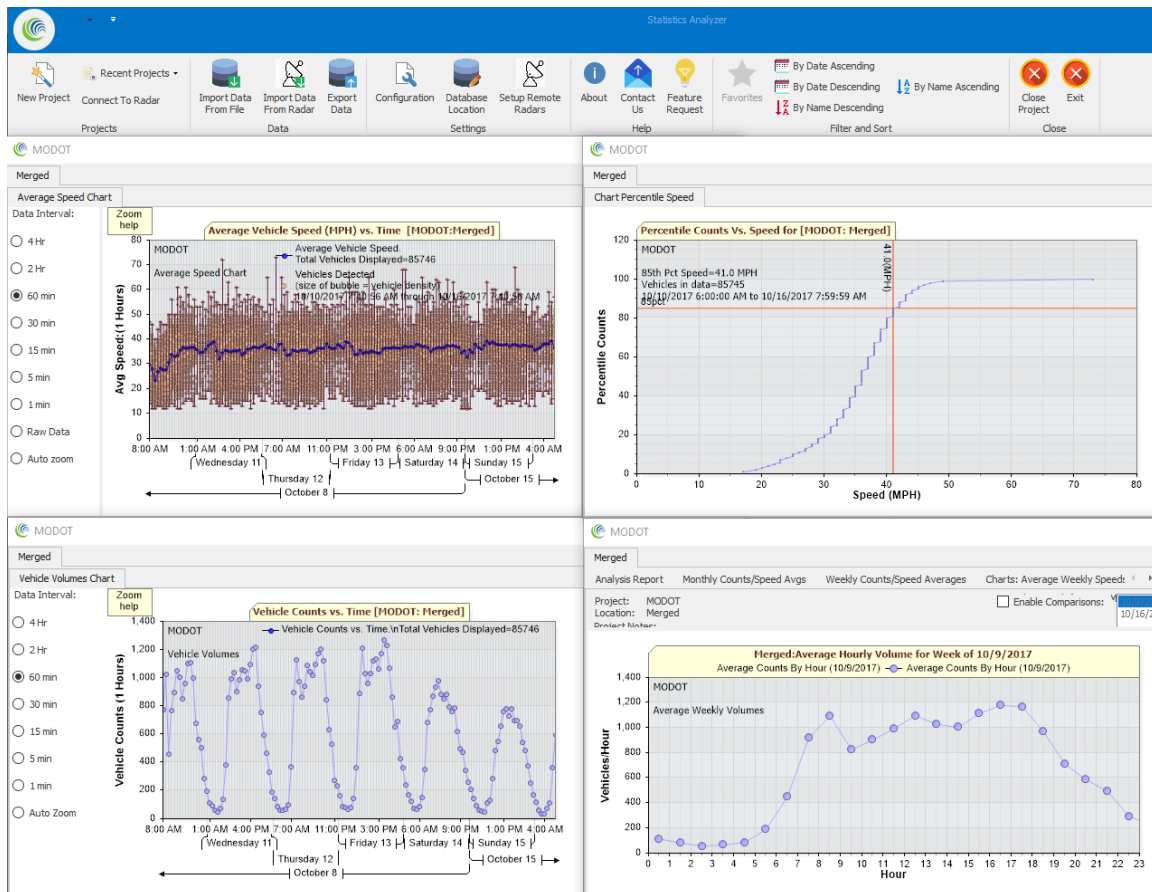




Advanced Stats Analyzer User Manual



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Note: Specifications may change without notice.
Note: Not liable for typographical errors or omissions.

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Introduction

Many of the Houston Radar traffic sensors offer our Advanced In-Radar traffic statistics collection option. When this feature is enabled, the radar collects vehicular traffic data and saves it to internal memory. A user may then download this data at a later convenient time and generate traffic statistics reports from it.

The Houston Radar Advanced Traffic Stats Analyzer Windows® software is a full featured data retrieval and analysis tool used to connect to the radar, configure it, retrieve collected data, organize this data into user projects and generate comprehensive reports.

Some of the features of this software are:

1. One common data retrieval and analysis tool for Houston Radar Armadillo and other Houston Radar OEM products
2. Access the radar via local Windows COM ports including Bluetooth¹
3. Access the radar via TCP/IP (Internet) connection²
4. Automatically search for a connected radar on all local ports at all baud rates
5. Create unlimited projects to organize data from multiple sites, signs or traffic studies
6. Unlimited data import into projects and ability to analyze data across multiple data sets
7. Generate interactive charts of speed vs. time, counts vs. time, speed vs. percentile, number of vehicle vs. speed for investigating traffic patterns
8. Generate hourly, weekly and daily reports of counts, average and 85th percentile speeds and pace.
9. Compare traffic pattern changes over days, weeks or months by generating comparative charts
10. Export raw data or hourly, daily and weekly summary data to Excel
11. Copy and paste or print all charts and reports
12. Auto connect to multiple radars periodically and automatically import data into pre-assigned projects in batch mode
13. View data location visually on satellite maps and import via drag and drop into different projects³

¹ External Bluetooth module required on radar RS232 port to allow wireless Bluetooth connection except for Houston Radar Armadillo that has built-in Bluetooth modem.

² External cellular modem with TCP/IP functionality required on radar RS232 port to allow remote Internet connection

³ GPS option required in Armadillo traffic collectors. Not available in OEM radars. Internet connection required to retrieve Google or Bing satellite maps

Main Stats Analyzer Screen

Stats Analyzer contains the following toolbars:

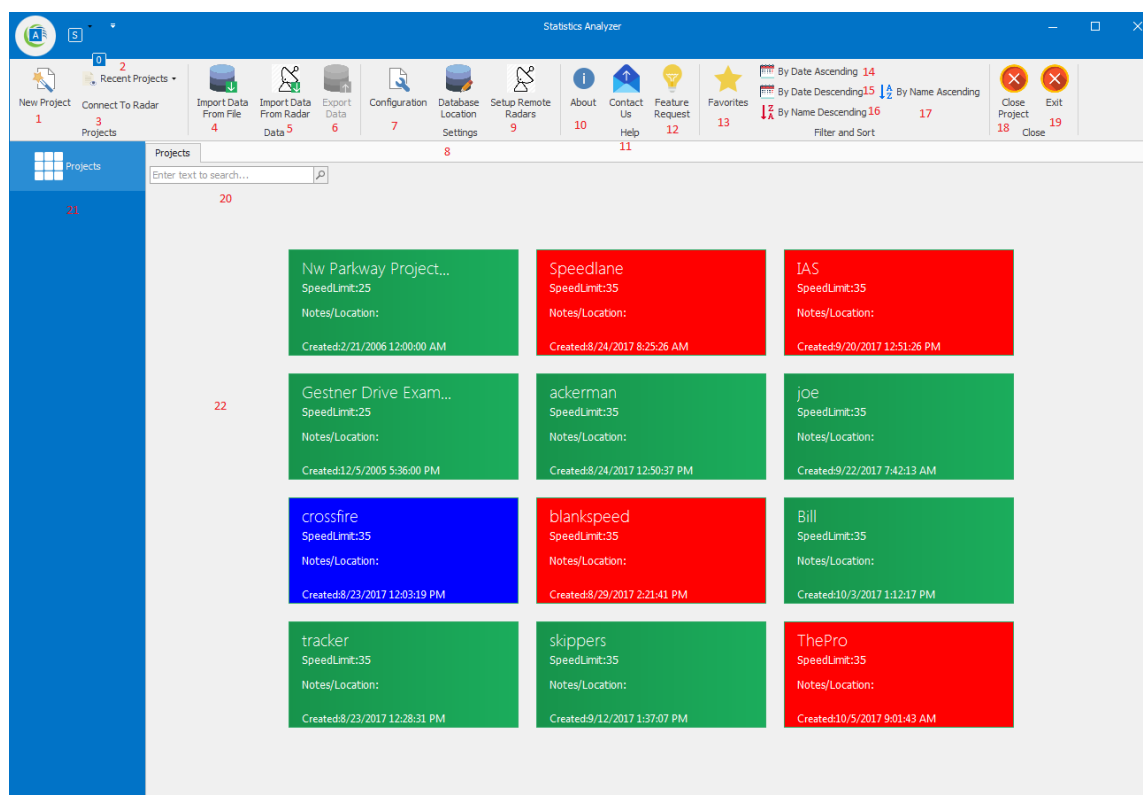
1. Menu Ribbon
2. Open Project List
3. Project Selection Area

