Armadillo® Tracker

Multi-Lane Bidirectional Traffic Statistics Gathering Device

Installation and User Guide

Rev 2.1, October 24, 2023

Houston Radar Armadillo® Tracker Non-Intrusive Multi-Lane Bidirectional Traffic Statistics Gathering Device

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The device must be located 20 cm or more from persons. The device must not be co-located with other transmitters.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Any modification or use other than specified in this manual will strictly void the certification to operate the device.

This product contains a rechargeable Lithium Iron Phosphate battery (LiFePO4). Charging must be performed indoors in a dry environment only by the provided LiFePO4 battery charger. Do not charge unsupervised or hidden from view. Do not expose the charger to rain, water, or moisture. Securely cap the connectors on the bottom when installing the unit outdoors.

Battery must be recycled or disposed of properly per local recycling regulations or may be returned to us for recycling.

Do not crush, pierce, or incinerate the product or the battery. Discontinue use immediately if any leaking occurs.

Product contains no user serviceable parts inside. Do not attempt to open or repair. Doing so will void the warranty.
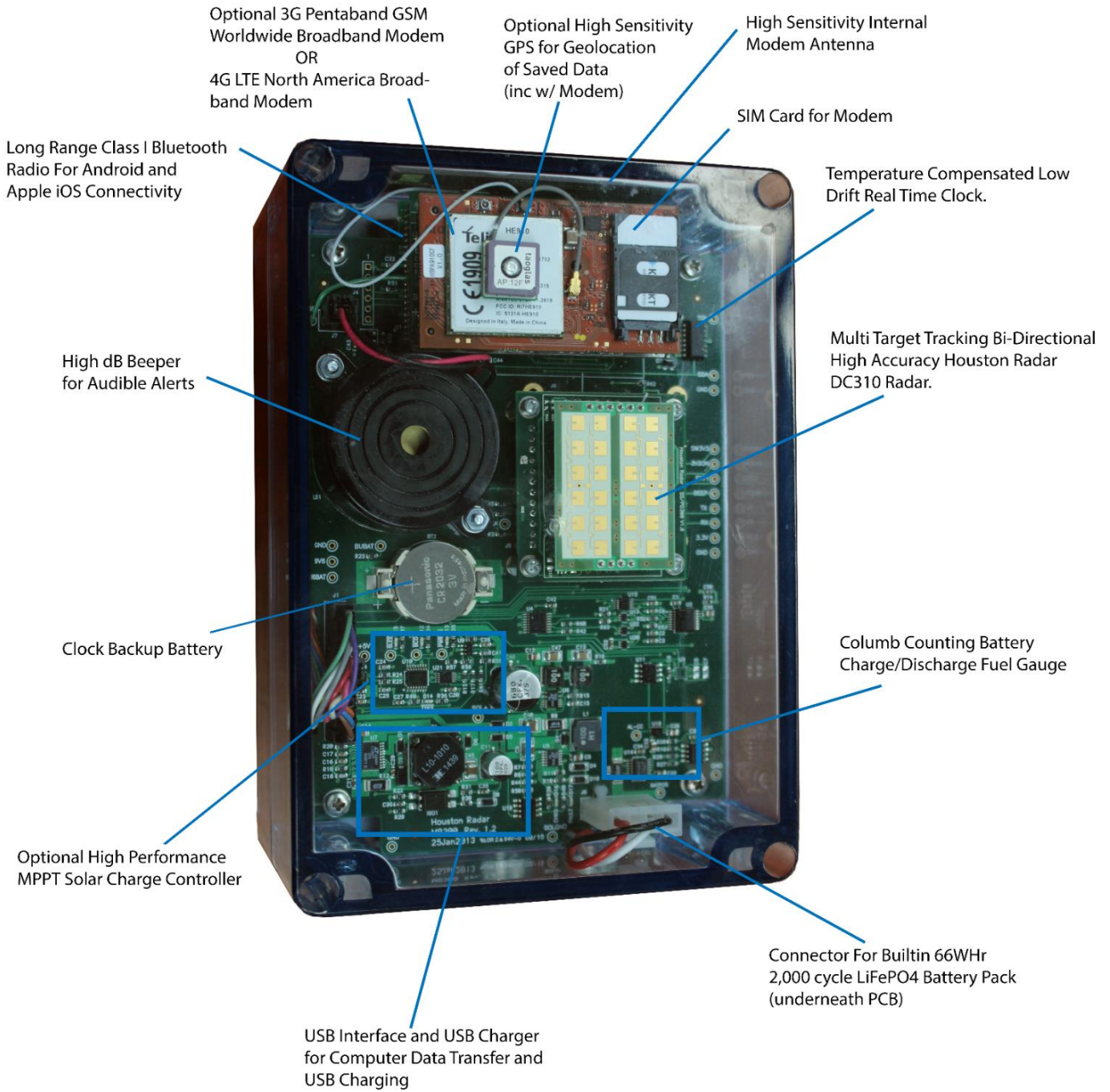
Specifications may change without notice.

Contents

1.0 A Look Inside an Armadillo Tracker Radar

Optional 3G Pentaband GSM Worldwide Broadband Modem OR 4G LTE North America Broadband Modem

Optional High Sensitivity GPS for Geolocation of Saved Data (inc w/ Modem)

High Sensitivity Internal Modem Antenna

SIM Card for Modem

Long Range Class I Bluetooth Radio For Android and Apple iOS Connectivity

Temperature Compensated Low Drift Real Time Clock.

High dB Beeper for Audible Alerts

Multi Target Tracking Bi-Directional High Accuracy Houston Radar DC310 Radar.

Clock Backup Battery

Columb Counting Battery Charge/Discharge Fuel Gauge

Optional High Performance MPPT Solar Charge Controller

Connector For Builtin 66WHr 2,000 cycle LiFePO4 Battery Pack (underneath PCB)

USB Interface and USB Charger for Computer Data Transfer and USB Charging

2.0 Hardware Included With the Armadillo Tracker

	9.6V LiFePO4 Fast AC Charger	Indoor Fast AC Charger with worldwide plugs
	900-0045	Y-Cable for Power & USB Connection
	110-0036	Long Range Class 1 Windows Bluetooth Dongle
	110-0020 & 110-0025	Universal Pole-Mounting Bracket and Sliding Plate to Accommodate Different Mounting Heights
	110-0059	2x Quick-Release Mounting Clamps

3.0 Preparing the Tracker for Use

Before deploying the Houston Radar's Armadillo Tracker, one should take care to prepare the radar and installation site. This chapter will detail the most common steps a user will take to do so properly.

3.1 Fully Charge the Tracker Battery

The Armadillo Tracker features a state-of-the-art Lithium Iron Phosphate (LiFePO4) battery that will allow the unit to run approximately 2 weeks on a full charge. Additionally, it will retain the charge for many weeks when switched off and placed on the shelf, thus being ready when needed. Before deployment you must fully charge the battery using the provided Fast AC Charger for the on-board fuel gauge to work properly.

Connect the provided Fast AC Charger to the black connector on the weatherproof Y-cable provided with the Tracker and plug the circular connector into its mate on the bottom of the enclosure.

Fast AC Charger and Y-Cable Connectors

Plug the Fast AC Charger into a 110 to 240V AC wall socket. Ensure that the light on the Fast AC Charger turns on. A red light means that the battery is charging. A green light means that the battery is fully charged.

The Fast AC Charger is NOT weatherproof. It must only be used indoors and under supervision. Do not charge in locations which are out of sight. Houston Radar does offer a ruggedized AC charger suitable for use outdoors; please contact sales@houston-radar.com or support@houston-radar.com for more information.

3.2 Select Installation Location

* *Follow this link to watch a short installation YouTube video for the Armadillo Tracker:* http://youtu.be/QGLEoxRIM4c

A suitable installation location is one where the traffic flows freely and has at least 100 feet (30m) of unobstructed road in either direction. Best performance is obtained at locations where traffic volume is not more than 1,200 vehicles/hour but the device will continue to collect data with slightly degraded counting accuracy up to 1,800 vehicles/hour.

Avoid mounting within 100 feet (30m) of congestion points such as stop signs, sharp turns, and traffic signals. Avoid mounting where trees, branches, or other objects are obstructing the Tracker's "view" of the traffic.
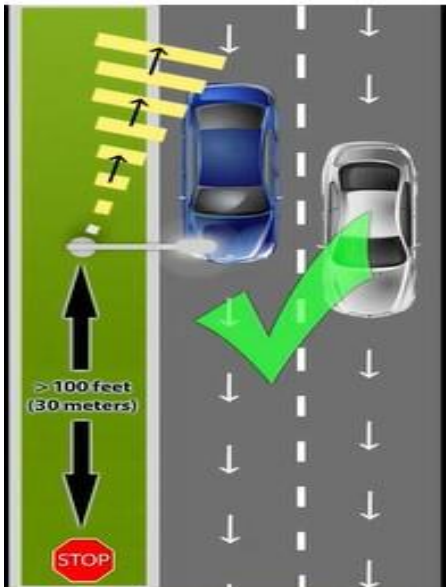
Ok to mount 100+ feet away from stop sign

Do not mount on a stop sign

Mount on the side of a two-lane undivided road to monitor a single direction or both directions.

Mount in the median of a four-lane divided road to measure both directions. Pick a location where the median is no more than 12 (3.6m) feet wide.

Mounting on the side of a 4-lane divided road will allow the Tracker to capture only the closest two incoming lanes accurately. Some data will be captured for the far lanes, which should be discarded after being imported for analysis.

To maintain specified counting accuracy, do not install on a road with more than two lanes in the same direction. Data will be collected but with slightly reduced count accuracy from the 3rd lane.

3.3 Set the Time, Speed Units and data collection Speed Range

By default, the internal clock of the Tracker is set to US Central Time, the Speed Units are set to Imperial (instead of Metric and the minimum collection speed set to 12 (mph or km/h). The internal clock, units of measurement and minimum collection speed should be set to the appropriate values before deployment.

Reference Section 8.1 to adjust the internal clock.

Reference Section 8.2 to adjust the Speed Units and Minimum and Maximum Speeds for data collection.

4.0 Installation

The Armadillo Tracker's design allows for multiple suitable installation types. The Armadillo Tracker is commonly mounted on posts and poles for which the user has right-of-way permission such as luminaires and MUTCD (or equivalent) sign structures.

4.1 Mounting Position

The Tracker should be mounted within 12 feet (3.7m) of the first lane of traffic to be monitored. It is recommended that the closest lane of traffic to be monitored has vehicles incoming towards the radar (incoming direction). This is a best practice but not essential. Mounting the Tracker farther than 12 feet (3.7m) from the closest lane will limit the radar's counting accuracy for detecting vehicles traveling in the farther lane(s).

The Tracker should be mounted between 6 feet (1.9m) and 12 feet (3.7m) high off the ground. A lower mounting height will increase the occurrences of occlusion. A higher mounting height may decrease the effective detection range by creating a higher plane for the detection zone causing vehicles to be missed.

DO NOT mount the Tracker to structures that are not stable such as trees or guy-wires.

4.2 Mounting the Tracker

Tool needed to install the Tracker: Slotted (flathead) screwdriver or 3/8" socket

Using the provided quick release straps, secure the Tracker to the selected mounting structure, at least 6 feet (1.9m) high, and no more than 12 feet (3.7m) high. Mount within 12 feet (3.6m) of the first lane of traffic. We recommend making the incoming direction the closer lane.

To deter theft, the mounting bracket allows the use of a bicycle cable and lock (or similar) to secure it to the pole. You may also consider sticking an Airtag tracker inside the bracket to track the device in case it is stolen.

4.3 Aiming the Tracker

The Armadillo Tracker has a beam angle of 20-degrees vertical and 60-degrees horizontal, with an effective detection range of approximately 300 feet (90m). Vehicles must travel through the detection zone at least 80-100 feet (25-30m) and pass the radar's mounting location to be accurately logged. The radar logs the vehicle's maximum speed observed during this track zone.

When installing on the side of the road, visually aim the Tracker towards the direction of incoming traffic, and inwards to the middle of the road, choosing a point at least 100 feet (30m) away, and preferably 200 feet (60m) away. Getting behind the unit and "eyeballing" the pointing is usually sufficient. Unlike other devices on the market, do **not** point the Tracker inwards at a 45-degree angle, as this will be too sharp of an angle to allow for proper detection and will diminish accuracy.

When installing in the median between opposite flowing traffic, do not angle the Tracker towards either side. Aim the Tracker so its center is parallel to the lanes on either side of the median.

In all mounting locations, use the adjustable sliding plate at the top of the unit to tilt the Tracker down to aim at the road about 100 feet (30m) in front of the mounting location. Adjust the sliding plate all the way out to tilt the enclosure down when utilizing a mounting height of 10-12 feet (3-3.7m), about halfway out if mounted 8-9 feet (2.4-3m) high, and all the way in if mounted lower to the ground.
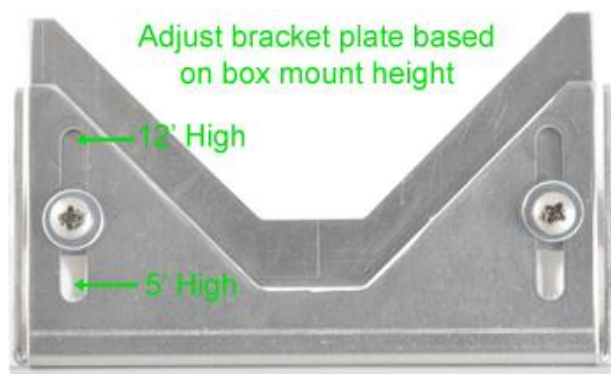
4.4 Power ON and Verify Detection

Turn the key switch to the ON position and verify that you hear a single **1 second beep**.

- Ten successive beeps indicate that **less than 30% battery** capacity remains, and battery should be re-charged before deployment. You can view the exact battery charge level using the App or the Windows Stats Analyzer program.

If the unit was ordered with and includes the optional built-in GPS option or cellular modem (which includes the GPS option), the Tracker must be turned on at the install location after being mounted. The GPS module will only power on to fetch coordinates for the first 10 minutes of operation. The GPS module will power down after 10 minutes to conserve battery power even if coordinates have not been acquired. Please see page 9 of the Houston Radar Smartphone App User Guide (Armadillo Tracker Operations> Radar Info) to learn how to verify a GPS signal has been attained.

For the first 10 minutes after powering on, the Tracker will emit a short beep for every vehicle that it logs, providing verification that the Tracker is properly detecting traffic. This beep will be emitted as each detected vehicle exits the detection zone. This is usually once the vehicle has reached or passed the radar location in the incoming direction and far enough away that it is no longer being tracked in the outgoing direction.

- Incoming vehicles will trigger a beep when it approximately passes the Tracker (within +/- 25 feet (8m) of the unit).
- Most outgoing traffic will trigger a beep within 200-300 feet (60-90m) after crossing the Tracker.

If you do not hear a beep for each vehicle (within the stated accuracy count of the counter), adjust the pointing angle or mounting height to get a clearer "view" of the traffic. Ensure no obstructions like tree or bush branches, metal signs etc. in view of the radar's front cover.

Removal of the Tracker from its installed location is the opposite of installation. Turn the key switch to the OFF position. Loosen the quick release straps while supporting the Tracker, then remove the straps from around the pole.

4.5 Optional Solar Panel

The optional solar panel kit will provide year-round autonomy in most locations with the built-in Maximum Power Point Technology (MPPT) solar charger. In the northern hemisphere, the solar panel must be pointed towards true south (not magnetic south) and angled based on the latitude of the location. Most smart phones feature a compass that may be set to point towards true South. The suggested angle from the horizontal is (location latitude + 15°). This provides maximum power during winter by angling the panel more towards the horizon where the sun is low in the sky.

Connect the provided solar panel cable to the solar panel circular connector on the bottom of the Tracker enclosure. The solar panel will charge the battery even with the key switch in the off position.
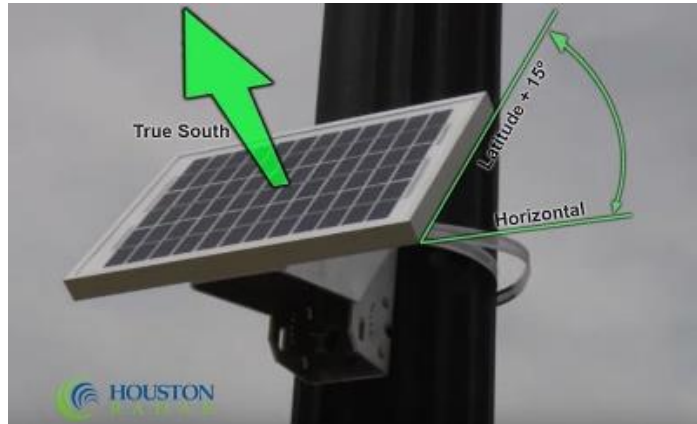
4.6 Optional Armadillo Booster Pack

The optional Armadillo Booster Pack will approximately double the Tracker's run time to 24-28 days (depending on ambient temperature conditions, modem usage, and other variables) with both batteries fully charged. To charge the Booster Pack via the provided Fast AC Charger, connect the provided "Y-able" to the Booster Pack. The "Y" charging cable for the Tracker and the Fast AC Charger are identical for the Armadillo Tracker and the Booster Pack. Either cable or charger may be used. A dedicated cable and charger are provided with each Booster Pack.

The bi-color LED on the Fast AC Charger indicates the charging state.
- **Red** LED indicates battery is charging.
- **Green** LED indicates a fully charged battery/end of charge cycle.

Charge Status LED

The Fast AC Charger is NOT weatherproof. It must only be used indoors and under supervision. Do not charge in hidden locations which are out of sight.

The Armadillo Booster Pack Contains a 62WHr Lithium Iron Phosphate Battery. It must be recycled or disposed of properly per local regulations. Do not crush or incinerate.

To use the Armadillo Booster Pack, attach the Booster Pack to the chosen mounting structure by the same method the Tracker was secured. Connect the Booster Pack to the Armadillo Tracker's USB/Charging port using the provided weatherproof cable as shown.
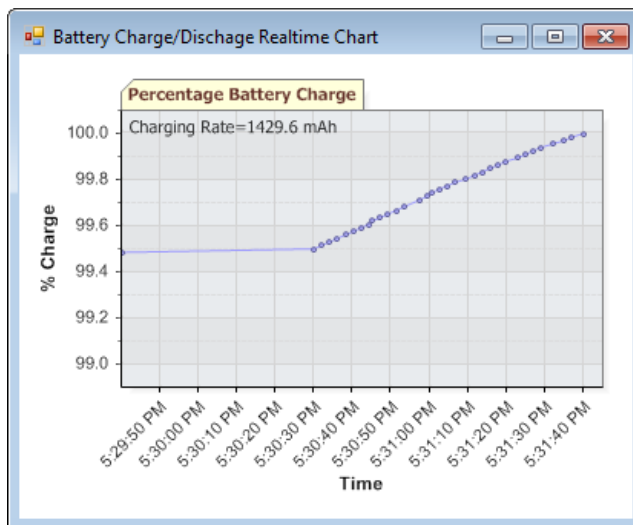

Armadillo Tracker

Armadillo Booster Pack

Finger tighten the connectors completely on both ends. The connector is only waterproof when completely tight. Mount both units with the connector facing towards the ground to prevent water from seeping in.

