click a row of data to see its acceleration and velocity graphs. For the acceleration graph you can either leave it unfiltered, or choose 1$^{st}$ or 2$^{nd}$ order and select a frequency.

**Key Benefits:**
Can look in depth at a unit's impact, see unfiltered to see the impact with vibrations and filtered to see the impact with vibrations reduced.