The Menu Ribbon is location at the top of the application and organizes the features of the application into 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 you a list of projects. If you open a project, this section shows you details of the open project.

The screenshot below shows the various sections. Each command or feature is highlighted with a number; see below for detailed description for each item.



- 1) New Project; Click this button to create a new project
- 2) Recent Projects; Click this button to show a list of recently opened projects
- 3) Connect To radar; Click this button to bring up the Radar Connection Dialog

- 4) Import Data From File; Imports data from a .dat file into a project via the Data Import Wizard
- 5) Import Data From Radar; Imports data from a radar
- 6) Export Data; Performs raw data export from the currently selected project
- 7) Configuration; Click this button to bring up the Stats Analyzer Configuration dialog
- 8) Database location; Click this button to select the folder where the database file will be stored
- 9) Setup Remote Radars; Click this button to configure remote radars that can be accessed over TCP/IP networks.
- 10) About; Click this button to display the software version number
- 11) Contact Us; Click this button to launch your email client to send an email to Houston Radar.
- 12) Feature Request; Click this button to launch your email client to request a feature from Houston Radar.
- 13) Favorites; Click this button to show only those projects that have been marked as a "favorite"
- 14) By Date Ascending; Click this button to sort projects by date ascending in the Project Selection Area.
- 15) By Date Descending; Click this button to sort projects by date descending in the Project Selection Area
- 16) By Name Descending; Click this button to sort projects by name descending in the Project Selection Area.
- 17) By Name Ascending; Click this button to sort projects by name ascending in the Project Selection Area
- 18) Close Project; Click this button to close the currently selected project.
- 19) Exit; Click this button to exit Stats Analyzer.
- 20) Name Filter; enter text in this box to only show projects containing the text entered.
- 21) Open project list; contains a list of currently open projects
- 22) Project Selection Area; Shows a list of projects

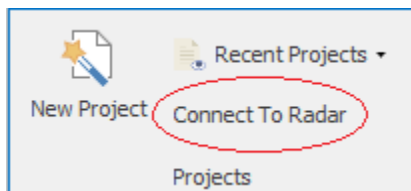
Connecting To a Local Radar to Retrieve Data

To connect to a Houston Radar traffic collector, simply plug it into your PC's USB port and turn it on. To connect to a local radar, you must have an RS232 COM port installed on your computer. If your computer does not have a built-in COM port, you may purchase an external USB to RS232 adapter. Such adapters are commonly available in the market at a nominal price or may be purchased from Houston Radar. Our USB-RS-P1 adapter is also capable of providing power to the radar.

Once you plug an adapter or the radar into your computer's USB port, Windows will add a COM port to your computer. Please see Appendix A for more details on debugging COM port problems.

STEP1: Connect to the Radar

Click Connect To Radar



STEP2: Select the COM port

Then click on "Connect To Radar".

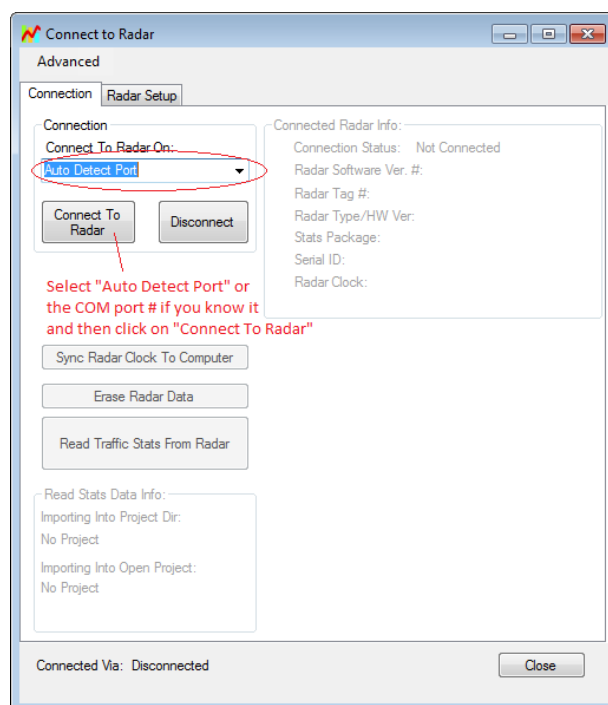
If you selected "Auto Detect Port", the program will search all ports in parallel (so there is no penalty for selecting "Auto Detect Port"). Otherwise it will only search on the port you selected.

If the radar is not being detected, it is sometimes advantageous to select the actual port the radar is connected on, 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).