- For best performance (and accurate report of remaining battery life from the Armadillo Tracker fuel gauge) it is best to completely charge the Armadillo Booster Pack and Armadillo Tracker using the provided Fast AC Charger before connecting them together.
- The Armadillo Tracker's battery fuel gauge will decrease slowly with the booster pack connected. The percentage charge remaining shown is a combined value of the internal battery AND the Booster Pack.
- If a partially charged Booster Pack is connected to a fully charged Armadillo Tracker, the internal battery of the Tracker will quickly charge the Booster Pack (or vice-versa) until both reach equilibrium.
- If a solar panel is also connected to the optional Solar Connector on the Armadillo Tracker, it will charge both the internal battery and the Booster Pack.
- The Armadillo Tracker WILL trickle charge via the USB connector.
- The Booster Pack will NOT charge via the USB connector. It will only charge via the Fast AC Charger or if the solar panel is connected to the solar panel connector on the Tracker (Solar Kit option).

*To see a visual history of the Tracker's charge/discharge status, connect to the Tracker via the **Houston Radar StatsAnalyzer** software and then **click on the battery icon**. A window will open that will track the charge status of the battery. It will also calculate the rate of charge or discharge of the battery. This is a helpful tool when debugging charging issues.*
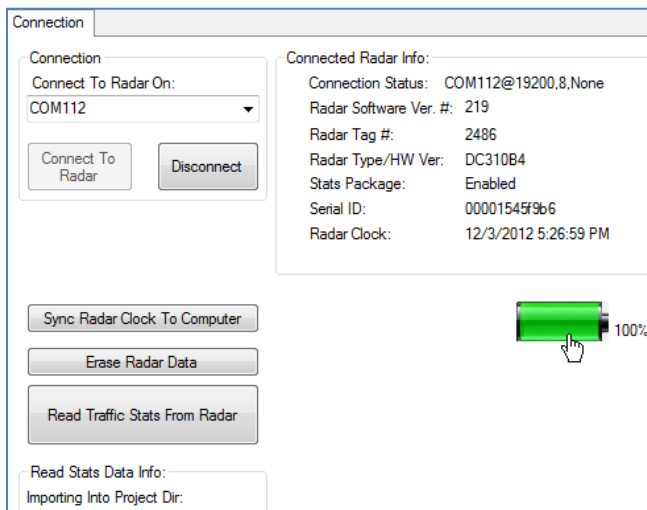
The Tracker also logs the battery charge, voltage, and ambient temperature every hour to internal data memory. These parameters are extracted when you retrieve the traffic statistics data from the Tracker and may be plotted. This will allow you to ensure that the solar charger is keeping the battery adequately charged.

5.0 Retrieving Data from the Tracker Using Houston Radar StatsAnalyzer

To view data collected by the Armadillo Tracker, the data must be copied from the radar to compatible software. The most commonly used software is Houston Radar's MS Windows based StatsAnalyzer program. The first step in the retrieval process is connecting to the Tracker using StatsAnalyzer. There are three methods of connection to retrieve data from the Tracker using StatsAnalyzer: wired USB, wireless Bluetooth, and optional remote cellular. This section will describe the USB and Bluetooth connections. The optional cellular connection is described in Section X.Y.

Different Microsoft Windows installations have different views and permissions. For assistance within Windows, please contact Microsoft or your IT support team.

For information on data retrieval using Houston Radar's Tetryon Cloud Server, please see the Houston Radar Tetryon Cloud Server User Manual. For information on data retrieval using Houston Radar's smartphone app, please see the Houston Radar Smartphone App User Guide.

5.1 Wired USB Interface

1.   Connect the provided Y-cable to the weatherproof connector on the bottom of the Tracker enclosure and hand tighten to secure the connection. Plug the USB connector on the other end into a USB jack on a Microsoft Windows computer on which StatsAnalyzer is installed.

2.   Power on the Tracker. Windows will detect a USB to RS232 converter and install/configure a COM port. If the computer is connected to the Internet, it will likely automatically install the drivers. Otherwise, download links for the USB drivers are located on the paperwork included with each device when shipped from the factory.

5.2 Wireless Bluetooth Interface

You must have a Bluetooth adapter on your computer to make a Bluetooth connection. A Class I USB Bluetooth adapter is provided with the Armadillo Tracker. In Windows, Bluetooth is usually indicated by an icon in the task bar.

We highly recommend using the provided Class I USB Bluetooth adapter even if your computer has a built-in Bluetooth adapter. Built-in adapters are usually Class II adapters with a 30-foot (10m) range and will only allow a connection if the computer is very close to the radar. The Tracker includes a high performance long-range Class I adapter that will perform best when paired with the provided Class I USB adapter.

For a new connection the computer's and Tracker's Bluetooth adapters must be paired. If the computer has previously been connected to the Tracker using Bluetooth, skip to the next section.

1. Open the Bluetooth interface on the computer by clicking on the Bluetooth icon in the task bar, and then scan for devices (or click on "*Add a device*"). All Houston Radar Bluetooth device names start with "**HR-BT…**"and the complete and unique name is also printed on the rear of the enclosure.
2. Once the scan locates the appropriate Tracker, right-click the new device icon and select "Pair" to establish the connection. Windows will then assign a COM port to this paired connection. A pairing key is usually not required but if it is requested, enter **1234**.

Each Tracker must be paired with the computer before a connection in StatsAnalyzer can be established.

The Bluetooth adapter in the Armadillo Tracker is not available to transfer data (even though it's discoverable and can be paired) if the Armadillo Tracker is simultaneously connected to a computer over a USB port. The Armadillo Tracker's Bluetooth adapter is not affected by being connected to the Fast AC Charger or a dedicated USB charger.

5.3 Retrieving Data Using USB or Bluetooth Connection

Open StatsAnalyzer on the computer connected to the appropriate Tracker.

1. Click "Connect to Radar" from the menu bar at the top of the StatsAnalyzer screen. This will open a new "Connect To Radar" window.
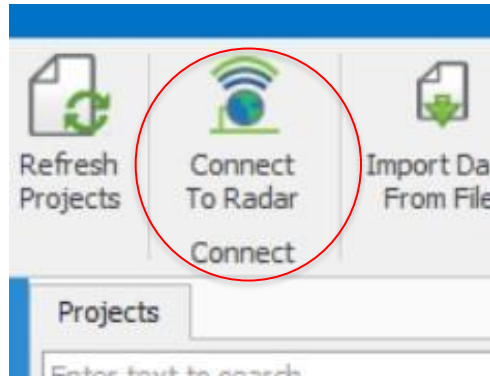

2. From the drop-down menu in the top left corner of the "Connect to Radar" window, select the appropriate COM port (identified with "Bluetooth Serial Port" in the name), as assigned by Windows, and then click on "Connect to Radar".
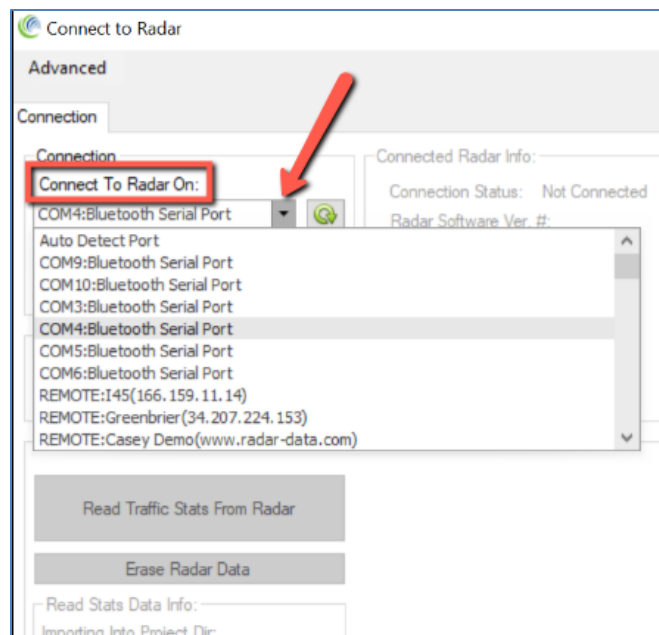
If "Auto Detect Port" is selected from this drop-down menu, StatsAnalyzer will search all available COM ports in parallel to find a paired or connected radar. Otherwise, the software will only search on the selected port. If the radar is not detected, it can be advantageous to select the actual port the radar is connected to, as this is the only case where Windows connection errors are shown to the user. These errors are helpful to deduce the reason for the connection problems (e.g., if the port is already open or inaccessible).

3. Two successive windows are displayed when the radar is found by StatsAnalyzer. The first indicates which COM port the radar is attached to and what baud rate is used. The second indicates some details about the connected radar, such as its firmware version and internal date & time. Click "OK" on each window to proceed.
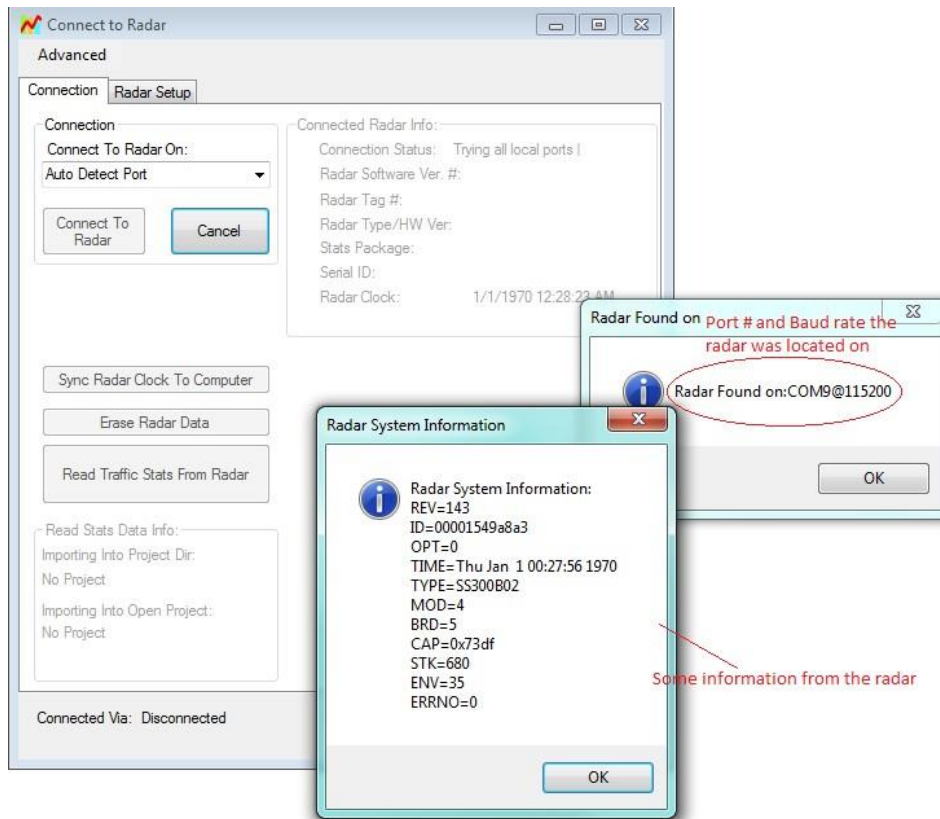
4. Select "Read Traffic Stats from Radar", which will open a "Save As" window.
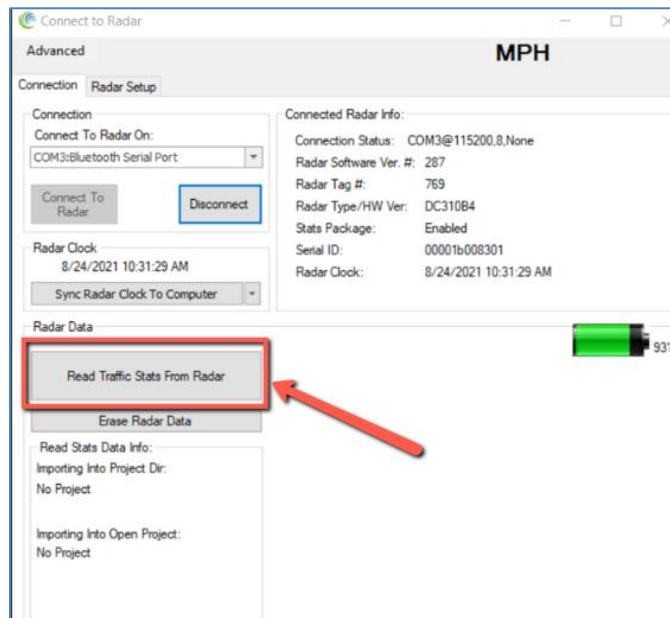
5. Select the preferred location to save the *.dat file created from reading the Tracker's data. We recommend using the default file name created by StatsAnalyzer but you may assign a user-defined file name, then select "Save".
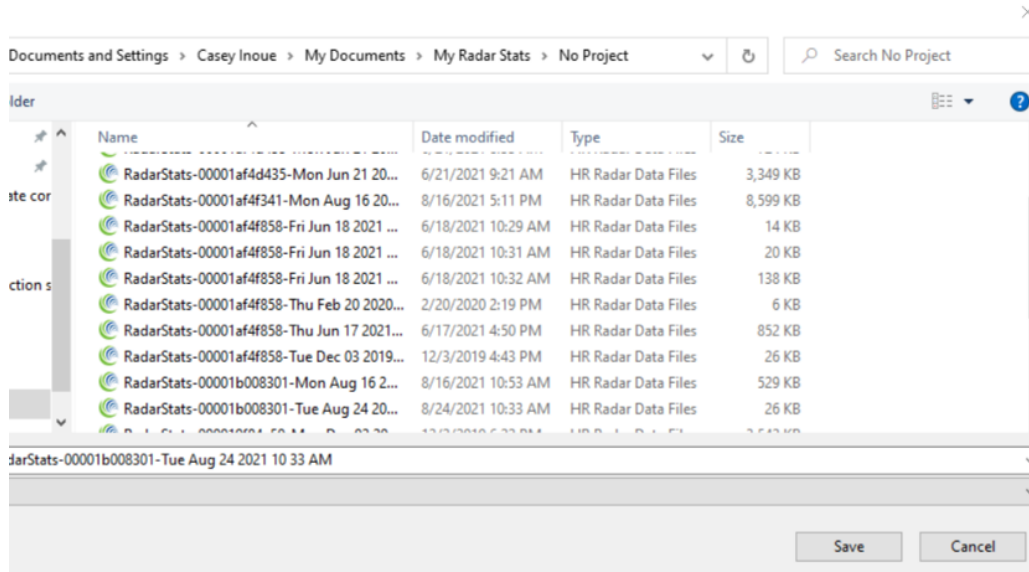
6. The time it takes to read the Tracker's data is proportional to the amount of data being read – the more data stored in the radar, the longer the read process will take. Once the read is complete, a prompt will display to import the data into a StatsAnalyzer project. Select "Yes" and reference Section 6.3.1 to import data into a new or existing project. Select "No" to import the data into a new or existing project at a later time.

7. Once the reading of data is complete, it is recommended to select "Erase Radar Data". Erasing the radar data after each data retrieval can prevent the duplication of data in future retrieval efforts, and prevent confusion over multiple data ranges in future project management. Selecting "Erase Radar Data" will generate a new window from which to confirm the operation by clicking "OK".
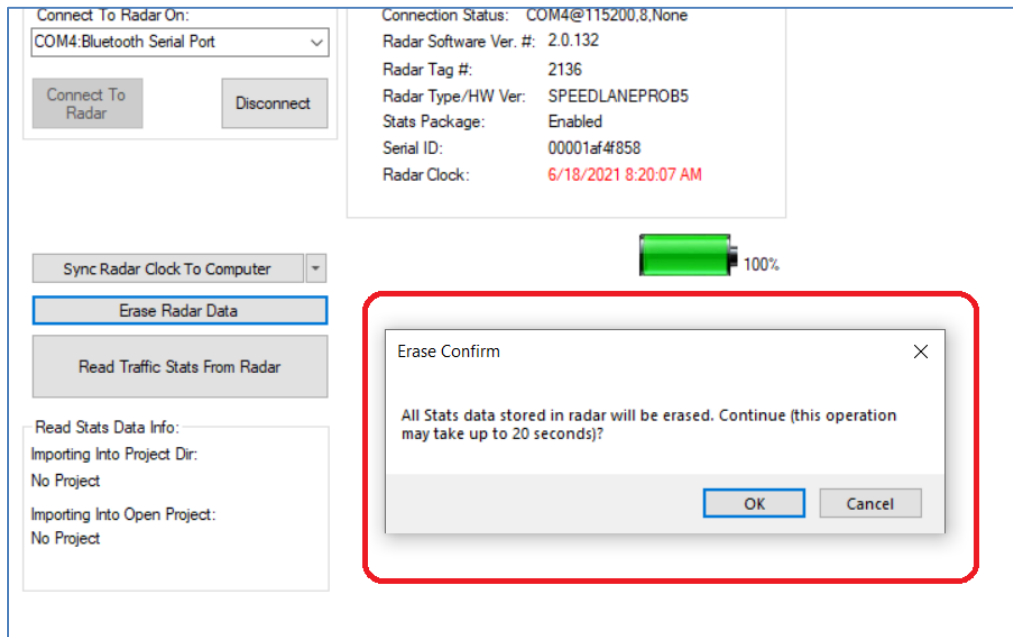
8. After erasing the radar data, select "Disconnect" or close the "Connect to Radar" window.

6.0 Importing Data into Houston Radar StatsAnalyzer to Generate Reports

Houston Radar's Windows-based StatsAnalyzer software is used to retrieve and analyze the stored data from Houston Radar products, generating detailed reports, graphs, and charts.The Houston Radar StatsAnalyzer installer is available for no extra cost and can be downloaded at: https://houston-radar.com/products/software/stats-analyzer-configuration-software/

The *Houston Radar Advanced StatsAnalyzer User Manual* is available on our website using the link above. It can also be downloaded to a smartphone or tablet by scanning the QR code below.

6.1 StatsAnalyzer Home Screen

Stats Analyzer contains the following navigation panes:
1. Menu Ribbon
2. Open Project List
3. Project Selection Area

The Menu Ribbon is located at the top of the application and organizes the features of the application into a series of tabs.

The Open Project List contains a list of all open projects and allows the Active Project to be selected.

The Project Selection Area shows the complete list of projects available from this instance of StatsAnalyzer. If you open a project, this section shows you details of the open project.

The screenshot on the following page shows the various sections. Each command or feature is highlighted with a number; see below for detailed description for each item.
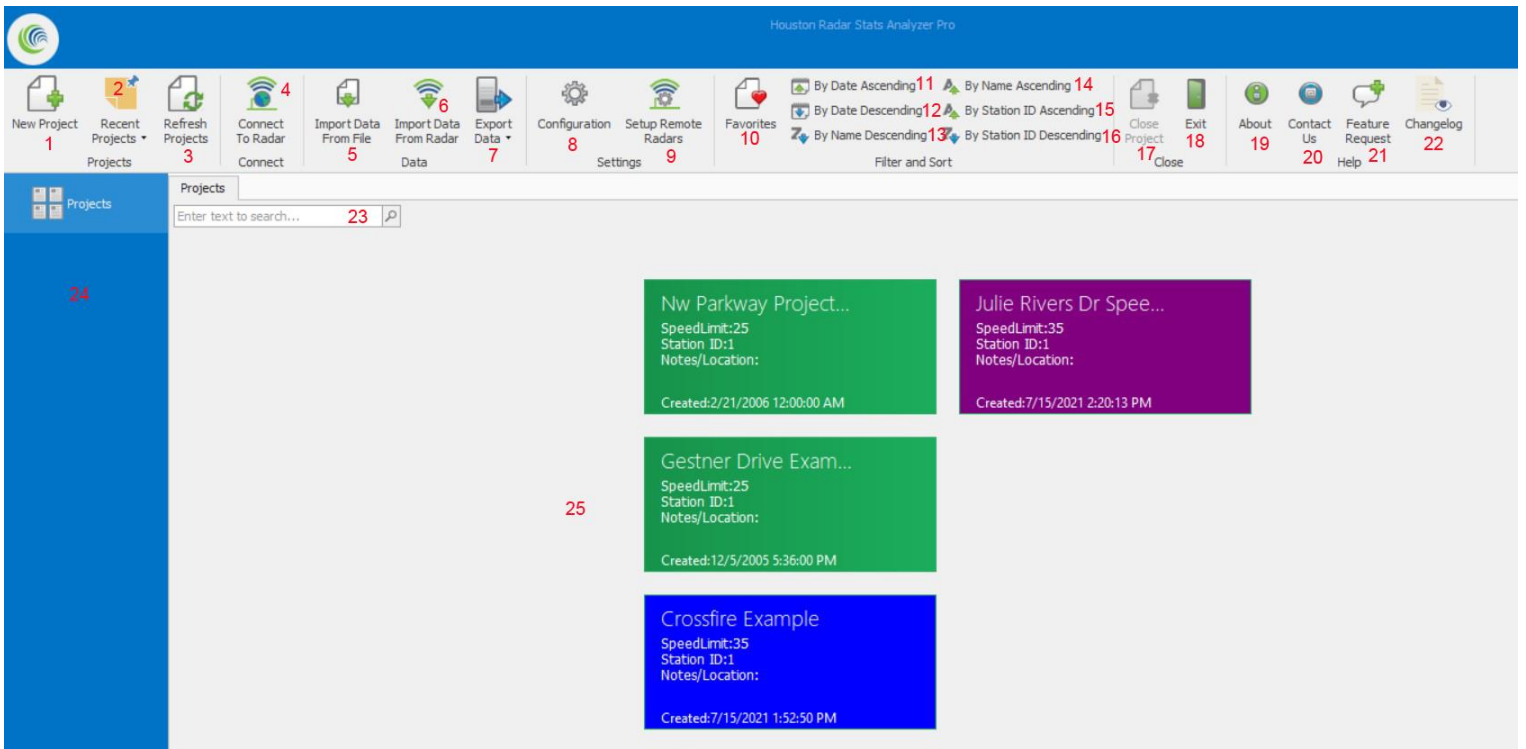
1) New Project: Create a new project
2) Recent Projects: Show a list of recently opened projects
3) Refresh Projects: Refresh data from projects
4) Connect To radar: Display the Radar Connection dialog window
5) Import Data From File: Imports data from a *.dat file into a project via the Data Import Wizard
6) Import Data From Radar: Imports data from a radar
7) Export Data: Performs a data export from the currently selected project
8) Configuration: Display the Stats Analyzer Configuration dialog window
9) Setup Remote Radars: Configure remote radars accessible over TCP/IP networks
10) Favorites: how only those projects that have been marked as a "favorite"
11) By Date Ascending: Sort projects by date ascending in the Project Selection Area.
12) By Date Descending: Sort projects by date descending in the Project Selection Area
13) By Name Descending: Sort projects by name descending in the Project Selection Area.
14) By Name Ascending: Sort projects by name ascending in the Project Selection Area
15) Station ID Ascending: Sort projects by Station ID ascending in the Project Selection Area
16) Station ID Descending: Sort projects by Station ID descending in the Project Selection Area
17) Close Project: Close the currently selected project.
18) Exit: Exit StatsAnalyzer.
19) About: Display the software version number
20) Contact Us: Launch your email client to send an email to Houston Radar
21) Feature Request: Launch your email client to request a feature from Houston Radar
22) Change Log: View list of changes from previous software version
23) Name Filter: Enter text in this box to only show projects containing the text entered.
24) Open Project Pane: Lists currently open projects.
25) Project Selection Pane: Displays a list of projects.

6.2 Stats Analyzer Configuration Window

The Configuration window contains options and values for organizing how data is presented in StatsAnalyzer reports and exports.
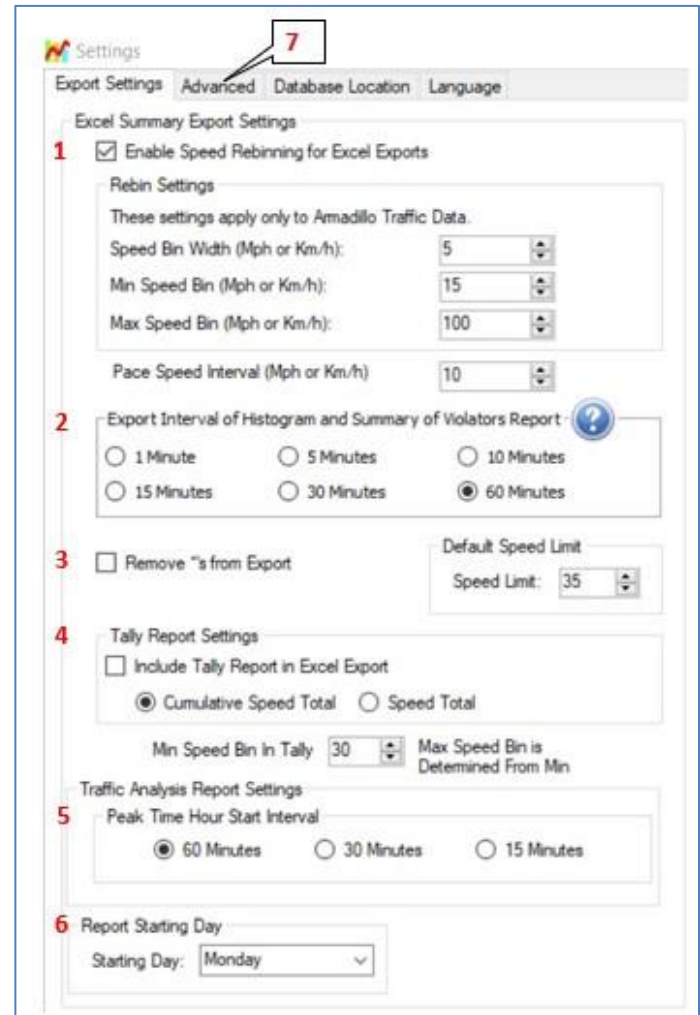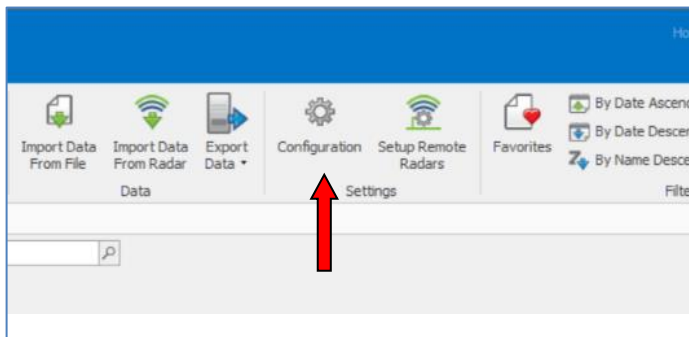

1. "Enable Speed Rebinning for Excel Reports" affects the configuration of the exported "Histogram" reports (Incoming/Outgoing, or Merged), and adds a line for Pace on the "Summary" reports. The first speed bin column in the Histogram reports includes the volume of all vehicles less than the "Min Speed Bin" value. The last speed bin column tops out at the "Max Speed Bin" value. Each speed bin column in between those two are grouped based on the "Speed Bin Width" value. The "Pace Speed Interval" is the range of speed in which a plurality of vehicles is traveling. Pace is also shown on the Summary reports.
2. The "Export Interval of Histogram and Summary of Violators Report" value determines the intervals of time displayed in the "Histogram" and "Summary of Violators" reports.
3. The checkbox for "Remove *s from Export" toggles zeros or asterisks to represent no data.
4. The "Tally Report Settings" is described on pages 35-36 of the StatsAnalyzer user manual.
5. The "Peak Time Hour Start Interval" value determines if the Peak Time on the Summary page starts at (for example) 7:00, 7:30, or 7:15.
6. "Report Starting Day" impacts which day of the week is listed first in weekly reports.
7. "Advanced" tab – "Extend Raw Data" – Sequence Numbers in Raw will add the GPS coordinates in a new column in Raw Data.

6.3 Importing Data into Projects

To view collected data, that data must be imported into a project within StatsAnalyzer. There are two import methods: "Import Data From Radar" and "Import Data From File".

6.3.1 Import Data From Radar

Use this import method in instances when you have access to a radar (via Bluetooth, USB, or cellular) that has stored data not yet retrieved for analysis.
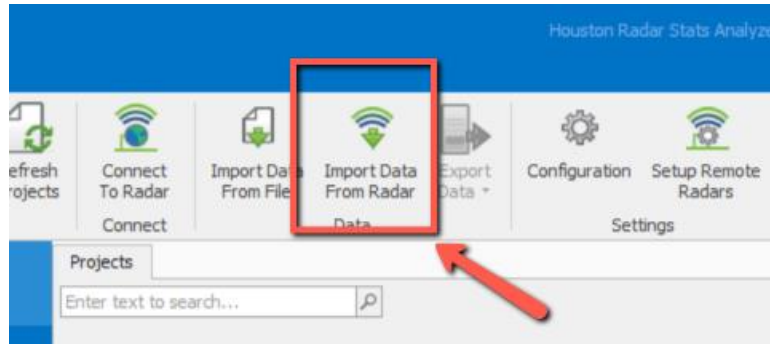
1. Click "Import Data from Radar" from the StatsAnalyzer menu bar. Follow the instructions in Section 5.0 "Retrieving Data from the Tracker Using StatsAnalyzer" until the prompt to import the data into a StatsAnalyzer project.

2. Select "Yes" and a "Project Import" window will display.
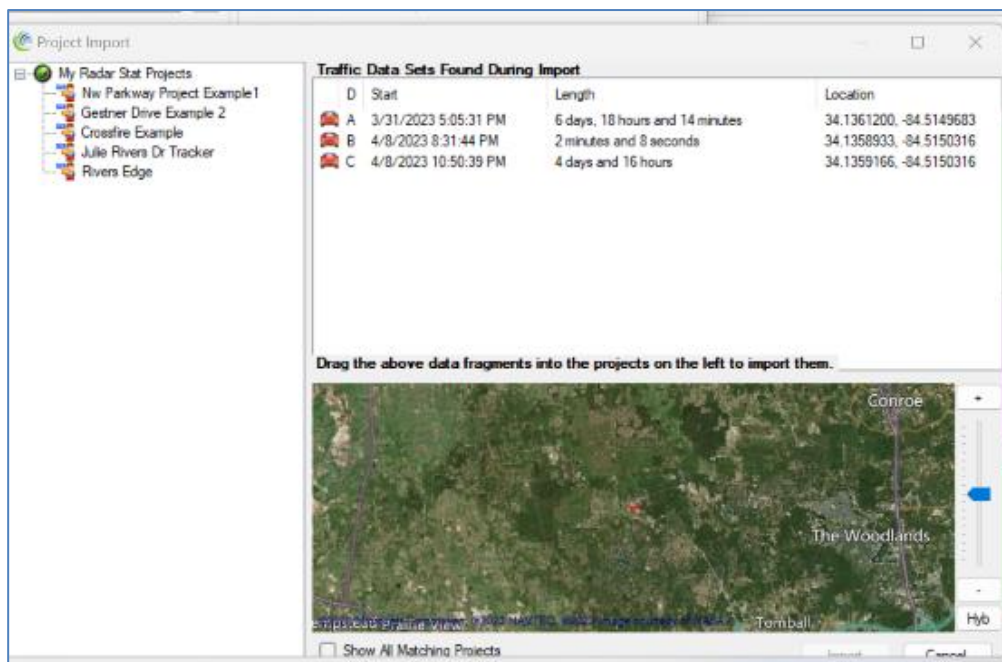
3. The left pane has a list of existing projects. Drag and drop the data from the pane on the right into an existing project on the left. If you have more than one data set, you can drag them to different projects.
    a. To create a new project, right-click in the left pane with the list of existing projects, then click on the resulting window "Create New Project". Type in a name for the new project and hit enter. You can then drag and drop the data from the right pane onto the new project.

4. Click "Import" in the bottom right of the "Project Import" window. When the process is complete, you will see a new window indicating the import was completed successfully.

5. Once the traffic stats are read you may choose to erase the Tracker's data memory with the "Erase Radar Data" button in the "Connect to Radar" window. This will prevent the same data being imported next time.

   Note: When importing the data directly from the radar, the data is still saved into an intermediate ".dat" file and then imported from that file into StatsAnalyzer. This .dat file is never modified by StatsAnalyzer and data may be reimported as many times as you wish. You may also email this .dat file to a colleague. Delete or trimming imported data in a project does not affect data stored in this .dat file.

6.3.2 Import Data From File

Use this import method if data was previously retrieved from a radar without being imported into a project.
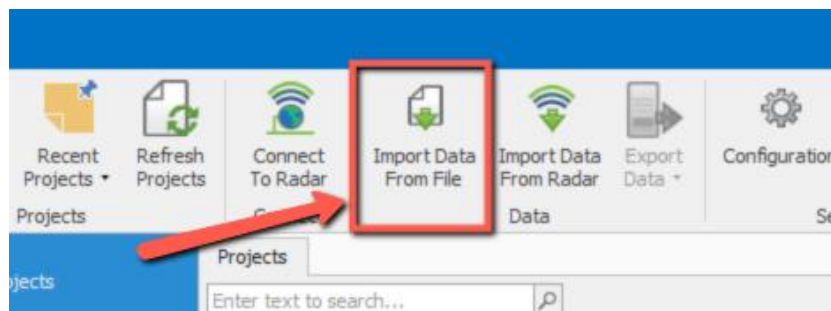
1. Click "Import Data From Radar" from the StatsAnalyzer menu bar. A new window will be displayed, from which you can navigate to the location in which a data file was previously saved.

2. Select the appropriate *.dat file, click "Open", and a "Project Import" window will display.
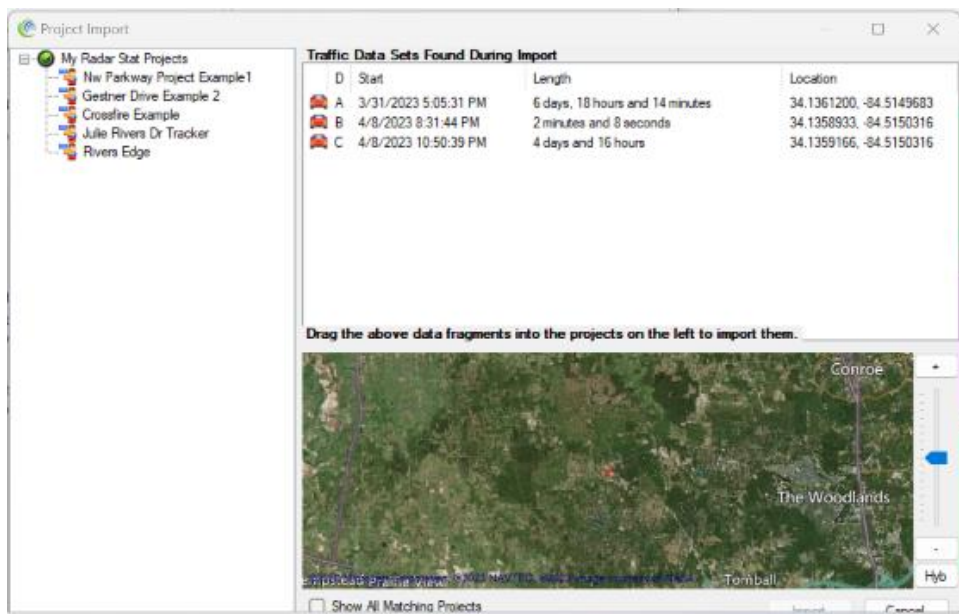
3. The left pane has a list of existing projects. Drag and drop the data from the pane on the right into an existing project on the left. If you have more than one data set, you can drag them to different projects.

a. To create a new project, right-click in the left pane with the list of existing projects, then click on the resulting window "Create New Project". Type in a name for the new project and hit enter. You can then drag and drop the data from the right pane onto the new project.

4. Click "Import" in the bottom right of the "Project Import" window. When the process is complete, you will see a new window indicating the import was completed successfully.