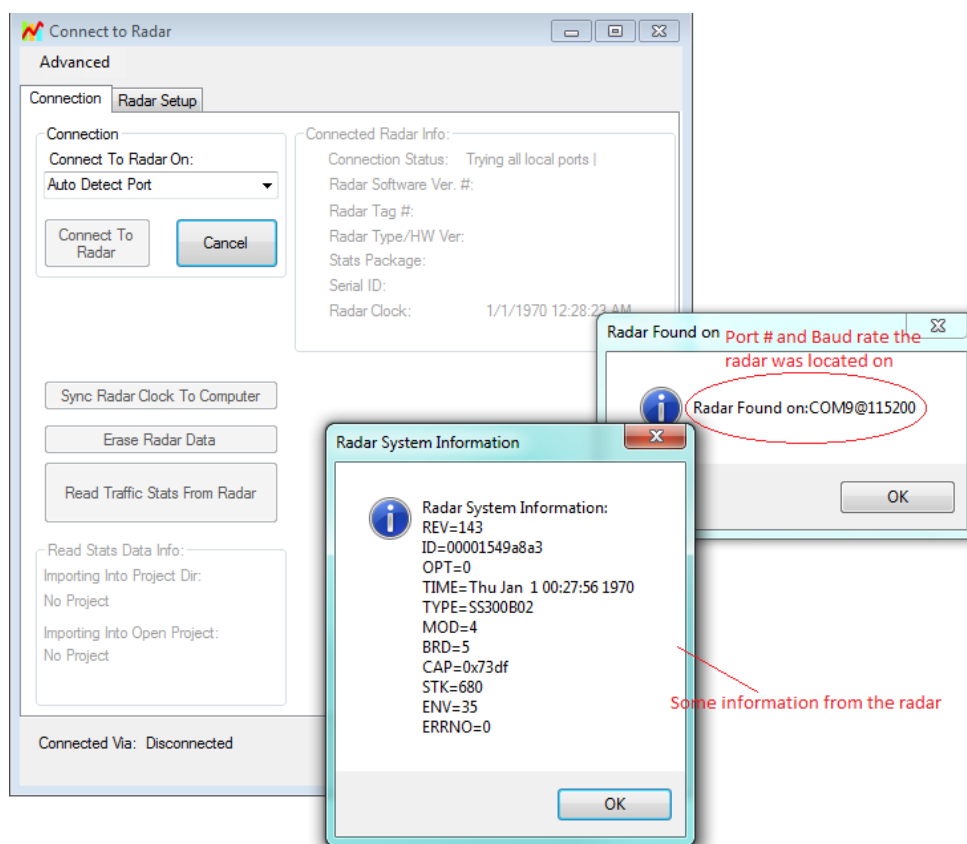


STEP3: Ensure radar is found

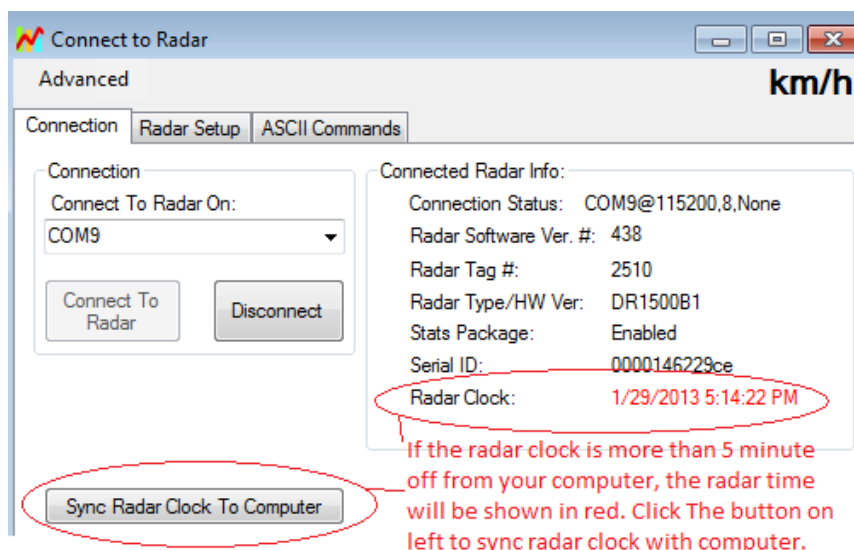
Two windows are popped up when the radar is found. The first indicates which COM port the radar is attached to and what baud rate is used. The second indicates some details about the connected radar. At this time, you should click "OK" on both windows to proceed.



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Adjust the radar clock if it is off from your computer.



Downloading Data from the Radar

All data that needs to be analyzed must be first downloaded into a project. A project is simply a place to organize different sets of data together.

The user is the best judge of how they want to organize their data.

Some possibilities are:

1. 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 comparison over time to see how traffic patterns are changing.

2. 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 lot 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.

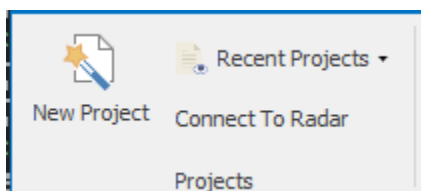
Project per date:

You may create a project date named by “year-month”. This will allow easy navigation if you track your speed studies by date.



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.

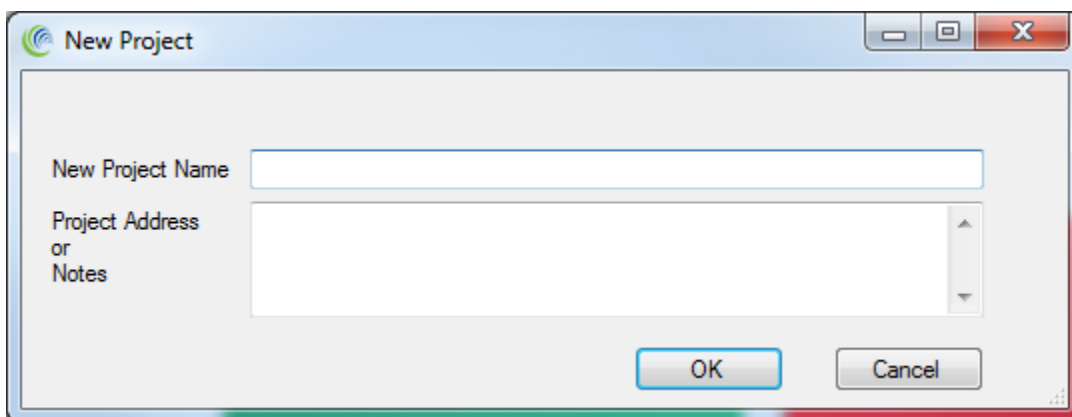
Note: If you have the Armadillo with the GPS option, please refer [Downloading Data From Armadillo With GPS Option](#) to take advantage of the GPS location information.



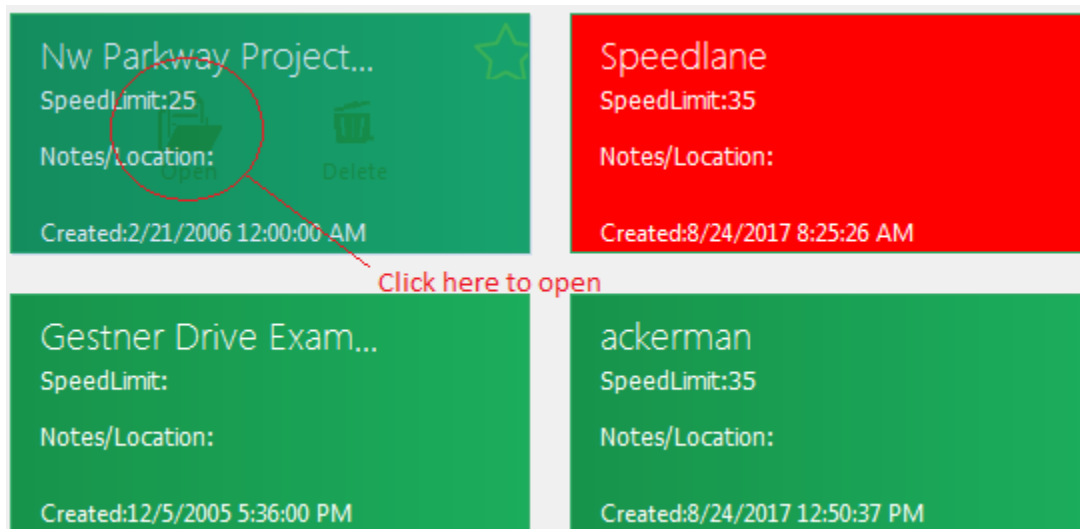
STEP 1: Create (or Open) a project to import your data into

STEP 2: Name your project or Open Existing Project

This dialog will be shown after clicking New Project.

A screenshot of a 'New Project' dialog box. It has a title bar with a green icon and the text 'New Project'. Inside, there are two text input fields: 'New Project Name' and 'Project Address or Notes'. At the bottom right, there are 'OK' and 'Cancel' buttons.

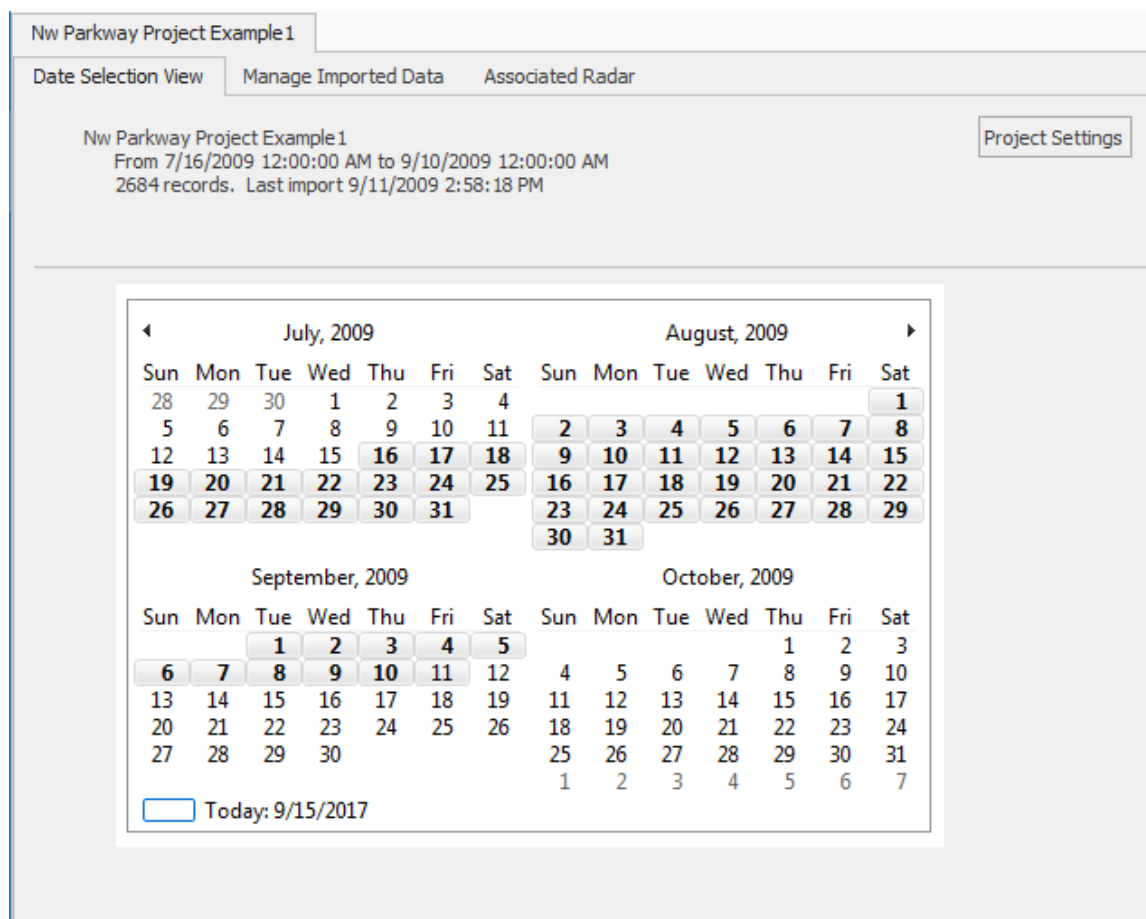
After creating a new project, it will be shown in a new box created in the Project Area. Mouse over the project, and click the open icon to open the project.

A screenshot of the 'Project Area' interface showing four project cards. The top-left card is green and titled 'Nw Parkway Project...'. It has a magnifying glass icon over the 'Notes/Location:' field, a 'Delete' button, and a star icon. The top-right card is red and titled 'Speedlane'. The bottom-left card is green and titled 'Gestner Drive Exam...'. The bottom-right card is green and titled 'ackerman'. A red arrow points from the text 'Click here to open' to the magnifying glass icon on the 'Nw Parkway Project...' card.

Project Name	SpeedLimit	Notes/Location	Created
Nw Parkway Project...	25		2/21/2006 12:00:00 AM
Speedlane	35		8/24/2017 8:25:26 AM
Gestner Drive Exam...			12/5/2005 5:36:00 PM
ackerman	35		8/24/2017 12:50:37 PM

STEP 3: Import Data from Your Connected Radar

Ensure the project you wish to import is selected. Data will be imported into this project.



There are two methods to visualize the imported data.

1. The **Date Selection View** shows you a calendar (shown above) with days marked in bold text if data records are present for that particular day.
2. The **Manage Imported Data** shows a tree view (shown below) which shows each imported dataset as an individual entry.

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Nw Parkway Project Example1

Date Selection View Manage Imported Data Associated Radar

Nw Parkway Project Example1
From 7/16/2009 12:00:00 AM to 9/10/2009 12:00:00 AM
2684 records. Last import 9/11/2009 2:58:18 PM

Project Settings

[-] NW Pky and main st. (Click To Edit)
Id: 17 07/16/2009 10:30-09/10/2009 08:00

Switch Data To Outgoing

Merge

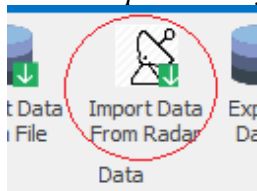
Trim

Delete Selection

Explore To Dat File

Email Dat File

Select *Import Data from Radar* as shown below:



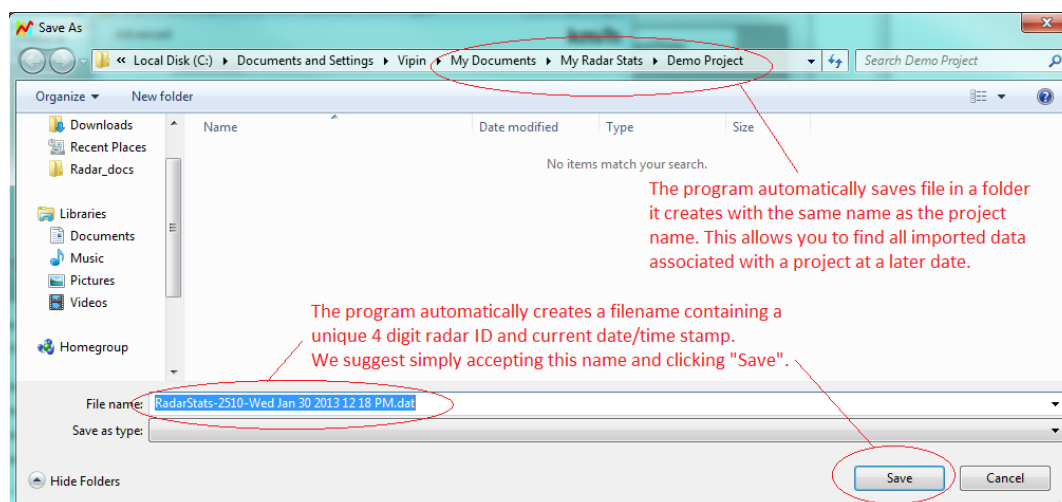
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If you connected to the radar in the section “Connecting to a local radar to retrieve data” or “Connecting to a remote radar to retrieve data”, you will now be prompted to save a “.dat” file. We suggest that you accept the default path and file name and simply click on “Save” button.



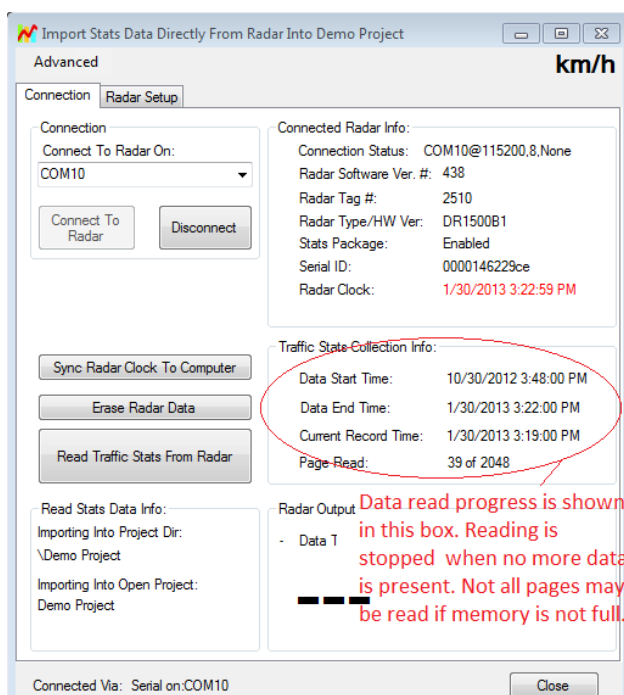
All imported data is saved in the .dat file on your computer in addition to being imported into the project database. This file may then be emailed to a colleague and/or imported into a project. We suggest that you simply accept the suggested filename and click “Save”.

The .dat file will be placed in a folder with the same name as the project in the “My Documents\My Radar Stats” directory. This allows you to find .dat files later.

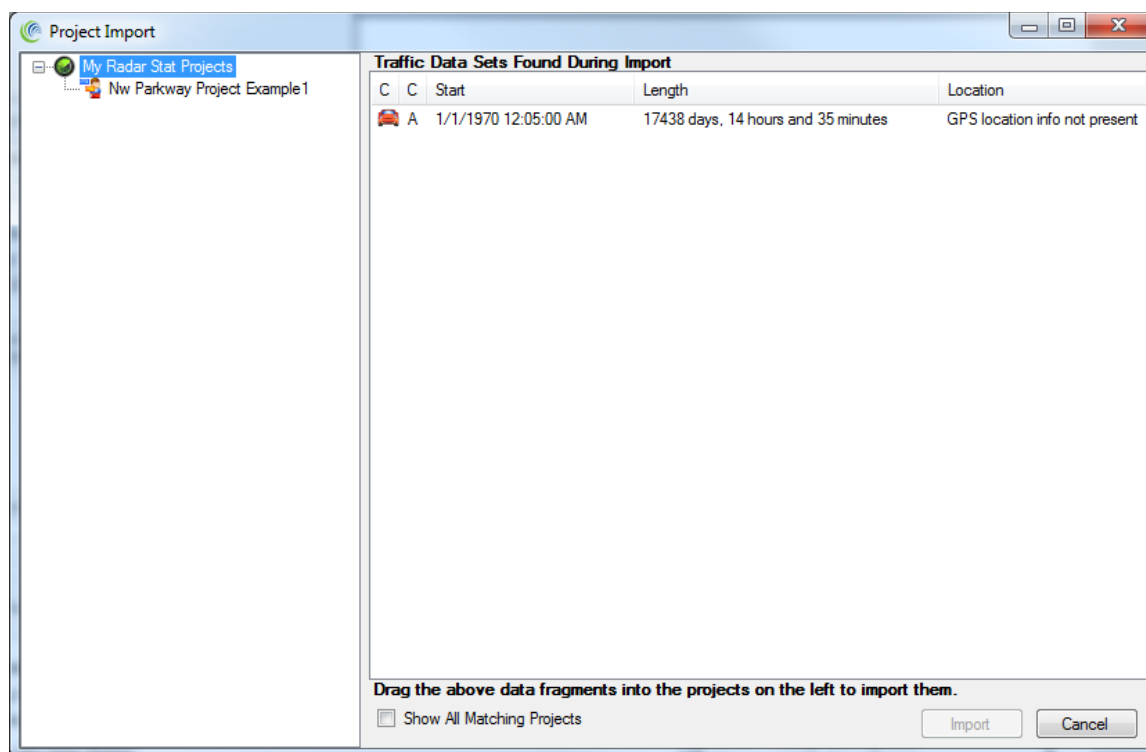


Once you click Save, the program will download the data from the radar. You will see the download progress in the following box.