6.4 Prepare Project for Analysis

After the import operation has been completed, your project has been created in StatsAnalyzer, and is available to open from StatsAnalyzer's Project Selection Pane. Use the computer's cursor to hover over the appropriate project, then click "Open".
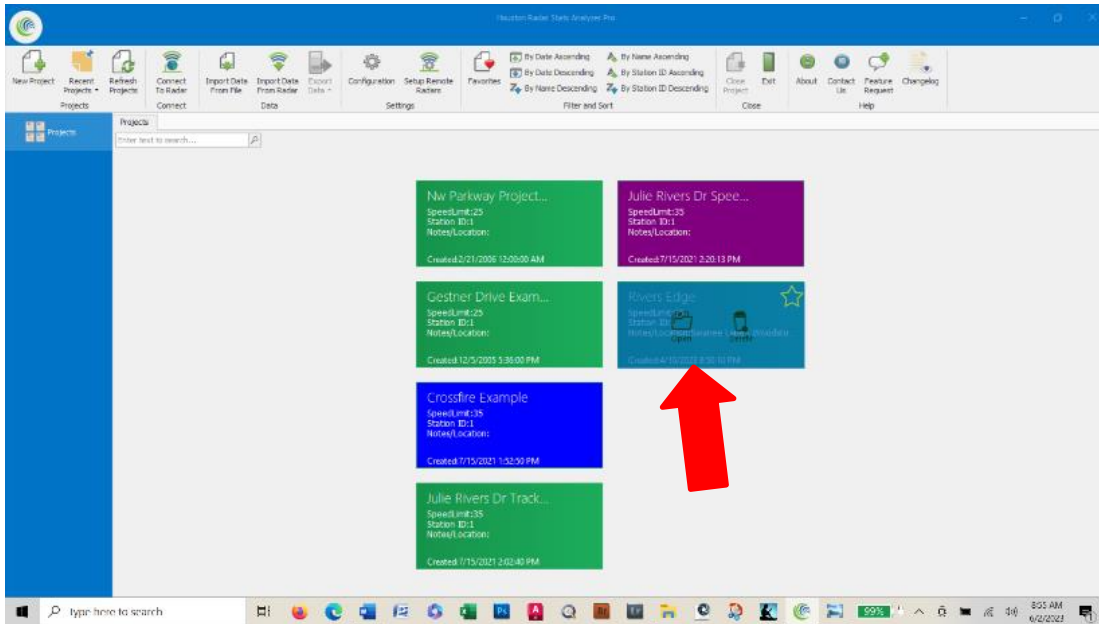
The Date Selection View tab shows you a calendar with days marked in **bold text** if data records are present.
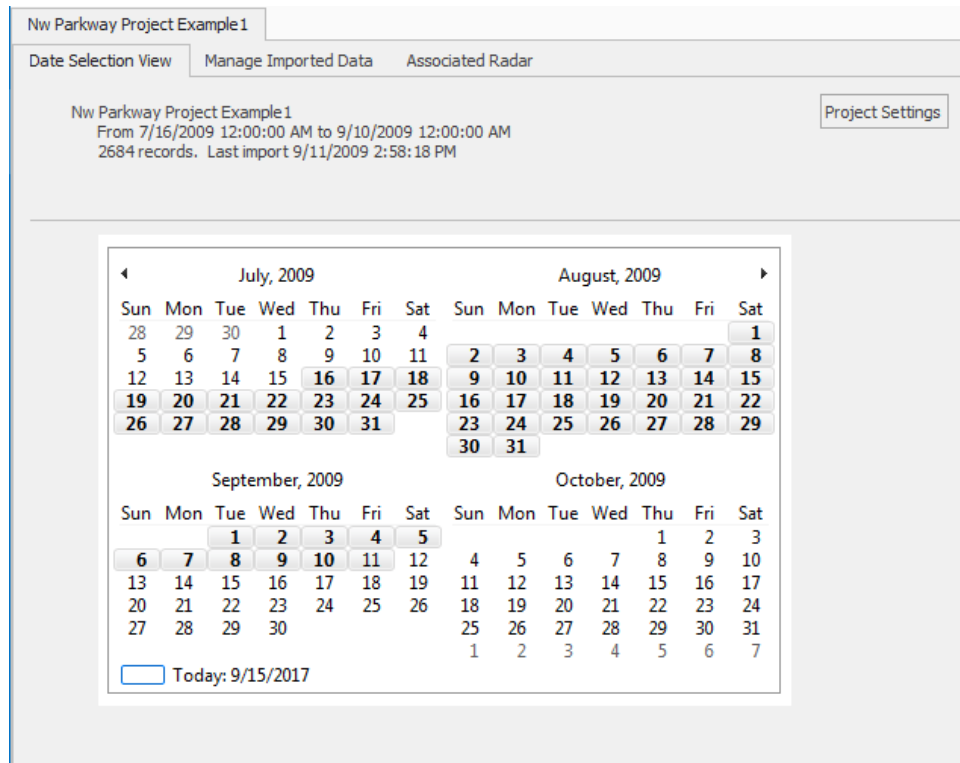
The Manage Imported Data tab displays a tree view which shows each imported dataset as an individual entry. If more than one dataset has been imported into this project, there will be multiple entries.
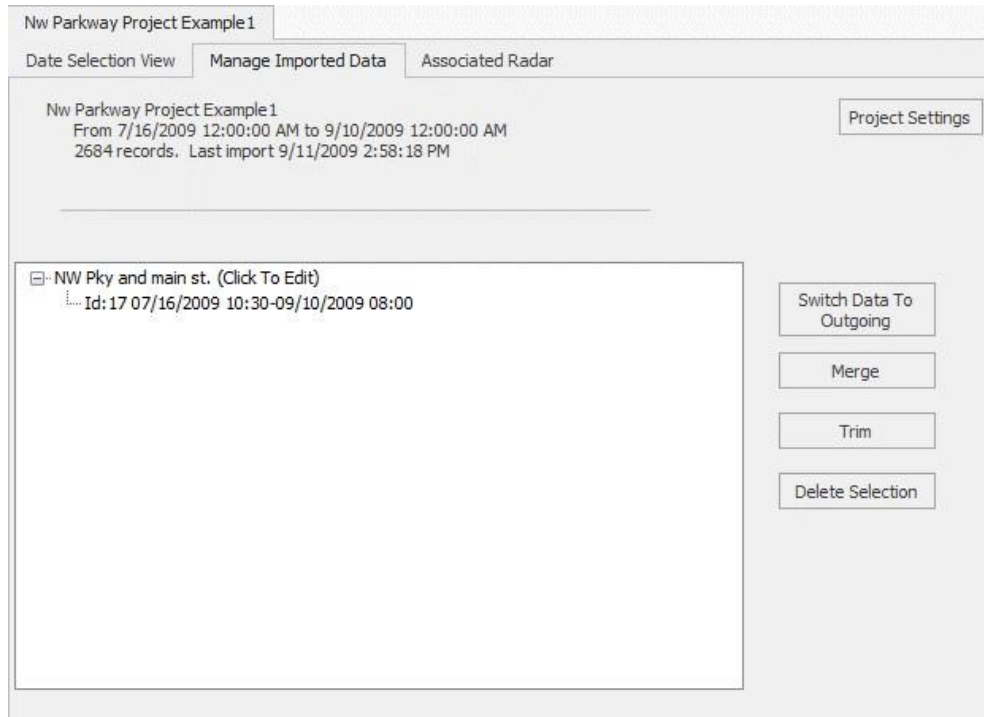
Once the data has been successfully imported from the radar into the project database, you can (optionally) rename the import by location name and/or traffic direction from the Manage Imported Data tab. To edit the label, see screenshot below.
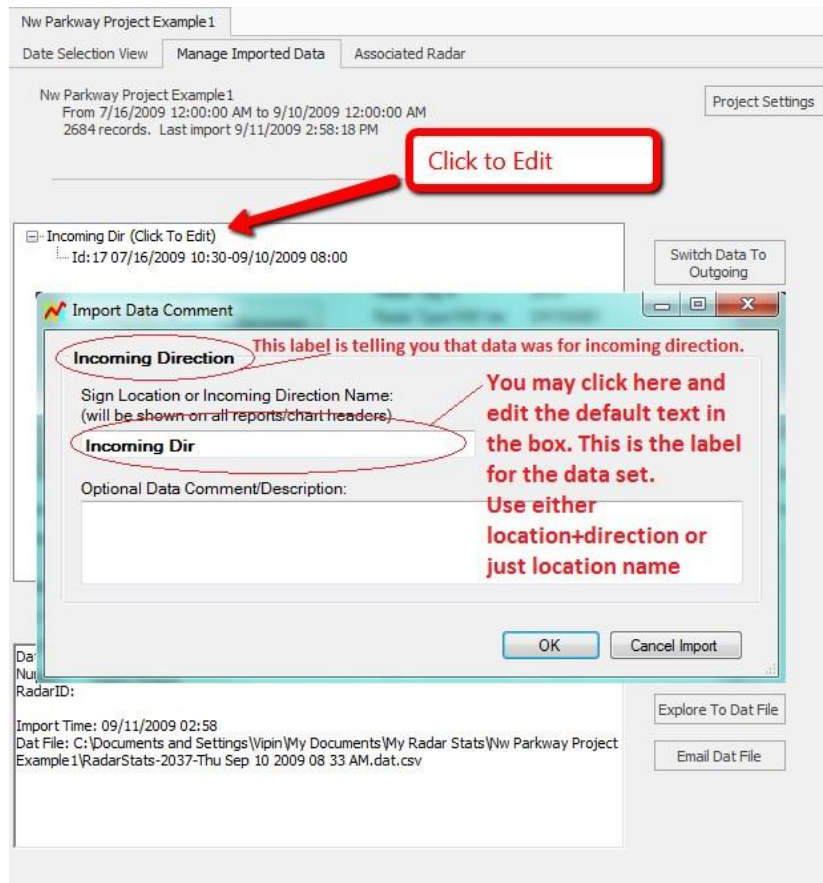
6.5 Organizing Data

The user is the best judge of how they want to organize their data. Projects can be created and deleted with ease, and without loss of data, as long as the *.dat files of data downloaded from the radar are saved. A user should feel free to try many types of organization methods. Some possibilities are:

Fixed location sign or data taken at various times from the same location.

If the sign is in a fixed location, or you return to the same location over different periods of time of the month or year, you may create a project for that location. Then you can import data at different times from the same location into the same project. This will allow you to analyze different sets of data from that location together and even run comparisons over time to see how traffic patterns are changing.

Speed studies at various locations.

In this case, you may want to create a project per speed study, or by date. There are pros and cons to each approach.

Project Per Speed Study: In this case, you may end up with a large number of projects. There is no inherent limitation to the number of projects allowed, but projects are created and displayed in a single level view and a lot of projects may get difficult to navigate after many studies.

Project per date: You may create a project date named in "year-month" format. This will allow easy navigation if you track your speed studies by date. StatsAnalyzer also allows you to sort projects alphabetically by name.

The software allows you to label each individual import of data from the radar. The project name and import label is printed on each report and chart. Thus, even if you collect your data by "Year-Month" format, you can easily have multiple speed studies in the same project even if they are from different sites.

There are several reports configured for the Armadillo Tracker in StatsAnalyzer available for viewing within the program, and for exporting for use outside of the program. Many of these reports have filtering and/or sorting features to aid in the data's analysis.

For more information on StatsAnalyzer projects, please reference the Houston Radar StatsAnalyzer User Manual.

7.0 Analyzing Data and Generating Reports

The Houston Radar StatsAnalyzer program is a powerful tool to analyze collected traffic data and generate reports. Traffic data may be selected by date or by choosing individual import records. There are several options and parameters to choose from when analyzing data in StatsAnalyzer reports.

7.1 Date Selection View

The Date Selection View of a project provides the opportunity to select several parameters for the reports to be generated.
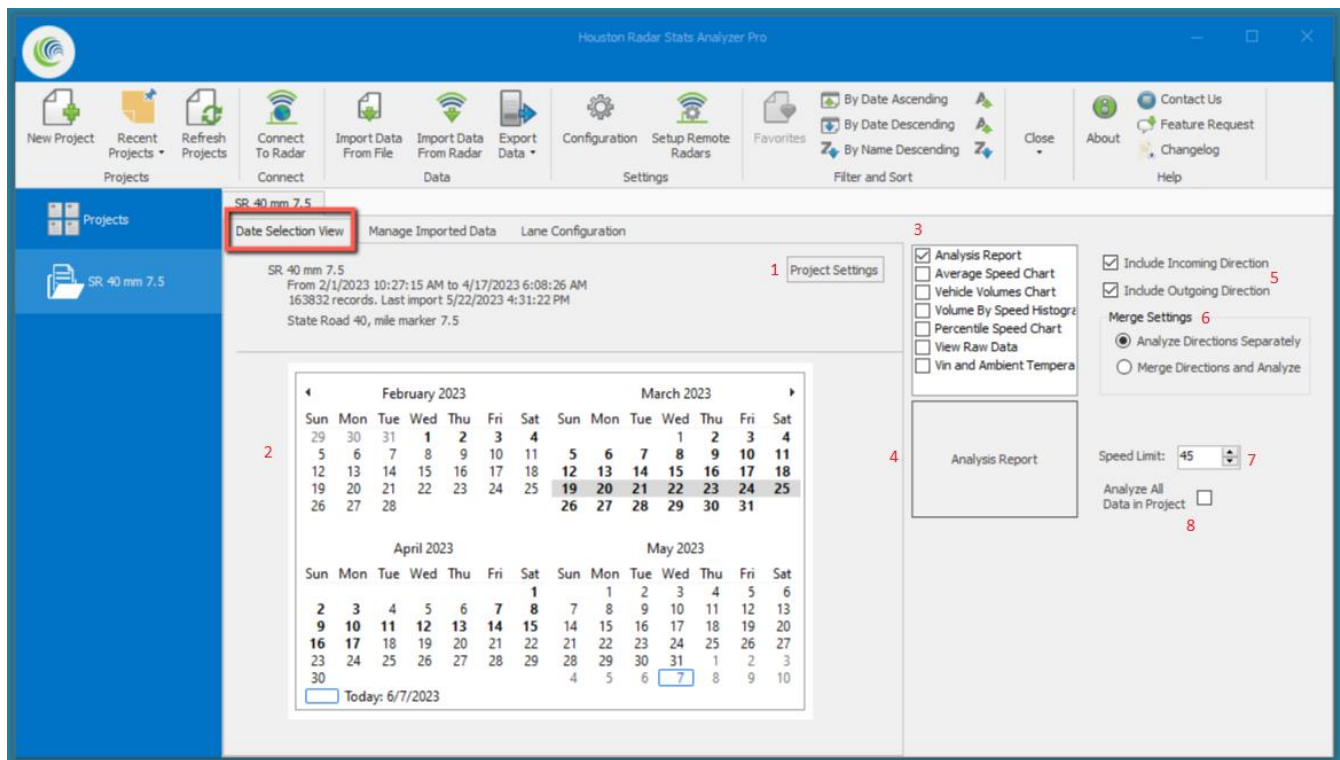
1. Project Settings: Edit the Project Name; Create or Edit Project Address or Notes; Edit the project Station ID
2. Calendar view: Select the date or range of dates to be included in the analysis. Dates **in bold text** indicate data is present.
3. Report selection: Choose which reports to include in the analysis (see Section X.Y for more information on the reports included with each selection)
4. Analysis Report: Action button to generate the analysis
5. Include Incoming/Outgoing Direction: If the project's data includes information for traffic both incoming and outgoing (relative to the Tracker's deployed position), this section will allow the option to include or exclude one of those directions.
6. Merge Settings: If the project's data includes information for traffic both incoming and outgoing (relative to the Tracker's deployed position), this section will all the option for each direction to be analyzed separately (generating separate reports for each direction) or merged (generating reports that totals the data from each direction).
7. Speed Limit: This value is auto-generated from the user-defined selection in the Configuration window (see Section X.Y), and can be adjusted before each analysis is conducted. Speeder data is generated based on this value.
8. Analyze All Data in Project: If selected, all data within this project will be analyzed, instead of the date, dates, or range of dates selected in the calendar view.

7.2 Manage Imported Data tab.

The Manage Imported Data tab of a project provides access to edit the imported data.

1. Project Settings: Edit the Project Name; Create or Edit Project Address or Notes; Edit the project Station ID
2. List of imported datasets: By default, all datasets are selected to be included in the analysis. Individual, and combinations of, datasets can be selected for the analysis.
3. Tools to edit project datasets.
4. Tools to find or share associated *.dat files.

7.3 Lane Configuration tab

The Lane Configuration tab provides access to data export settings unique to certain third-party software. For more information on the Lane Configuration tab, please reference the Houston Radar StatsAnalyzer User Manual, or contact Houston Radar's Service Department at support@houston-radar.com or +1.888.602.8111.

7.4 GPS Location Map tab (OPTIONAL)

The GPS Location Map tab is available for projects whose data was imported from an Armadillo Tracker with the optional GPS upgrade, or optional cellular modem with GPS upgrade.

1. Map with pushpins indicating the GPS coordinates where each dataset was collected.
2. Zoom slider to increase or decrease the map's level of resolution.
3. Toggle for different types of display – Map, Satellite, or Hybrid
4. List of each dataset with GPS coordinates in table format
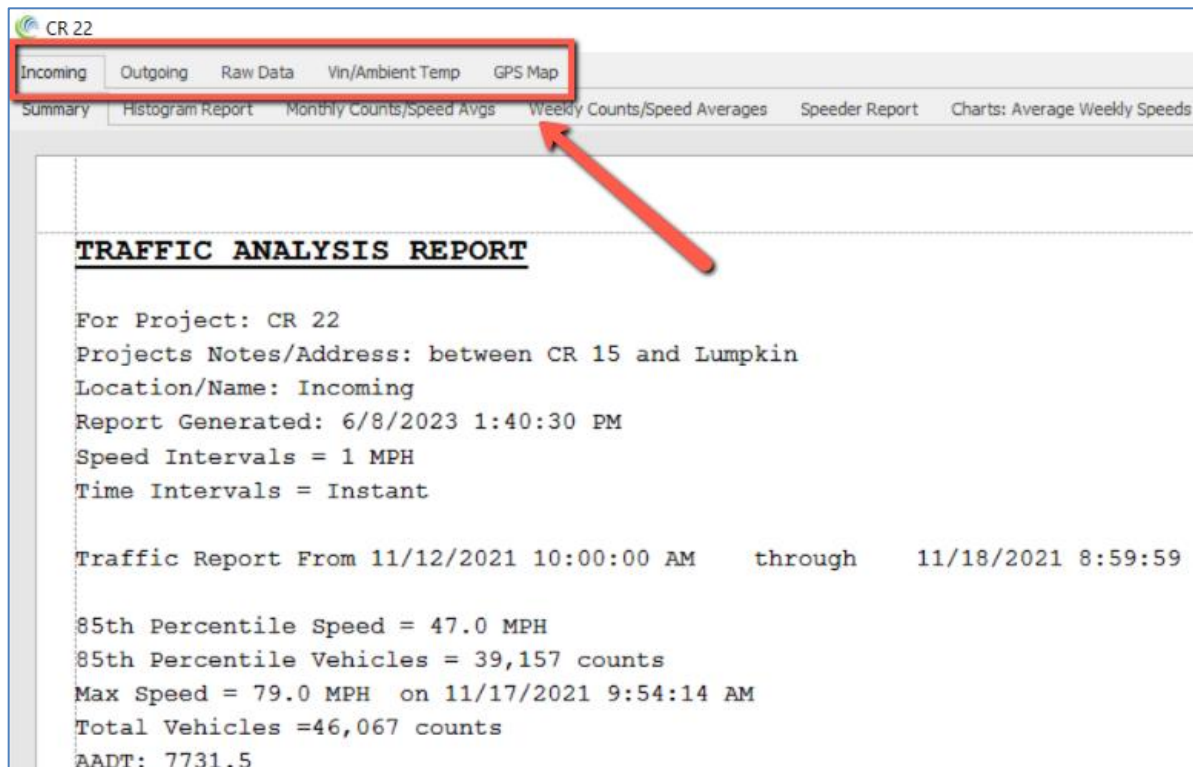
7.5 Conduct Data Analyses / Generate Reports

Within the Houston Radar ecosystem, the phrases "conduct an analysis", "generate a report", "run a report" (and similar) will have the same meaning, which is the action of having the StatsAnalyzer software process project data for review.

1. From the Project Selection Pane, open the project with the desired imported datasets by hovering the cursor over the project and then clicking "Open."
2. From the Date Selection View tab:
    a. Choose the date or range of dates to analyze. Note that this action will generate the report from a merge of all imported data in this project that matches the date/time stamp of the records in the dataset.
    b. Check the appropriate boxes for which reports to generate.
    c. Select, as desired, the directions to analyze.
    d. Adjust, as needed, the speed limit for the roadway from which the data was collected.
    e. Click the "Analysis Report" button.

Once the "Analysis Report" button has been clicked, a new window will be displayed within StatsAnalyzer. This window will display the selected data across various tabs for the selected reports.

7.6 Navigating StatsAnalyzer's Reports Window

The window to review data reports will have several tabs to choose from, depending on the reports and directional options selected in the previous step. The tabs at the top of this window separate reports by direction (Incoming & Outgoing), and offer directionless reports, such as the Raw Data, Voltage & Temperature, and GPS locations.