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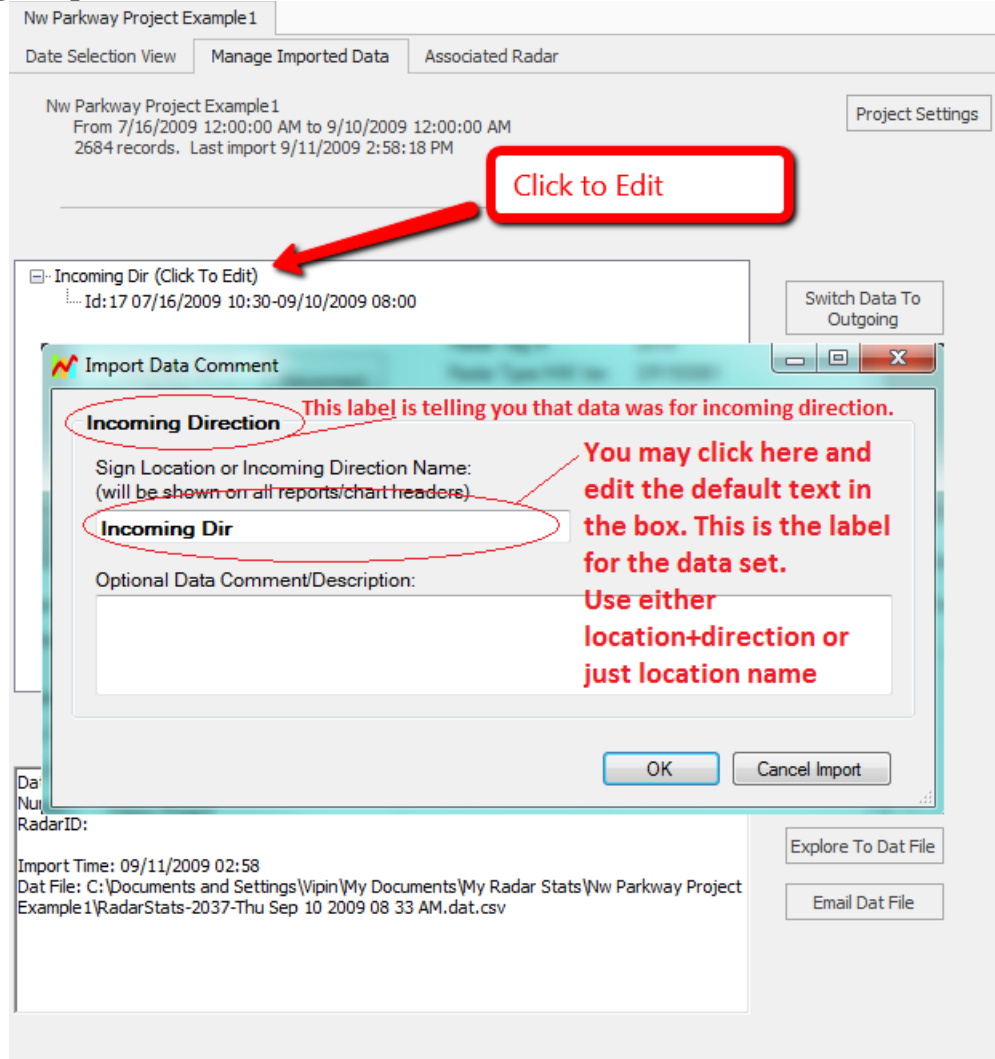
Once all data has been read from the radar and stored into the .dat file, you will be presented with the Import Wizard.



You will see all the different locations your data was collected in. To import into an existing project, simply select the data chunk and drag it to one of the existing projects on the left. You may create a new project by right clicking on the left pane.

To finish the import, you must click the “Import” button at the bottom.

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.



If you are organizing the data into projects created by year-month, we suggest that you label your import by location name and traffic direction (e.g. main and Dartmouth-NB). If you are organizing your projects by location name, we suggest you simply use the traffic direction as the import label (e.g. incoming or north bound or NB etc.).

Stats Analyzer Configuration

Stats Analyzer Settings dialog allows you to customize the software for your specific needs.

Settings

Web proxy

☐ Enable HTTP proxy

1 Address: Port:

Excel Summary Export Settings

☒ Enable Speed Rebinning for Excel Exports

2 **Rebin Settings**

These settings apply only to Armadillo Traffic Data.

Speed Bin Width (Mph or Km/h):

Min Speed Bin (Mph or Km/h):

Max Speed Bin (Mph or Km/h):

Pace Speed Interval (Mph or Km/h)

3 **Export Interval**

☐ 1 Minute ☐ 5 Minutes ☐ 10 Minutes
☐ 15 Minutes ☐ 30 Minutes ☒ 60 Minutes

4 ☐ Include Raw Data in Excel Export

5 ☐ Include Tally Report in Excel Export

Min Speed Bin In Tally Max Speed Bin is Determined From Min

Export Summary template (the default template is in the installation folder.)

6

Traffic Analysis Report Settings

7 **Peak Time Hour Start Interval**

☒ 60 Minutes ☐ 30 Minutes ☐ 15 Minutes

Default Data Save/Export File Directory:

8 C:\Documents and Settings\gandl\My Documents\My Radar Stats

Language Selection

9 Language:

- 1) HTTP Proxy; setup a proxy server to access the internet, if required.
- 2) Speed bin settings for Excel; specifies the speed interval for the exported summary report.

- 3) Export Interval; specifies the time interval for the exported summary report.
- 4) Export Raw Data yes/no.
- 5) Include Tally Report on export for the Armadillo Tracker.
- 6) Export Excel Summary template; this is version 8.x only functionality.
- 7) Time interval for Peak Traffic Analysis; specifies time bins for peak traffic analysis.
- 8) Default directory for saving .dat files and export files.
- 9) Language selection.

Analyzing Data and Generating Reports

The Houston Radar Advanced Traffic Stats Analyzer program is a powerful tool to analyze the traffic data and generate reports. Traffic data may be selected by date or by choosing individual import records.

Generating Monthly, Weekly and Daily Counts and Speed Reports

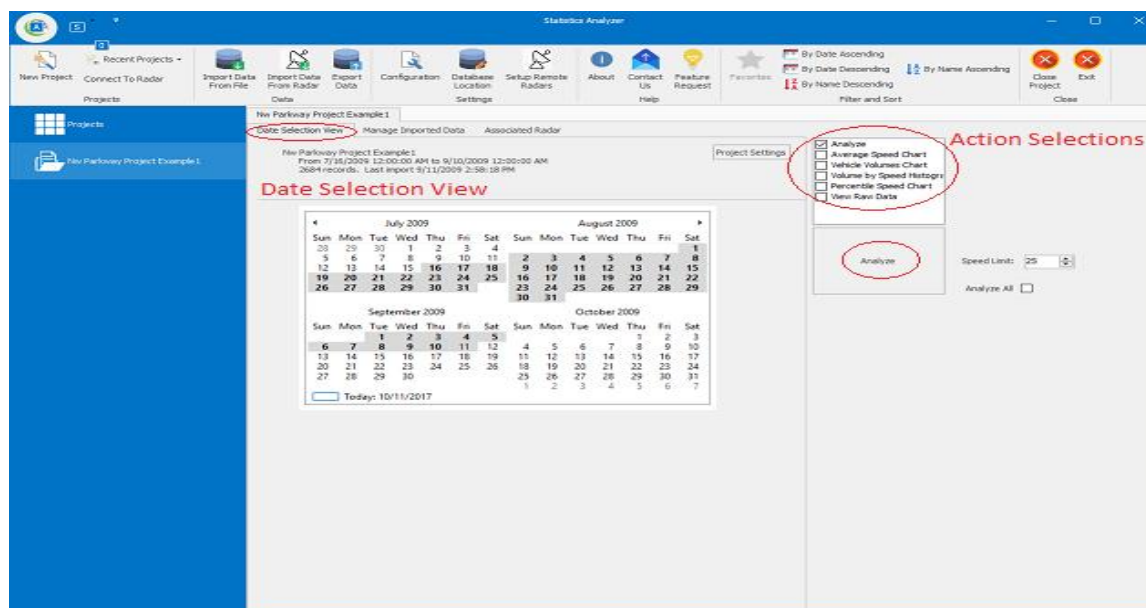
STEP 1: Open the project and select the data set you want to analyze

Refer to the section [Step 3: Import Data from Your Connected Radar](#) to create and import data into a project. Once your project is open you have two choices to select your data set.