When the Incoming or Outgoing tabs are selected, the row of tabs below them will display the various reports selected from the previous step.
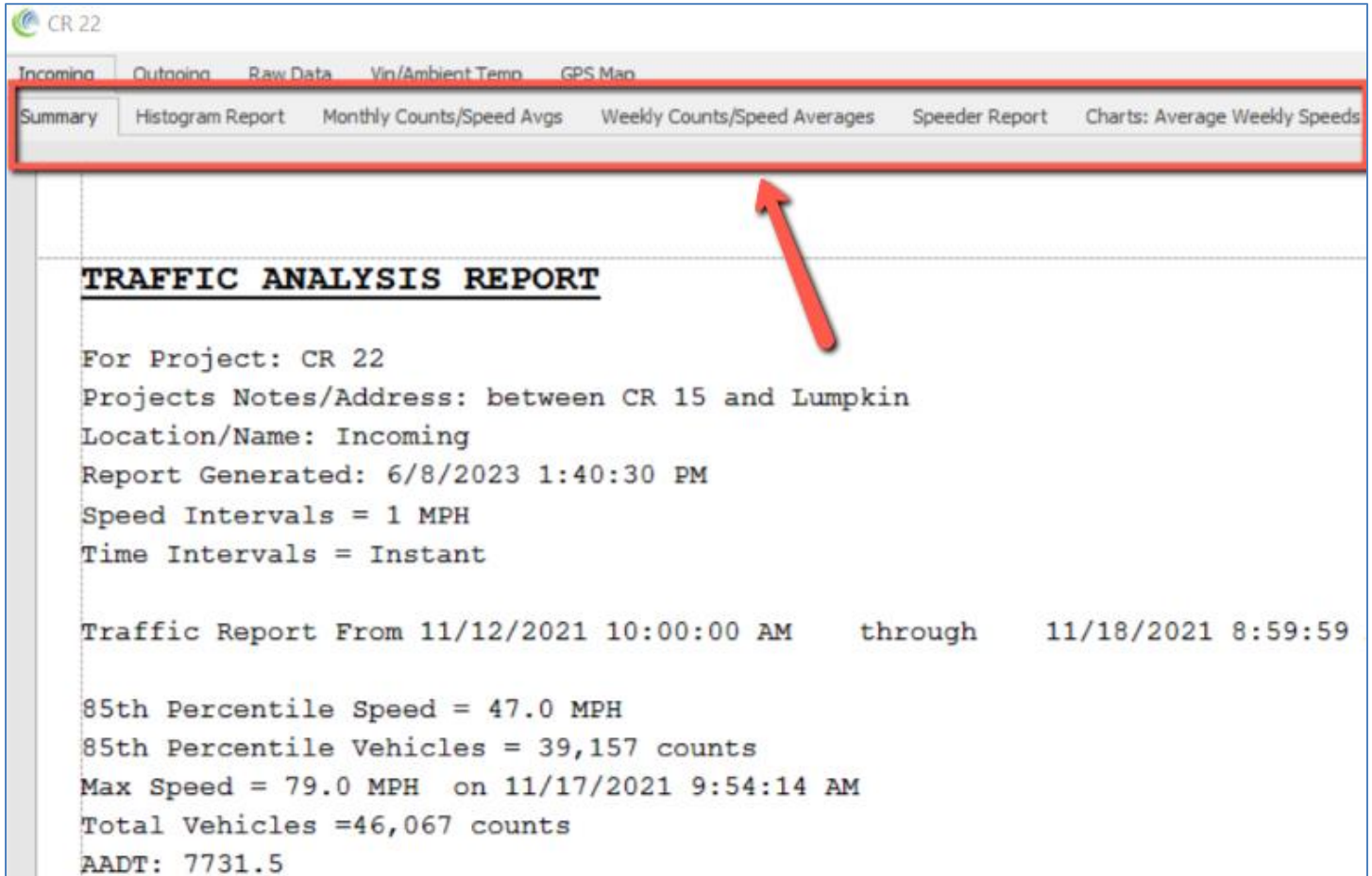
The right side of the reports window will display options for filtering the report data by size classification, gap, binned volumes, and duration.
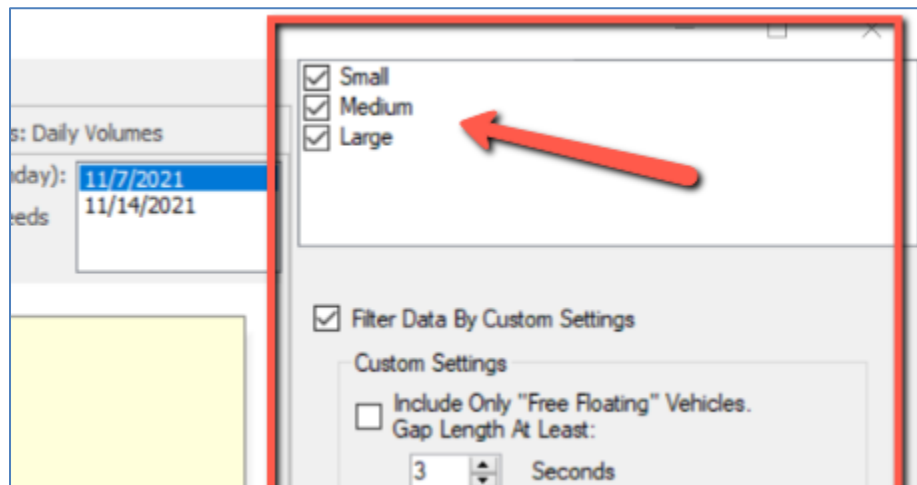
7.7 Available Reports in StatsAnalyzer

Following is a list of reports StatsAnalyzer can generate for the Armadillo Tracker, including the user actions available for each.

*Summary (filter by direction and class)

*Histogram (filter by direction and class)

*Monthly (filter by direction, class, month, and Custom Settings)

- Counts
- Average Speeds
- 85th Percentile Speeds
- Speeder Counts
- Average Speeder

*Weekly (filter by direction, class, week, and Custom Settings)

- Counts
- Average Speeds
- 85th Percentile Speeds
- Speeder Counts
- Average Speeder

*Speeder

*Chart – Average Weekly Speeds (filter by direction, class, week, and Custom Settings)

*Chart – Average Weekly Volumes (filter by direction, class, week, and Custom Settings)

*Chart – Daily Volumes (filter by direction, class, week, and Custom Settings)

Raw Data (filter by date range, speed range, and class)

Chart – Average Speed (filter by direction, class, and Custom Settings)

- available intervals of 1 min, 5 min, 15 min, 30 min, 1 hr, 2 hr, 4 hr, raw data

Chart - Vehicle Volumes graph (filter by lane, class, and Custom Settings)

- available intervals of 5 min, 15 min, 30 min, 1 hr, 2 hr, 4 hr, 8 hr

Chart – Histogram Vehicle Volumes vs Speed (filter by direction, class, and Custom Settings)

Chart - Percentile Speed graph (filter by lane, class, and Custom Settings)

Chart - Power Supply Voltage/Ambient Temperature/Battery Charge (filter by date range and Custom Settings)

GPS Map

* Indicates report is included with selection of "Analysis Report".

The Summary, Histogram, and Raw Data reports are most often referenced by users. Examples of each are included in the following pages, with notations for common data points of interest.

7.7.1 Summary Report (Incoming or Outgoing)

TRAFFIC ANALYSIS REPORT

For Project: SR 40 mm 7.5
Projects Notes/Address: State Road 40, mile marker 7.5   **1**
Location/Name: Incoming
Report Generated: 5/26/2023 1:42:11 PM
Speed Intervals = 1 MPH
Time Intervals = Instant

Traffic Report From 2/1/2023 10:00:00 AM   through   4/17/2023 6:59:59 AM   **2**

85th Percentile Speed = 56.0 MPH
85th Percentile Vehicles = 64,694 counts
Max Speed = 97.0 MPH on 3/23/2023 2:24:34 PM   **3**
Total Vehicles =76,111 counts
AADT: 1016.5

Volumes - weekly vehicle counts

	Time	5 Day	7 Day
AM Peak	6:30 AM to 7:30 AM	153	124
PM Peak	4:00 PM to 5:00 PM	285	227

4

Speed

85th Percentile Speed: 56.0 MPH
50th Percentile Speed: 50.0 MPH   **5**
10 MPH Pace Interval: 46.0 MPH to 56.0 MPH
Average Speed: 48.7 MPH

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Count over limit	5456	10246	11887	11820	8244	5420
% over limit	75.1	83.8	78.7	75.4	67.0	66.5
Avg Speeder	52.2	52.7	52.5	52.5	52.6	52.7
Avg Speed	49.2	50.6	49.3	48.6	47.2	47.3

6

Class Counts

	Number	%
VEH_SM	3687	4.8
VEH_MED	68682	90.2
VEH_LG	3742	4.9

[VEH_SM = motorcycle, VEH_MED = sedan, VEH_LG = truck]

7

1. Project information, including project name, notes, and timestamp of the analysis

2. Time range of reported data

3. 85th percentile speed, number of vehicles within the 85th percentile speed, total volume, and Average Daily Traffic (or Annual Average Daily Traffic, depending on range of time)

4. AM and PM peak times for volume

5. 50th percentile speed, pace speed range, and average speed

6. Speed violator information

7. Volume by size classification

7.7.2 Histogram Report (Incoming or Outgoing)

from Fri-Nov-12-2021-10-00-AM to Thu-Nov-18-2021-08-59-AM

Starting Hr:min	<20	20 to <30	30 to <40	40 to <50	50 to <60	60 to <70	70 to <80	80 to <90	90 to >100	Total Counts	Avg Speed (MPH)	85pct Speed	10MPH Pace	% in pace	# of Speeders	% Speeders	VEH_SM	VEH_MED	VEH_LG
00:00	0	2	6	25	7	0	0	0	0	40	43.5	49.2	40 to 50	72.5	30	75.0	0	37	3
00:15	0	0	5	12	3	0	0	0	0	20	44	48	38 to 48	70.0	15	75.0	0	20	0
00:30	0	0	4	27	4	0	0	0	0	35	44.7	48	40 to 50	85.7	29	82.9	0	34	1
00:45	0	0	8	22						32	42.8	47	38 to 48	81.3	22	68.8	0	31	1
01:00	0	0	0	9	4	0	0	0	0	13							0	13	0
01:15	0	0	11	16	2	0	0	0	0	29	42.2	46.5	35 to 45	79.3	17	58.6	0	27	2
01:30	0	0	3	9	3	0	0	0	0	15	43.3	49.5	40 to 50	73.3	11	73.3	0	15	0
01:45	0	0	5	10	4	1	0	0	0	20	44	49.7	40 to 50	65.0	14	70.0	0	19	1
02:00	0	0	4	11	1	0	0	0	0	16	43.3	47	38 to 48	87.5	10	62.5	0	16	0
02:15	0	0	3	12	1	0	0	0	0	16	42.3	46.7	40 to 50	81.3	11	68.8	0	16	0
02:30	0	0	1	10	2	0	0	0	0	13	44.9	49	39 to 49	76.9	11	84.6	0	13	0
02:45	0	0	3	14	2	1	0	0	0	20	45.1	48	38 to 48	80.0	16	80.0	0	20	0
03:00	0	0	3	5	1	0	0	0	0	9	43.2	46	36 to 46	88.9	5	55.6	0	8	1
03:15	0	0	2	8	3	0	0	0	0	13	43.9	50	35 to 45	76.9	10	76.9	0	13	0
03:30	0	0	5	6	2	0	0	0	0	13	42.6	49	35 to 45	69.2	7	53.8	0	13	0
03:45	0	0	1	1	1	1	0	0	0	4	50	55	36 to 46	50.0	3	75.0	0	4	0
04:00	0	0	0	5	2	0	0	0	0	7	47.4	54	38 to 48	71.4	7	100.0	0	7	0
04:15	0	0	0	3	1	0	0	0	0	4	46.5	47	37 to 47	75.0	4	100.0	0	4	0

1. Starting time and user-defined intervals of analysis

2. Volume by user-defined speed bins per interval

3. Average speed, 85th percentile speed, pace speed data, and speed violator data per interval

4. Volume by size classification per interval

7.7.3 Raw Data Report

|	Timestamp	Speed	Class	Direction	Is Outgoing	Lane	GPS	Sequence
1	11/12/2021 10:59:10 AM	41.0	Medium	Incoming	False	1	33.9214366,-83.3492583	1134880
2	11/12/2021 10:59:13 AM	49.0	Medium	Incoming	False	1	33.9214366,-83.3492583	1134881
3	11/12/2021 10:59:14 AM	48.0	Medium	Incoming	False	1	33.9214366,-83.3492583	1134882
4	11/12/2021 10:59:28 AM	38.0	Large	Incoming	False	1	33.9214366,-83.3492583	1134883
5	11/12/2021 10:59:39 AM	39.0	Medium	Outgoing	True	2	33.9214366,-83.3492583	1134884
6	11/12/2021 10:59:40 AM	41.0	Medium	Outgoing	True	2	33.9214366,-83.3492583	1134885
7	11/12/2021 10:59:43 AM	43.0	Medium	Outgoing	True	2	33.9214366,-83.3492583	1134886
8	11/12/2021 10:59:45 AM	36.0	Large	Outgoing	True	2	33.9214366,-83.3492583	1134887
9	11/12/2021 10:59:46 AM	47.0	Medium	Outgoing	True	2	33.9214366,-83.3492583	1134888
10	11/12/2021 10:59:55 AM	38.0	Medium	Outgoing	True	2	33.9214366,-83.3492583	1134889

1. Record identification values

2. Individual vehicle data

3. Direction of travel values

4. GPS coordinates where data was collected (requires optional standalone GPS or optional cell modem with GPS)

7.8 Export and Print Data from StatsAnalyzer

Data displayed in StatsAnalyzer has limitations for how it can be shared and organized within the software. For those reasons, users will typically export or print the data so it can be shared and organized by other methods.

From the StatsAnalyzer reports window, click the "Export" button in the bottom right corner to export or print the displayed data. This action will display a new window with several options.
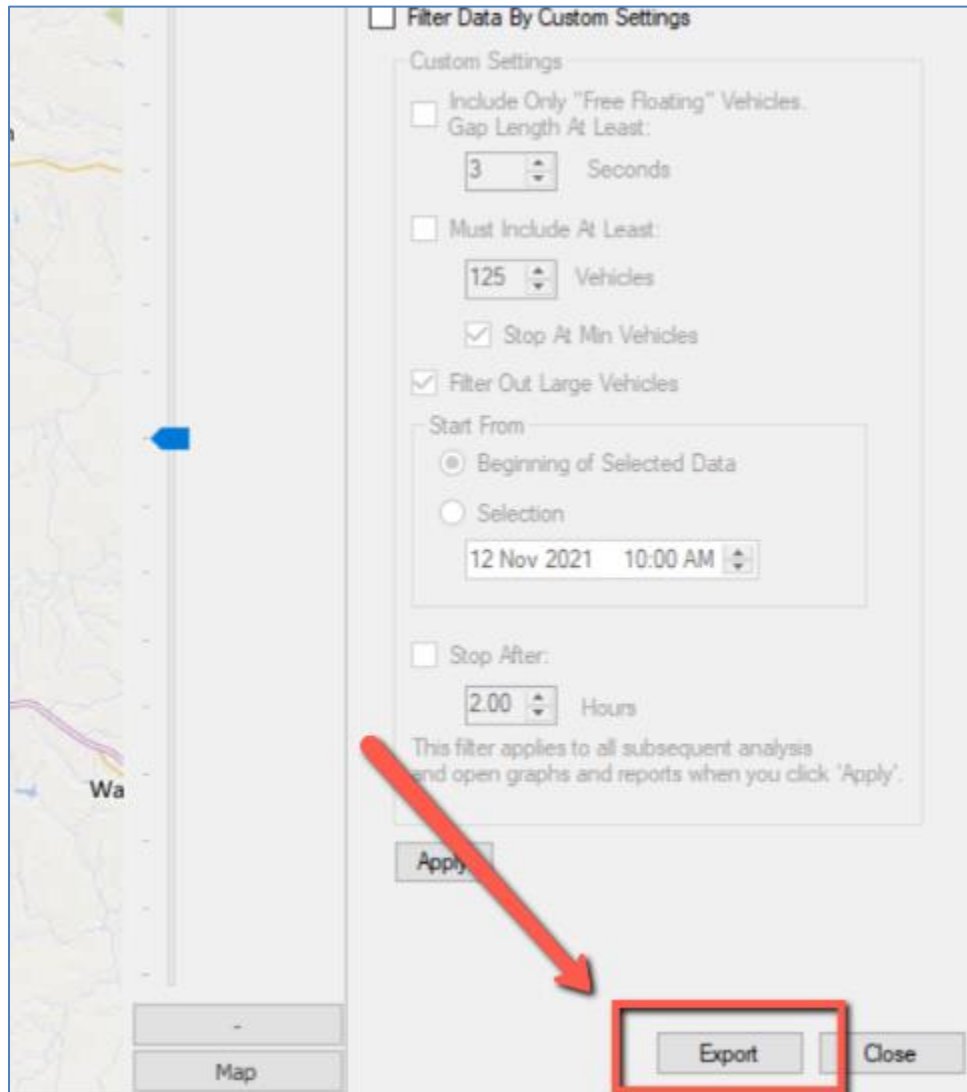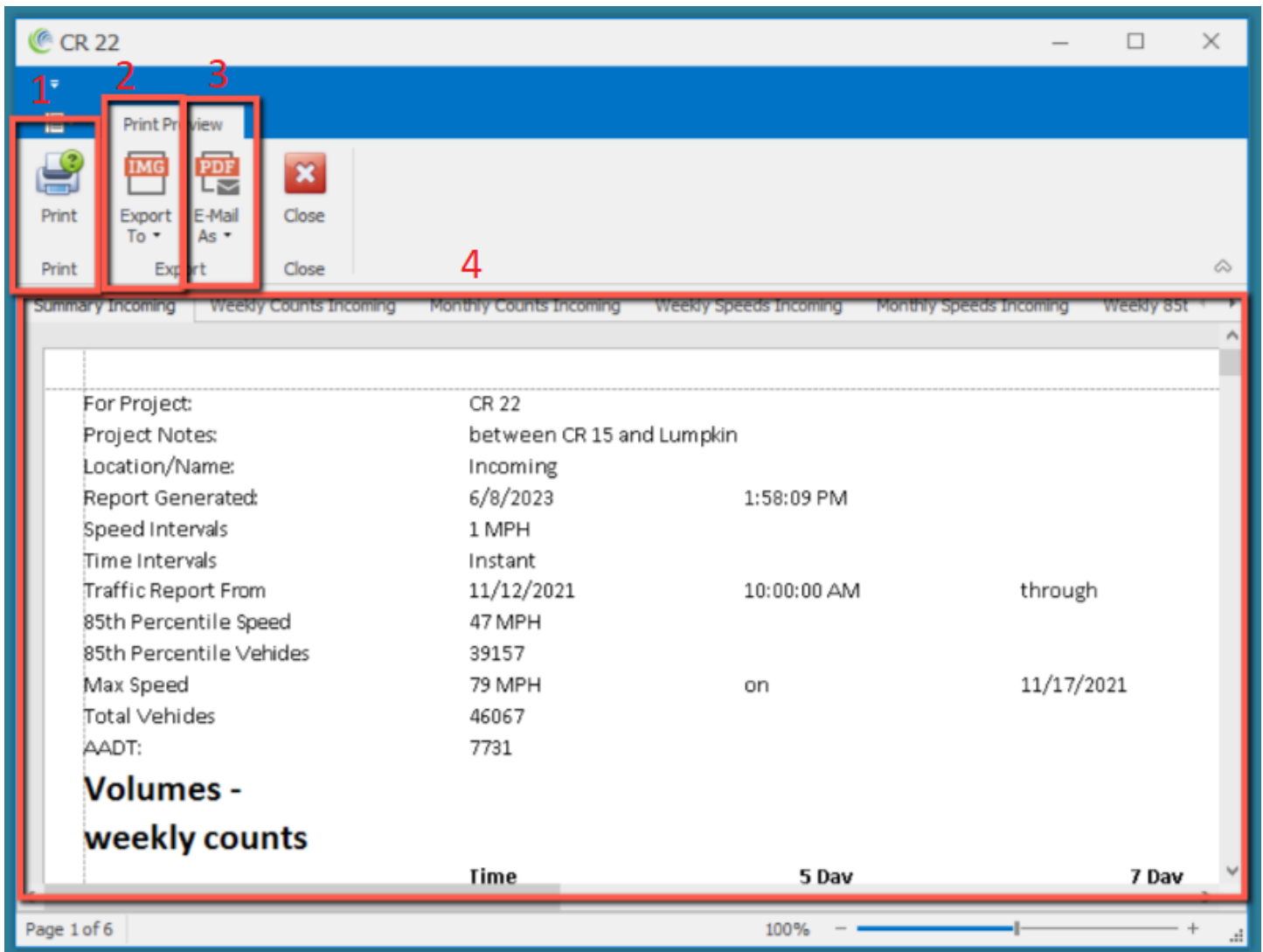
1. Print: Choose this action to send the report displayed in the preview pane to a printer installed on the computer. Choose this action to also export the single report selected in the preview pane to one of the available file formats.

2. Export To: Choose this action to export all of the data displayed in the StatsAnalyzer reports window to one of 15 available file formats, including CSV, XLSX, and PDF. Please note that exporting to CSV will generate a separate file for each report, exporting to XLSX will generate a single workbook with a separate tab for each report, exporting to PDF will generate one document with at least a page for each report, and exporting to an image file will generate an image for the report on whichever tab is selected in the preview pane.

3. Email As: Choose this action to generate an attachment in the selected file format (of 15 available file formats) of the report displayed in the preview pane.

4. Preview Pane: Displays each report from the reports window. The report selected for display in this section of the window will be the report acted upon by the "Print" and "Email As" buttons. All the tabs listed in the preview pane will be exported in the selected file format for the "Export To" button.

7.8.1 Available File Formats from Export Window

There are fifteen file formats to choose from in the export window:

- PDF
- HTML
- MHT
- RTF
- DOCX
- XLSX
- CSV
- TXT
- BMP
- GIF
- JPG
- PNG
- TIFF
- EMF
- WMF

8.0 Additional Operations in StatsAnalyzer

Houston Radar's StatsAnalyzer software program offers functionality for the Armadillo Tracker in addition to those functions and features explored in Sections 5-7. This Section will describe the next most common operations for which StatsAnalyzer is used.

8.1 Adjust the Radar Clock

The Armadillo Tracker's internal clock is set to US Central Time during the production process. Before being deployed for data collection, the Tracker's internal clock should be adjusted to match the time zone in which data is being collected. **Data collected using improper time cannot be retroactively changed in the radar or in Houston Radar's software, so the appropriate time must be selected before deployment**.

Once a connection has been established from StatsAnalyzer to the Tracker, click the drop-down menu beside "Sync Radar Clock To Computer" to view the available options.
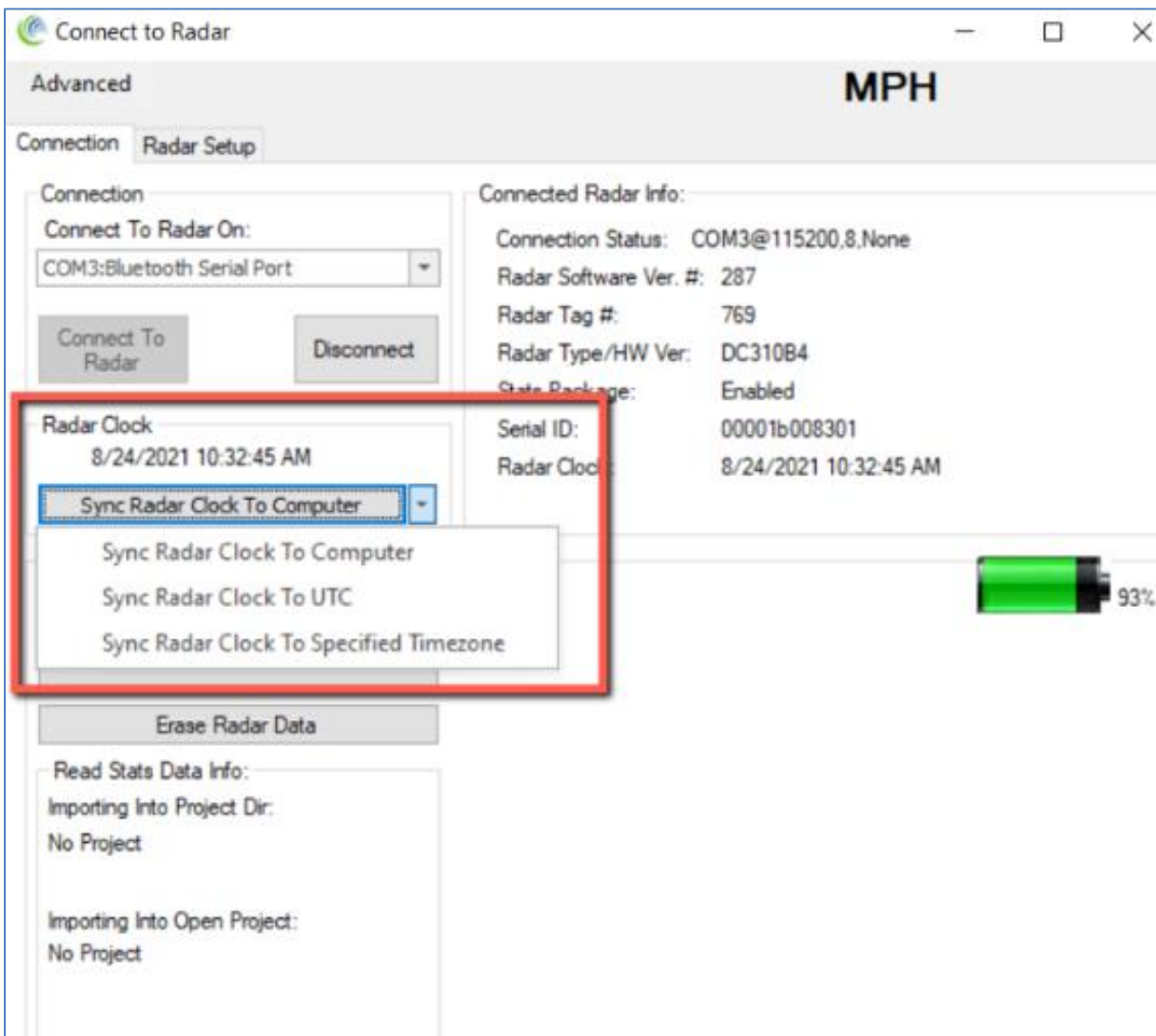
Any change to the radar clock settings from this screen will take effect immediately. If data is suspected to have been collected before adjusting the clock, select "Erase Radar Data" from this same screen to all new data will have the appropriate time stamp.

8.2 Adjust Speed Units

The Armadillo Tracker's default Speed Units value is Imperial (Miles Per Hour or mph), with a user option to record speed in Metric (Kilometers Per Hour or km/h). Before being deployed for data collection, the Tracker's Speed Units value should be adjusted to match the appropriate units of measurement in the area in which data is being collected. Data collected using improper Speed Units cannot be retroactively changed in the radar or in Houston Radar's software, so the appropriate Speed Units value must be selected before deployment.

Once a connection has been established from StatsAnalyzer to the Tracker, click the "Radar Setup" tab to view the "user Setup" sub-tab. Click the field beside "Speed/Limits Units" to adjust this value, and then click "Write to Radar" for the changes to take effect.
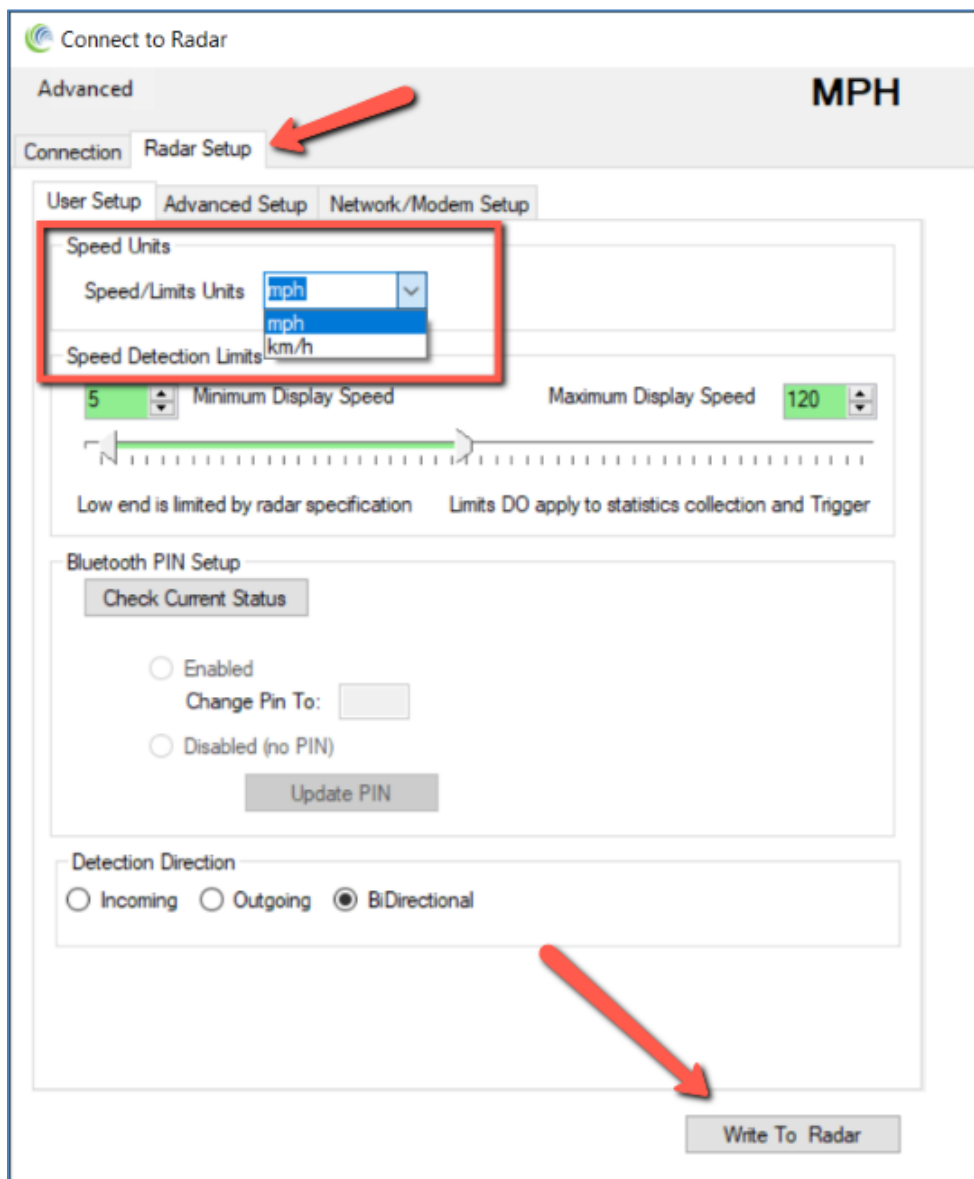
8.3 Enable Bluetooth Pin for Secure Login

[This functionality is deprecated due to the modern Bluetooth Standard no longer supporting PIN based security. This section is retained for historical documentation purposes and for those users using older versions of Windows where this functionality is available.]

The Armadillo Tracker offers added security for Bluetooth connections using a Bluetooth PIN. The Bluetooth PIN is disabled by default, to allow new users easier Bluetooth access to the Tracker. Houston Radar recommends all users add a Bluetooth PIN to their Armadillo Trackers to help secure the radars against unauthorized access.

Once a connection has been established from StatsAnalyzer to the Tracker, click the "Radar Setup" tab to view the "user Setup" sub-tab. Click "Check Current Status" in the Bluetooth PIN Setup section, then click the button beside "Enabled" to enter, or change, a four-digit alphanumeric PIN, and click "Update PIN". After the PIN is updated, all users accessing this device over a Bluetooth connection will need to enter this PIN to gain access to the device for data retrieval, access to settings, etc.
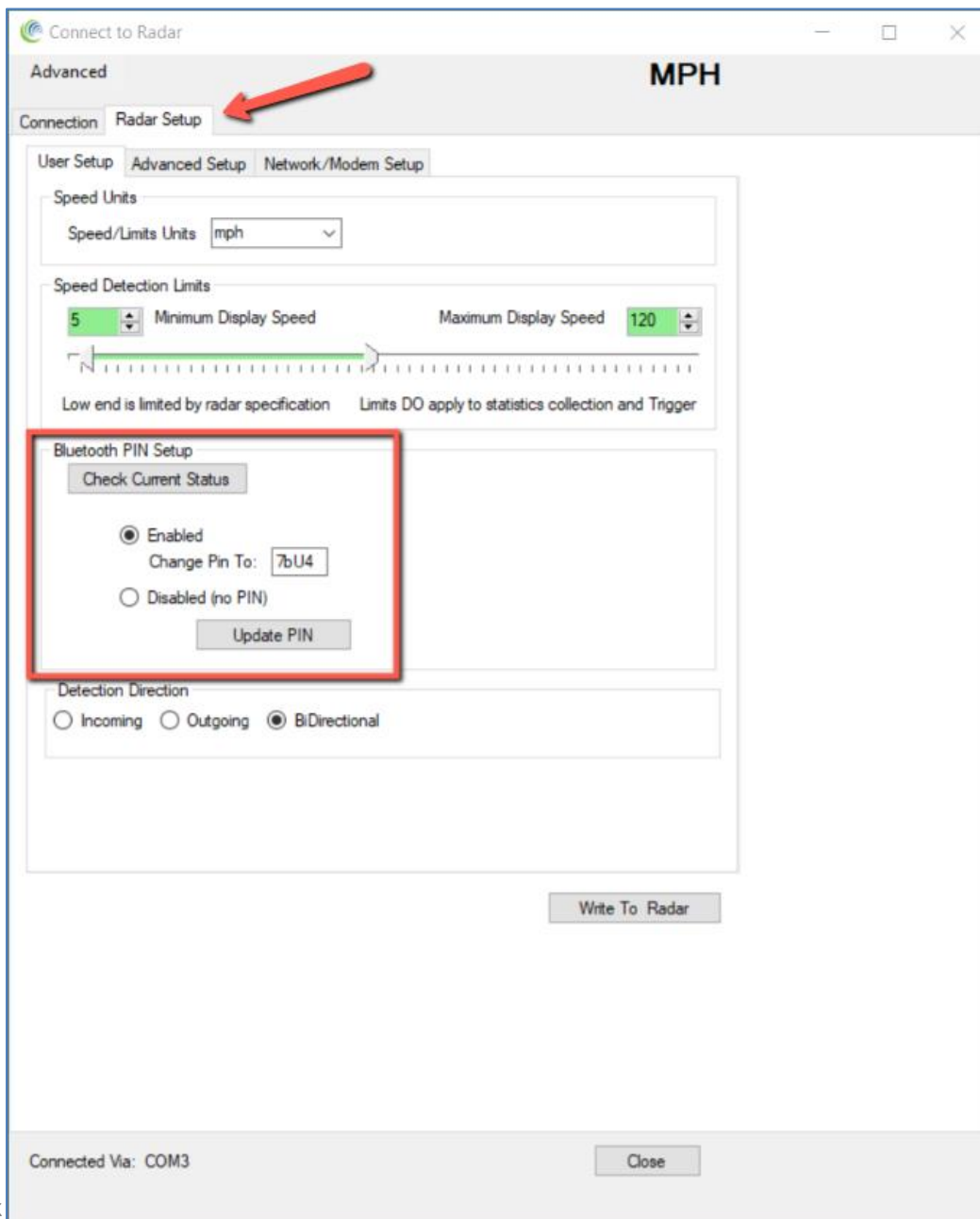
8.4 Advanced Menu