Option 1: Run report over specified dates:

The software allows you to specify start/end period to run the analysis. Using this option automatically includes all data in all import sets in *this* project that are within the specified timeframe. You may not want to use this option if you have data from different locations in this project.

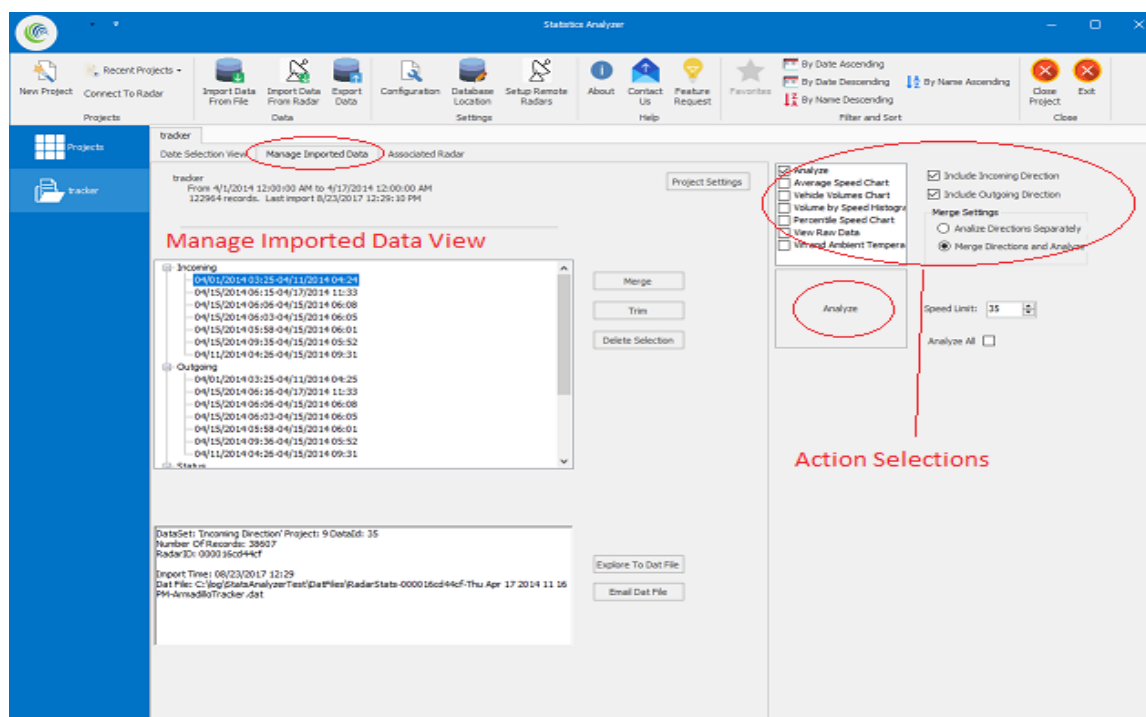
After opening the desired project, choose the Date Selection View. It contains a calendar control where dates containing data are displayed in bold text. Simply choose the contiguous dates required, the action selections on the right, and click the Analyze button.



Option 2: Run report over one or more data sets

To generate a report from a specific dataset, use the Manage Imported Data tab. It contains a tree view where individual import records are shown by type. Record types are broken down by Incoming, Outgoing, Crossfire, SpeedLane, and Status. Select one or more data sets from the tree view, choose the desired reporting action selections on the right, and click the Analyze button.

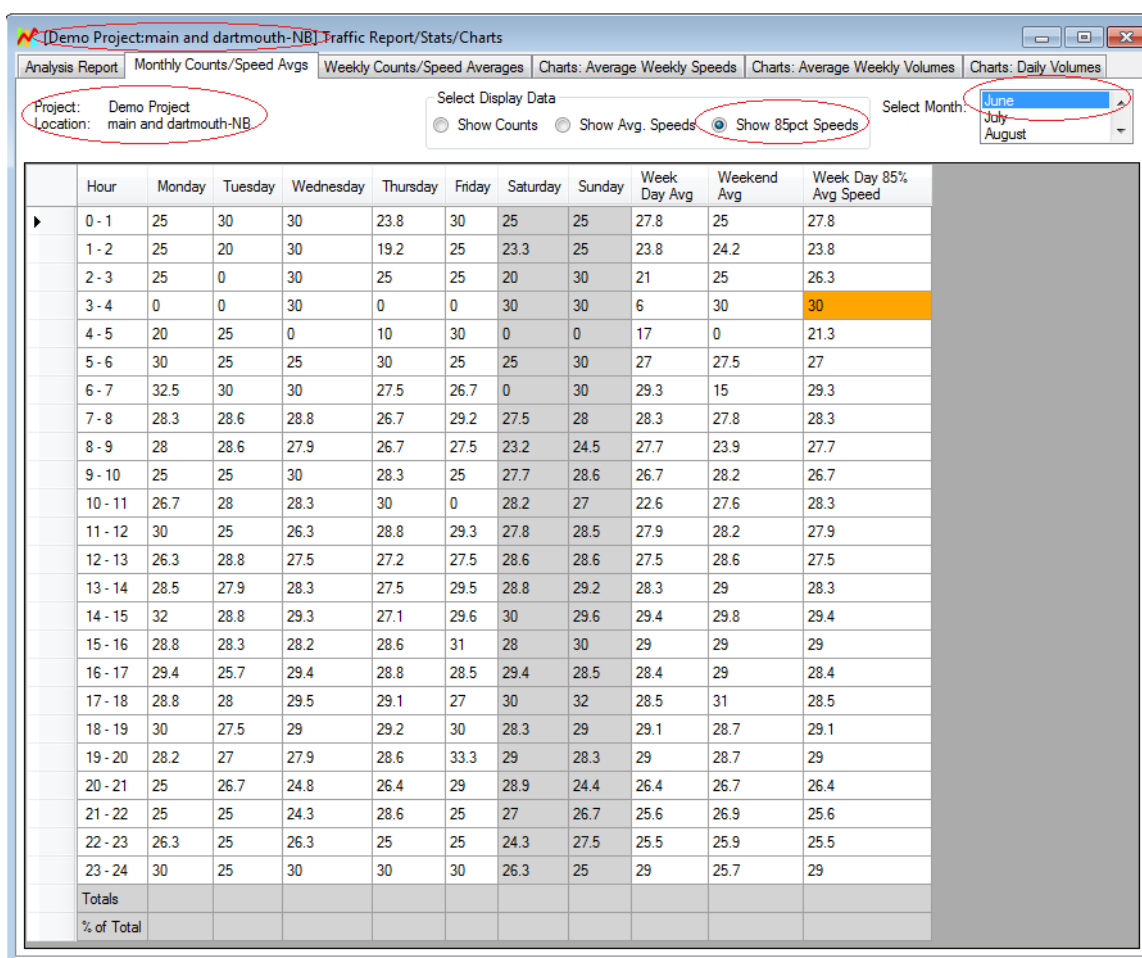
The Manage Import Data tab provides controls to choose incoming and/or outgoing directions and the capability to combine (merge) the directions into the same report.