Additional functionality can be accessed in the Advanced Menu of the Connection window once a connection to a Tracker has been established.
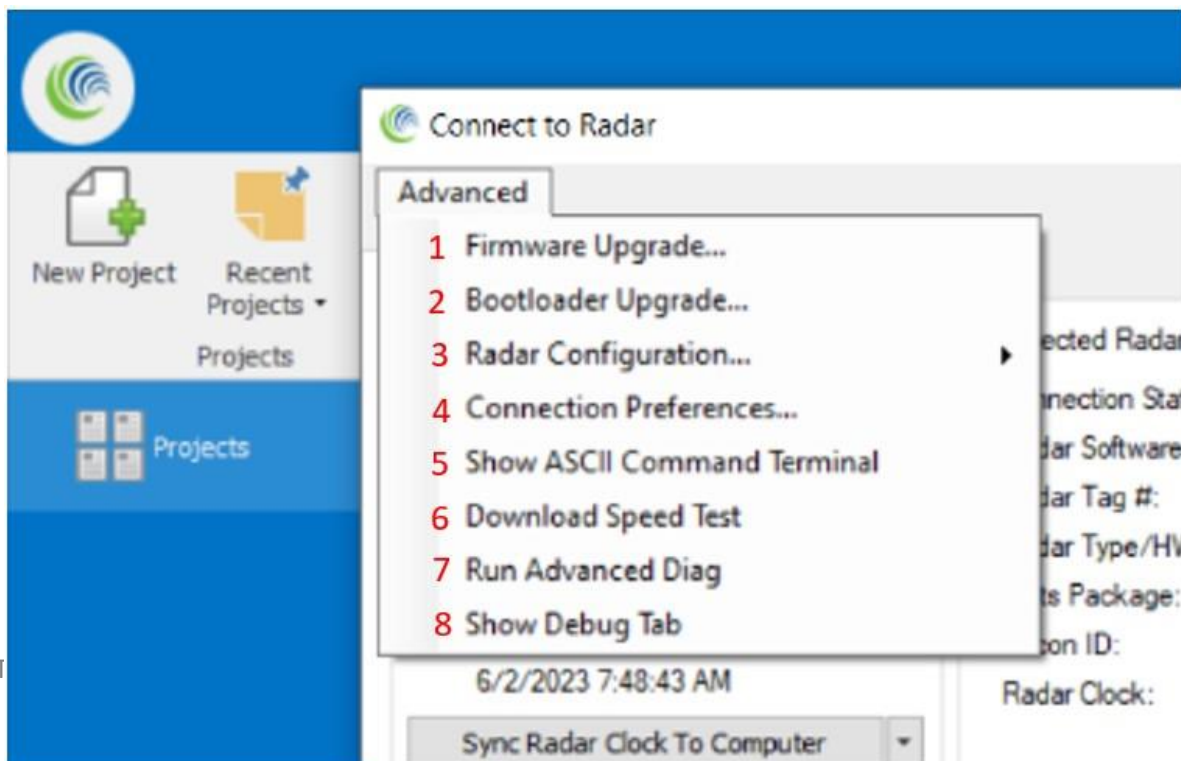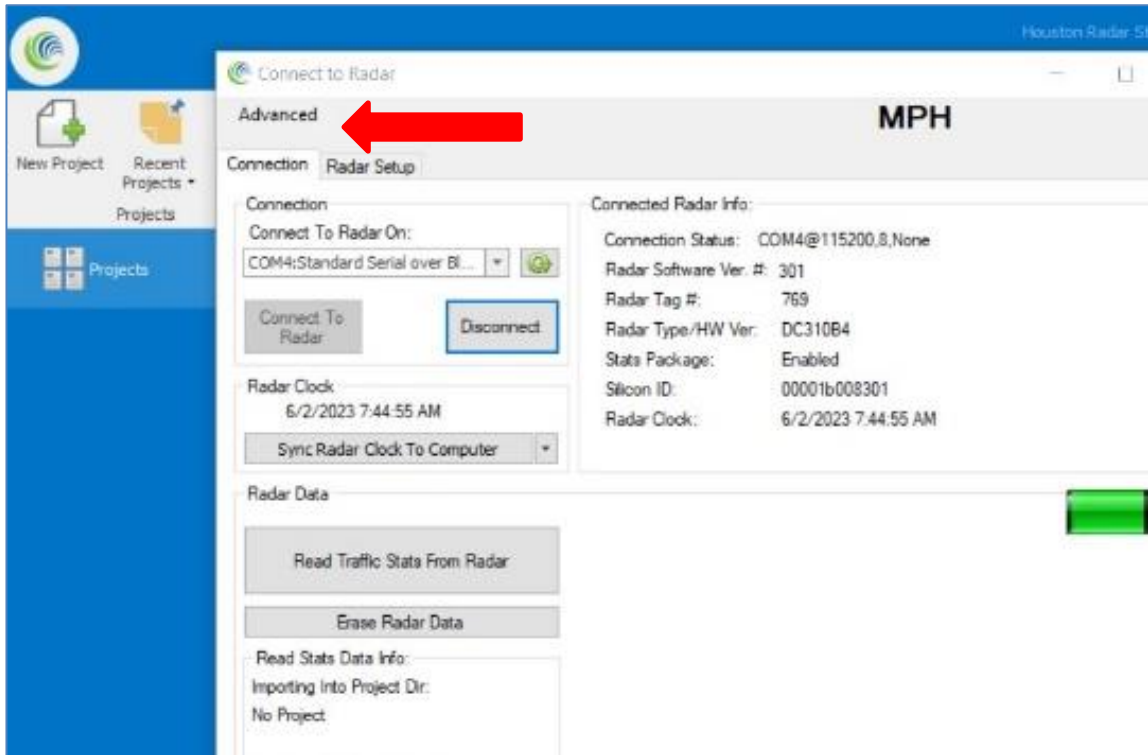
1. Firmware Upgrade: Choose a new firmware version to load into the Tracker. Please contact Houston Radar's Service Department for the latest firmware at support@houston-radar.com or +1.888.602.8111. The firmware in the device is in a stable state. However, we may occasionally release new versions to improve performance, support new features or fix a bug.

2. Bootloader Upgrade: Choose a new bootloader version to load into the Tracker. Please contact Houston Radar's Service Department for the latest bootloader at support@houston-radar.com or +1.888.602.8111. The bootloader is in a stable state for many years and is not frequently updated.

3. Radar Configuration: This screen provides the opportunity to 1) copy the Tracker's configuration settings into a *.rcfg file stored on your computer, or 2) load a previously saved configuration (*.rcfg) file onto the Tracker.

4. Connection Preferences: Adjust the USB-to-serial port connection parameters.

5. Show ASCII Command Terminal: Provides access to a range of settings within the radar that are not found elsewhere. Any action using commands in this screen should only be undertaken at the direction of Houston Radar service personnel. Please contact Houston Radar's Service Department with questions at support@houston-radar.com or +1.888.602.8111.

6. Download Speed Test: Test the download speed of data from the radar using the current connection method. This is for connection debugging purposes.

7. Run Advanced Diag: Provides access to a range of tools within the radar that are not found elsewhere. Any action using the tools in this screen should be undertaken at the direction of Houston Radar service personnel. Please contact Houston Radar's Service Department with questions at support@houston-radar.com or +1.888.602.8111.

8. Show Debug Tab: Enables the Tracker's debug tools to capture and evaluate specific detection events for diagnostic purposes. Please contact Houston Radar's Service Department with questions at support@houston-radar.com or +1.888.602.8111.

9.0 Application Note: Armadillo Tracker Classification Feature

Certain reports within StatsAnalyzer allow for the filtering of data based on vehicle size classification. The Armadillo Tracker implements a length-based vehicle classification system that translates to the following approximate vehicle types and lengths:

Armadillo Vehicle Class Size	Approximate Length	Example Vehicle Types	FHWA Class
Small	<~14 feet (<4m)	Motorcycles, sub-compact cars	1
Medium	~14 feet to ~20 feet (4m to 6m)	Sedans, minivans, pickup trucks, etc.	2 & 3
Large	>~20 feet (>6m)	Delivery vans, buses, dump trucks, and 18-wheelers	4 through 12

The vehicle class types are preset from the factory and cannot be modified by the user. The low power Doppler radar technology used in the Tracker results in excellent battery life and affordability of the unit. However, it does not allow direct length measurement. Hence, vehicle class must be inferred by the radar software from a variety of target parameters. This interpretation results in meaningful information for three class sizes which roughly correspond to the vehicle lengths listed above.

Independent testing has shown the overall classification accuracy of the Tracker for a mix of city or rural road traffic is approximately 90%. This will hold true if commercial or truck ("Large") traffic is less than approximately 15-20% of the total traffic on the road.

The Armadillo Tracker is not recommended for roads where traffic consists primarily of buses or large trucks or where traffic classification is a primary consideration. It is considered a "secondary value added" feature of the product. For such needs, we recommend our SpeedLane Pro, True dual beam side-fire radar that directly measures the vehicle lengths in 8 length based class bins.

Please contact Houston Radar's Sales Department at sales@houston-radar.com or +1.888.602.3111 for information on alternative solutions for applications requiring direct length measurement for size classification.

10.0 Using the Houston Radar Smartphone App

The Armadillo Tracker includes a Bluetooth module with compatibility with Android and Windows devices included as standard. The Tracker has an optional hardware upgrade to also add Bluetooth compatibility for Apple iOS devices. For more information on Houston Radar's smartphone app, please reference the "Houston Radar Android App User Guide".
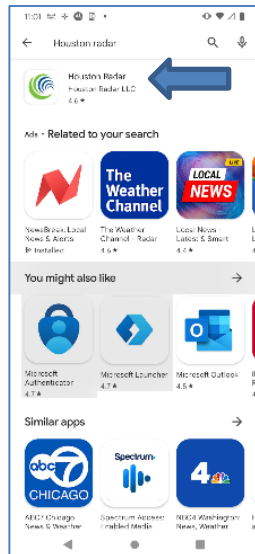
Scan the QR code from your smartphone to download the app and follow the instructions below to install the App and connect to the Tracker.

10.1 How to Download the Android App

Go to Play Store to search "Houston Radar LLC"

Click "Houston Radar"
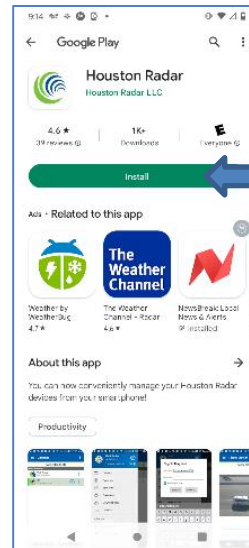
Click "Install"
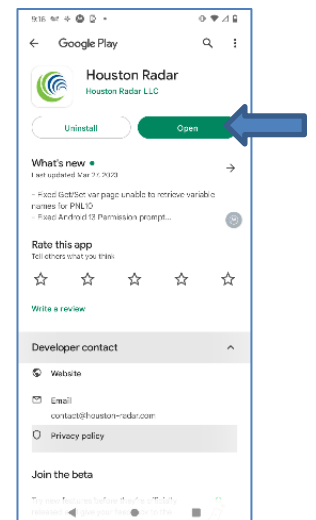
Click "Open"

10.1.1 How to Connect to the Radar via Bluetooth using Android.

Click "Bluetooth Scan"
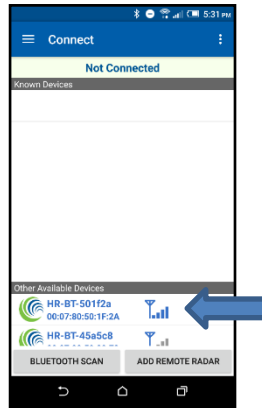
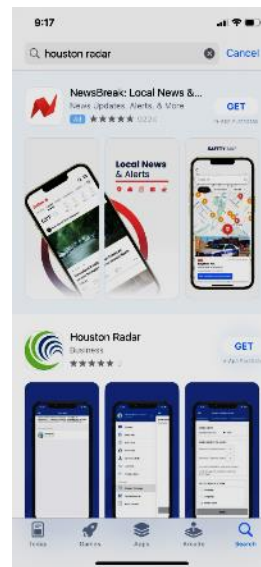Select your radar (confirm ID with label on your device)
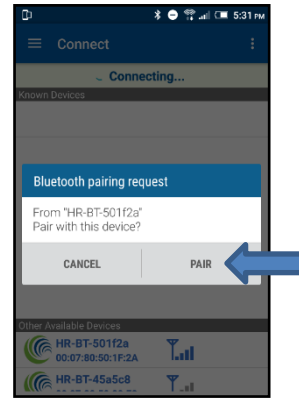
Click "Pair"

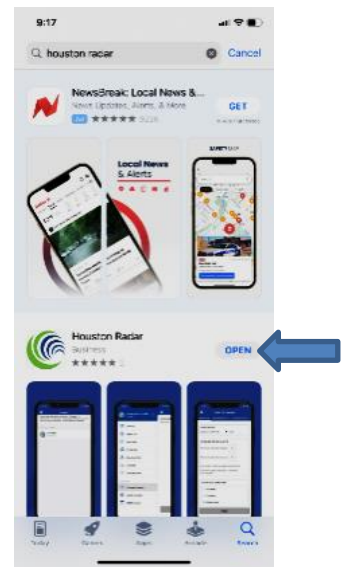**10.2 How to Download the iPhone App.**

Go to App Store
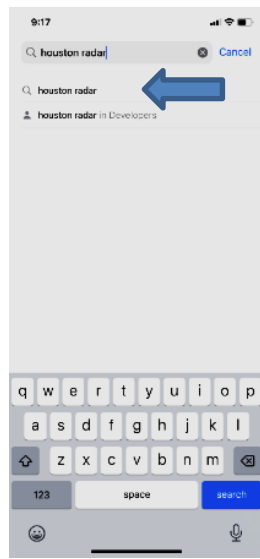
Search for "Houston Radar Bluetooth"

Click "GET"

Click "Open"

10.2.1 How to Connect iPhone to the Radar via Bluetooth

This is an optional feature that requires the purchase of the "MFI" (Made for iOS) hardware option in the Armadillo Tracker. This option can only be installed at the factory. Please contact Houston Radar's Sales Department at sales@houston-radar.com or +1.888.602.3111 for information on pricing and upgrades to your existing units.

The iPhone connection process requires that you connect to Bluetooth before connecting to the Tracker.

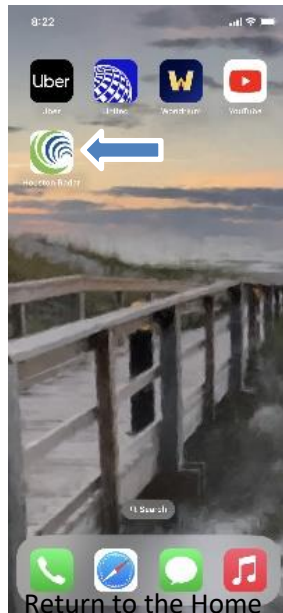

On the Home
Screen Click
"Settings"
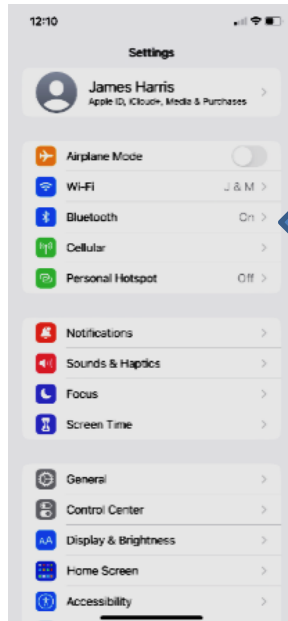
Click
"Bluetooth"



Select your
radar.

Click your
radar to pair.

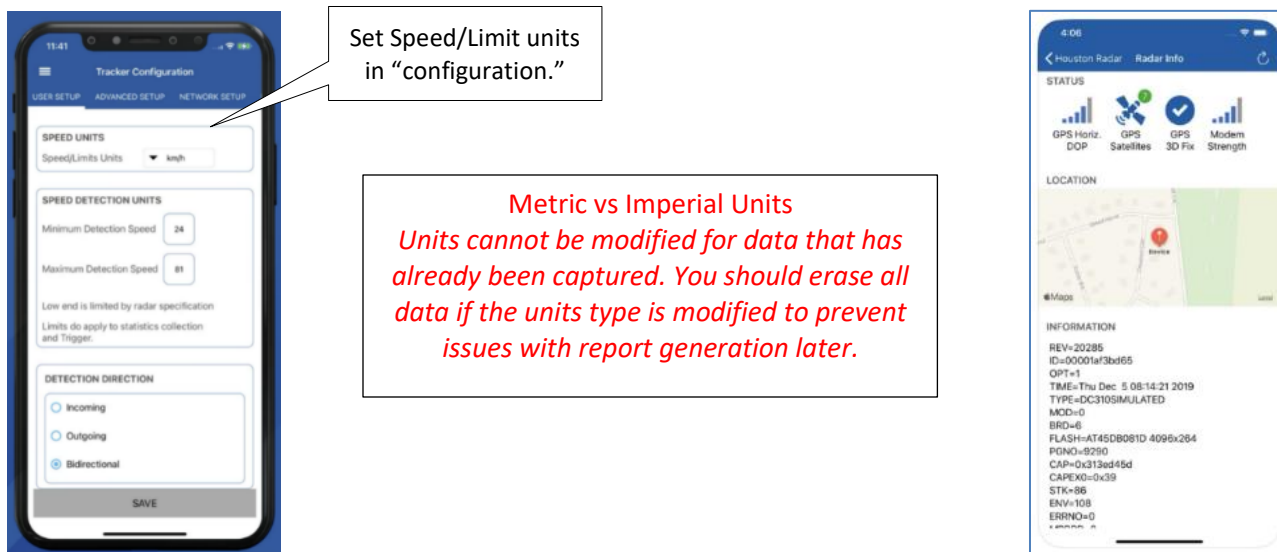Return to the Home
Screen. Click
"Houston Radar"

Click Armadillo
to connect to the
Tracker.

10.3 Direction Verification using your smartphone

The "Live Data" feature of our Android and Apple smartphone apps can make the detection verification process easier. Click Live Data to ensure that the Tracker is "seeing" both lanes.


Sync Time

Live Data
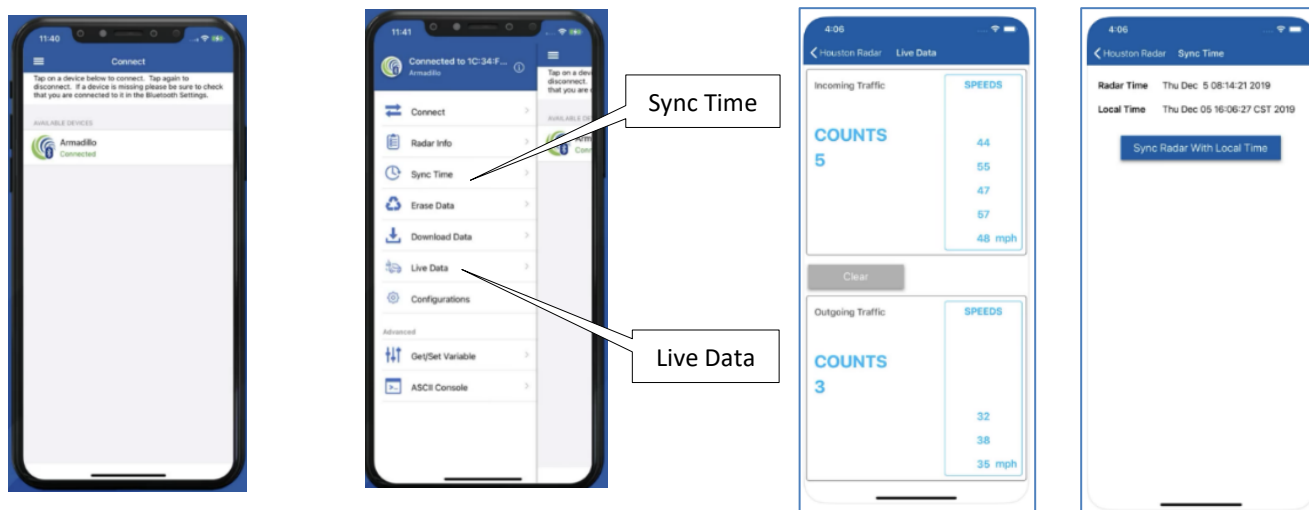
From the Connection screen, view the displayed Radar Clock time. The time is set to US Central Time by default. To change the Radar Clock time, click on "Sync Radar Clock to Local Time".

Set Speed/Limit units in "configuration."

Metric vs Imperial Units
Units cannot be modified for data that has already been captured. You should erase all data if the units type is modified to prevent issues with report generation later.

- The scan and connection are required to be done only once per radar.
- The ID shown is listed on a label on the device (Armadillo or Bluetooth Dongle).
- The "Remote Radar" is for making connections over the Internet or cellular connection if the device is on the Internet (with either an internal modem or an external modem).

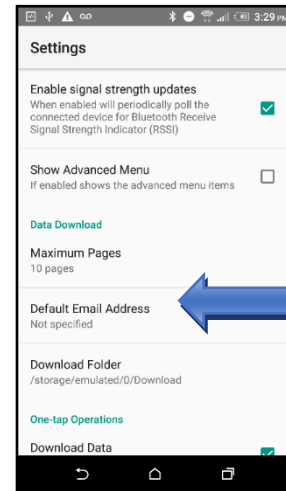## 10.4 Downloading Data via your Cell Phone

You can create one-tap operations to achieve multiple actions including making a connection, downloading data, syncing clock, erasing data, and sharing the downloaded file
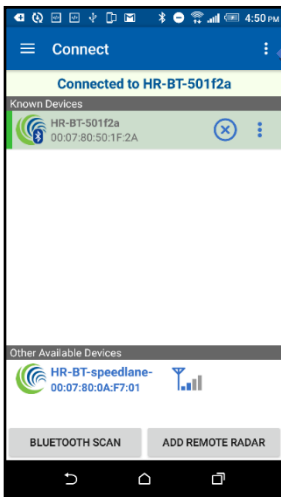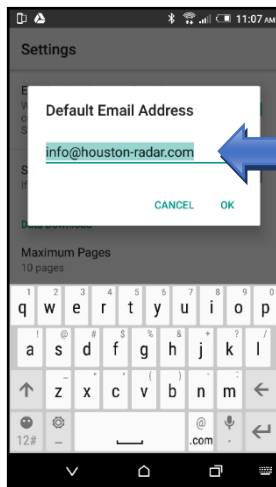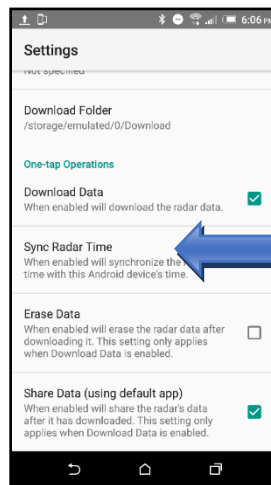

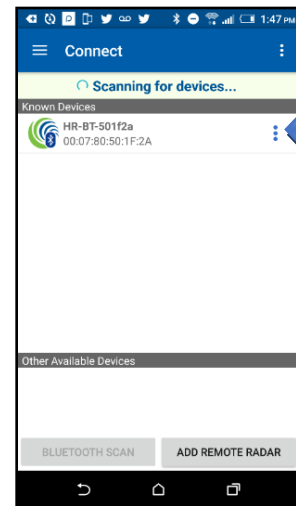Click on the drop-down menu.
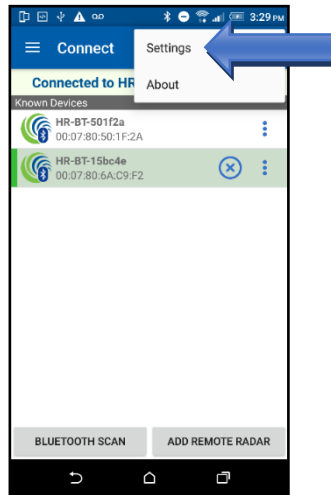
Click "Settings"

Select "Default Email Address"

Type in the desired default email address and click "OK."

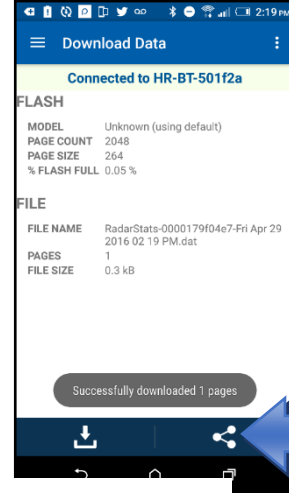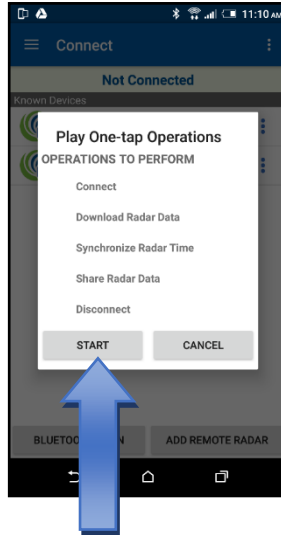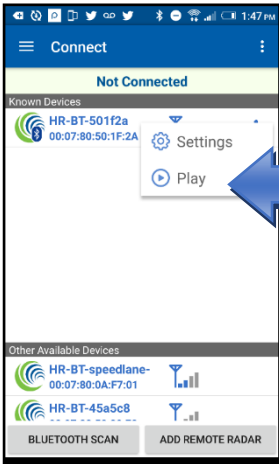
Scroll down and check: Download Data, Sync Radar Time, and Share Data

Click on the drop-down menu.

We recommend you select Erase Data so that you don't save old data each time.

Play One-Tap Operations: Operations to perform: Connect, Download Radar Data, Synchronize Radar Time, Share Radar Data and Disconnect

The first time you download data the app will ask how you want to share.
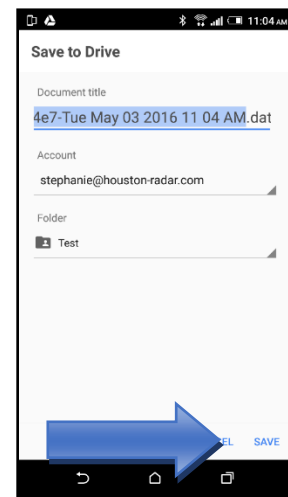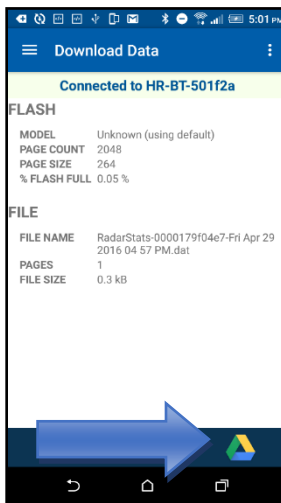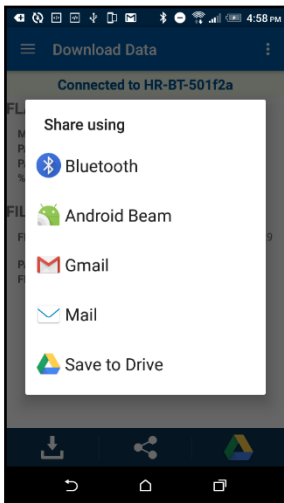
Installed and available options are shown in a pop-up window.

After you Save to Google Drive, the app will make an icon that you can easily click and save.

After you have Saved to Google Drive, this will come up for future One-Tap Operations. Click "Save"

Please Note:

The available sharing options depend on the applications installed on your phone or tablet and may be different than shown in the guide.

11.0 Setting up the Cellular Modem

If you have purchased the cellular modem option to enable remote operation and data retrieval, the modem will need to be configured for use within StatsAnalyzer. If you provided a SIM card to Houston Radar during the production of your Tracker, much of the process was undertaken during production. However, there may be a need to revisit these settings after delivery. You may need to set the mode you wish to use and APN for your SIM card. There are two different operational modes to choose from: "Listen" and "Call Server".

11.1 Network Setup

Navigate to the Radar Setup> Network/Modem Setup> Network Setup tab. The following options are available for the Call Server (Call Out) and Listen modes. Please see Section 11.2 "Modem Setup" section for more information on available modem modes.

1. **Callout Server IP:** IP address of the server you wish to use for Call Server Mode. This could be your server with our SDK software, or Houston Radar's Tetryon Cloud Server.
2. **Server Port #:** Port used for outgoing connections in Call Server Mode. This is the port # at the server the unit will attempt to connect to. This should be 5425 for Tetryon servers.
3. **Call Interval (minutes):** Time interval between calls to the server. The modem will be powered off in between calls to conserve power. There is a tradeoff between calling frequently calling the server to get up to date data which consumes more power from the battery, and calling infrequently to extend the battery charge run time. Note that setting the calling interval to be longer than once/4 hours results in negligible power usage from the modem and allows you to obtain the maximum battery charge run time comparable to units without a modem, allowing the best of both worlds (automatic data upload and maximum battery run time).
4. **Customer Number:** Disregard this field if you are not using the Tetryon Cloud Server. If you are a Tetryon customer, this is the unique number assigned to a customer by our Tetryon server that allows the server to segregate the data when different radars call into the same server. If you are using the Tetryon server, then this ID is "1" for the default (main) customer that is running the server or the number assigned by the server when you create new customers in addition to the default customer. If you do not know your Customer Number, please contact sales@houston-radar.com or support@houston-radar.com. An incorrect customer number in this field may be the cause of you not seeing the radar call into your Tetryon cloud server account.
5. **Call In Port #:** Port number used for incoming connections when modem is in Listen Mode. The default call in port number is 54000. This number should be used when setting up "Setup Remote Radars" in StatsAnalyzer.
6. **Current Modem Mode:** This option cannot be adjusted from this menu, and reflects the mode specified on the "Modem Setup" tab.
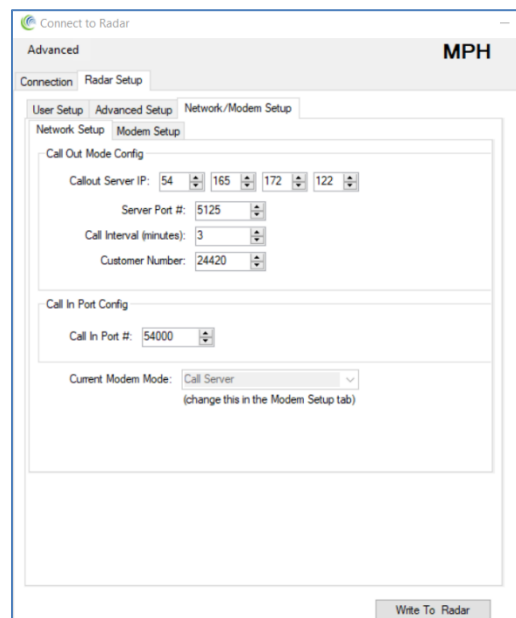
11.2 Modem Setup

Navigate to the Radar Setup> Network/Modem Setup> Modem Setup tab.

1. Select the "Start Configuring Modem" button.
2. Select "Yes" to proceed with the modem configuration process. The available modes are:
   - **Off:** The modem remains powered off and does not consume any power.
   - **Listen:** The modem remains powered on actively waiting for incoming connections on the port specified in "Network Setup". This mode requires a SIM card with a known public static IP address as you will be connecting directly to the Tracker from the StatsAnalyzer program or Android app over the internet. Create and configure this connection in "Setup Remote Radars" in the provided Windows StatsAnalyzer software.
   - **Call Server:** The modem will be automatically powered on based on the call interval specified in "Network Setup", and will initiate a connection to the address set by "Callout Server IP" in "Network Setup". Your SIM card may use a private dynamic IP address in this mode. This mode is required for use with Houston Radar's Tetryon Cloud Server.
   - **Modem Diags (diagnostics):** This mode can be used to send AT commands to the modem for special configurations or troubleshooting. After selecting this mode, commands can be issued, and responses viewed, in the "Modem AT Commands/Diagnostics" section.

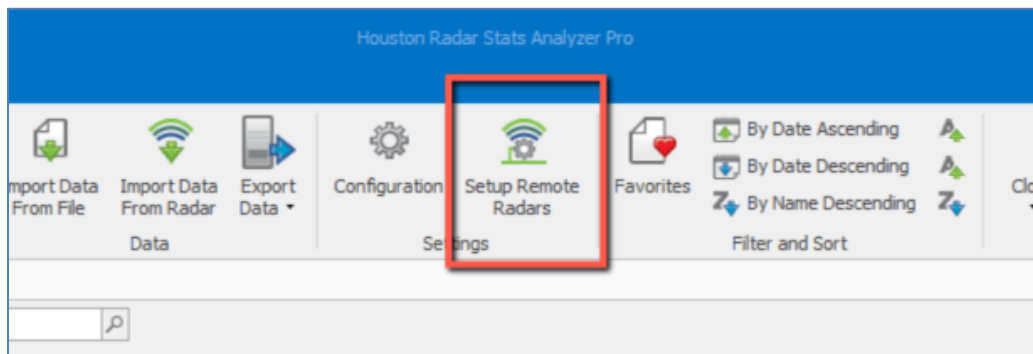3. Select "Call Server" in the Modem Mode menu, and then "Write to Radar".

4. The "Carrier" and "APN" fields are dependent upon the chosen cellular carrier. If the APN information was not received with the delivery of SIM cards, please contact the carrier. Note, the Armadillo Tracker's modem does not support SIM cards with PIN enabled. You must disable the SIM's PIN before it can be used in the device. Codes to disable the SIM PIN are available from the carrier. The "Carrier" field value is set at the factory based on your carrier and you should not change it.

11.3 Create Remote Radar Connections Within StatsAnalyzer

The optional built-in cellular modem allows you to program a static IP address of the modem with TCP/IP port number you can remotely connect into. An active SIM card with a static IP address must be installed in the modem during the production process and the modem set to "Listen" mode. Please contact sales@houston-radar.com or support@houston-radar.com for more information on the types of SIM cards supported.

To communicate with a Tracker using its built-in modem, you must create a Remote Radar Connection. Once the connection is configured, connecting to the radar works exactly the same way as with a local serial port (except you pick the "REMOTE:" connection you have setup.

To create a remote radar connection within StatsAnalyzer, click on the "Setup Remote Radar" icon in the middle of the menu bar at the top of the home screen.

A new window will open, displaying any existing remote radars.

Note that the IP address or the host name should be reachable from the computer. In most cases you need an external world-routable static IP address. If you get a dynamic IP address, your modem should support **_dyndns_** so that you may address the remote modem by name. In this case **_dyndns_** will do the mapping between host name and current dynamic IP address of the modem.

Once you have set up the remote radar connection, click OK. Then go to File->Connect To Radar… to bring up the radar connection screen, just like with the local radar connection.

Now your remote radar connections are listed along with your local COM ports. Select the desired connection and click on the Connect button.

The "Auto Detect Port" option only searches for the radar on the local serial ports. That includes Bluetooth and USB to serial adapters. The program does not search on remote TCP/IP radar connections. You must manually select the radar you wish to connect to if it is on a remote TCP/IP link.
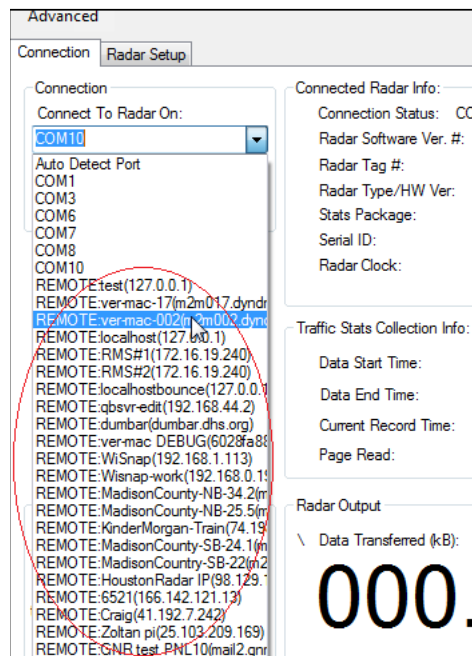
When using the Call Server mode, such as for operation with Houston Radar's Tetryon Cloud Server, you will also need to enter the server address, call interval, and port number. Connect to the unit using the StatsAnalyzer software and navigate to "Radar Setup" tab and then the "Network/Modem Setup" section of that page.

The modem can only operate either in "Listen" mode (for StatsAnalyzer to call it) or "Call Server" mode (for it to call our Tetryon cloud server). It cannot function in both modes simultaneously (unlike our SpeedLane Pro radar).

12.0 Houston Radar Tetryon™ Cloud Server

Houston Radar's Tetryon™ Cloud Server is a customizable cloud server used to aggregate data from multiple SpeedLane® Pros and Armadillo® Trackers in one central location in the Cloud. Data and reports are then accessible using any common browser by multiple users simultaneously.

An intuitive dashboard view allows the monitoring of average speeds of multiple locations with quick drill down into detailed live and historical charts. Advanced alerts may be configured with simple logic of different parameters.

Allowing multi-user access and browser-based user interface, this intuitive product simplifies data analysis and visualization.

For more information on subscribing to Houston Radar's Tetryon Cloud Server, please contact the Houston Radar sales team at sales@houston-radar.com or +1.888+602.3111.

For detailed information on how to integrate your Armadillo Tracker with Tetryon, please refer to Houston Radar's Tetryon Cloud Server User Guide.

12.1 Tetryon Live Charts for Armadillo Tracker, Individual Location

Speed
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

85th Percentile Speed
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Volume
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Occupancy
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Speed, Volume
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Speed Histogram
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Class Histogram
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Temperature
- Timeframe of 10, 15, 30, 60, 120, 240 min

Battery Status
- Timeframe of 10, 15, 30, 60, 120, 240 min

Voltage
- Timeframe of 10, 15, 30, 60, 120, 240 min

Summary CSV export
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Raw Data CSV export (if using Targets)
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min
- Filterable by Lane Groups

Debug Data
- Intervals of 5, 15, 30, 60 min
- Timeframe of 10, 15, 30, 60, 120, 240 min

Weekly Report
- Intervals of 5, 15, 30, 60 min
- Counts, Average Speed, 85th Percentile Speed, Speeder Counts, Average Speeder
- Filterable by Lane Groups
- Filterable by Classification

12.2 Tetryon Historical Charts for Armadillo Tracker, Individual Location

Speed
- Intervals of 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

85th Percentile Speed
- Intervals of 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Volume
- Intervals of 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Speed, Volume
- Intervals of 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Speed Histogram
- Any historical timeframe
- Filterable by Lane Groups

Class Histogram
- Any historical timeframe
- Filterable by Lane Groups

Temperature
- Any historical timeframe

Voltage
- Any historical timeframe

Summary CSV export
- Intervals of 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Raw Data CSV export (if using Targets)
- Any historical timeframe
- Filterable by Lane Groups

Debug Data
- Intervals of 5, 15, 30, 60 min, day, week, month
- Any historical timeframe

Weekly Report
- Intervals of 5, 15, 30, 60 min, day
- Any historical timeframe
- Counts, Average Speed, 85th Percentile Speed, Speeder Counts, Average Speeder
- Filterable by Lane Groups
- Filterable by Classification

Weekly Speed Count
- Filterable by days and weeks
- Filterable by Lane Groups

Communication Error
- Any historical timeframe

12.3 Tetryon Historical Charts for Armadillo Tracker, Multiple Locations

Speed
- Intervals of 1, 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

85th Percentile Speed
- Intervals of 1, 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Volume
- Intervals of 1, 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Speed, Volume
- Intervals of 1, 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Speed Histogram
- Any historical timeframe
- Filterable by Lane Groups

Class Histogram
- Any historical timeframe
- Filterable by Lane Groups

Temperature
- Any historical timeframe

Battery Status
- Any historical timeframe

Voltage
- Any historical timeframe

Summary CSV export
- Intervals of 1, 5, 15, 30, 60 min, day, week, month
- Any historical timeframe
- Filterable by Lane Groups

Raw Data CSV export (if using Targets)
- Any historical timeframe
- Filterable by Lane Groups

Debug Data
- Intervals of 1, 5, 15, 30, 60 min, day, week, month
- Any historical timeframe

Communication Error
- Any historical timeframe