Interpreting the Analysis Report

Once you click the *Analyze* button, the program selects the data you need analyzed, runs an analysis and returns the results in the following window.

Interpreting the Monthly Counts/Speed Avgs tab:



As you can see, the report title bar contains the project name and location and this information is also repeated within the report window as well.

All analysis is done on an hourly basis and reported by the day of the week.

For example, if you select the *Monthly Counts/Speed Avgs* tab, you are presented with an option to view the average hourly speeds by hour of day for each day of week.

-If you selected 85th percentile speeds for the month of June on this tab, the value in the 1st cell (hour = 0-1, Day = Monday) is the average of the 85th percentile speeds from the midnight hour to 1am on all Mondays in June (where there is data). And so on and so forth for all the cells.

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The *Week Day 85th % Avg Speed* (last) column contains the average of that row excluding the weekends. So, the 1st cell in the last column is the average 85th percentile speed during the weekday in June for the midnight to 1am time slot.

Similarly, the average speed and counts selector on this tab shows the average of the average speeds and average counts for the specified hour for the specified day of the week in June.

If data for more than 1 month is available, you can select it on the top right.

Interpreting the Weekly Counts/Speed Averages tab

Click on the *Weekly Counts/Speed Averages* tab to show the data by actual week.

When viewing counts, the cells in this tab contain actual count data for the selected week by hour of the day.

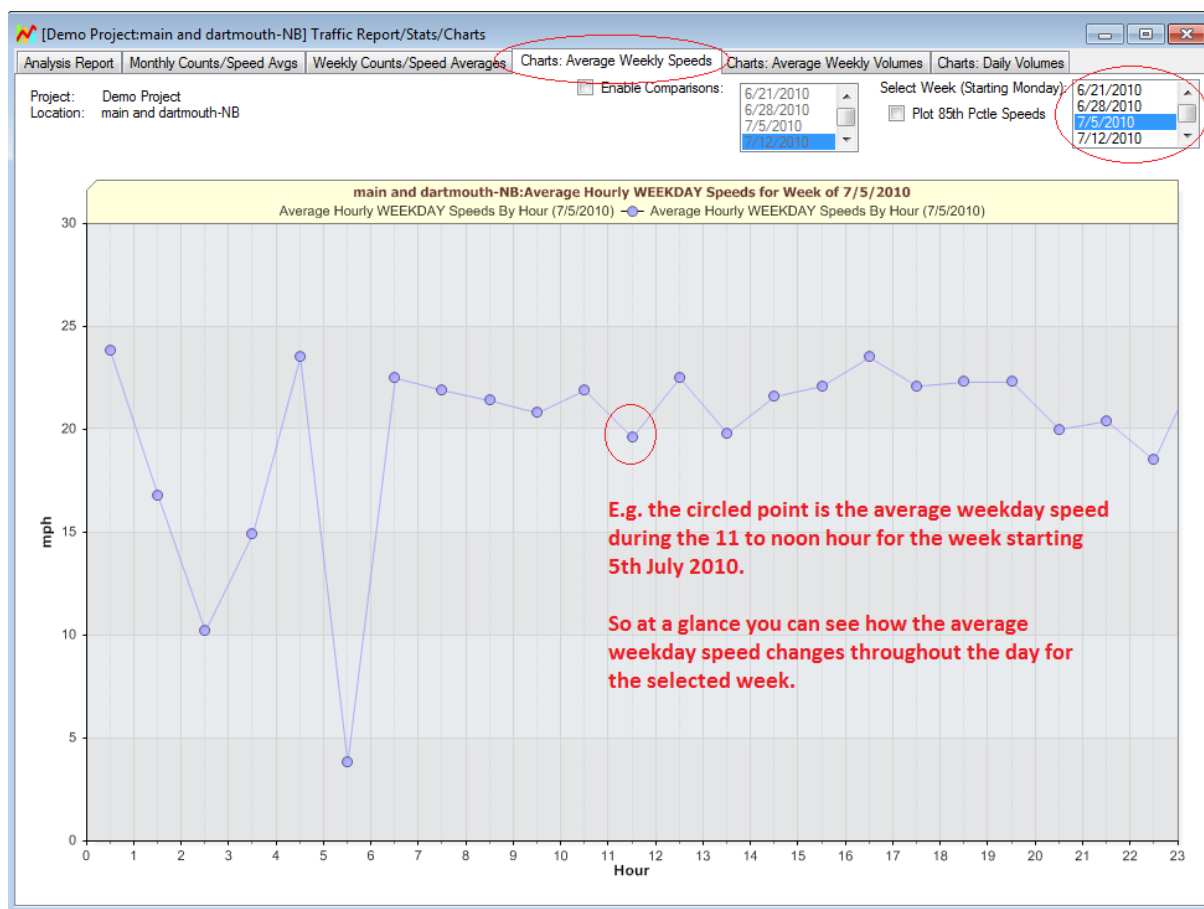
When viewing average or 85th percentile speeds, the cells contain the average or 85th percentile speed data for the selected week by hour of day.

If the analysis has more than one week of data available, you may select it on the top right as shown below.

Hour	Monday 7/5/2010	Tuesday 7/6/2010	Wednesday 7/7/2010	Thursday 7/8/2010	Friday 7/9/2010	Saturday 7/10/2010	Sunday 7/11/2010	Week Day Avg	Weekend Avg	Week Day 85% Avg Speed
0 - 1	35	40	27.5	28.3	30	40	28.3	32.2	34.2	32.2
1 - 2	30	20	0	25	28.3	35	30	20.7	32.5	25.8
2 - 3	25	0	0	25	10	0	25	12	12.5	20
3 - 4	0	25	35	0	30	25	25	18	25	30
4 - 5	35	25	25	30	30	30	30	29	30	29
5 - 6	0	0	10	0	20	30	25	6	27.5	15
6 - 7	28.3	27.5	30	32.5	29	23.8	30	29.5	26.9	29.5
7 - 8	28.3	27.5	27	28.1	25	28.3	24.3	27.2	26.3	27.2
8 - 9	27.5	28.3	28.3	27.5	28.3	25	25	28	25	28
9 - 10	27.5	25	24.3	27.9	27	24.5	28.8	26.3	26.7	26.3
10 - 11	28.3	27.5	28	28.3	26.3	27.5	25	27.7	26.3	27.7
11 - 12	26.3	27.5	28.8	26.7	24.2	28.3	28.7	26.7	28.5	26.7
12 - 13	28.3	28	28.3	29	28.3	28.8	29.4	28.4	29.1	28.4
13 - 14	24.2	27.9	26.7	28.3	25	29.1	27	26.4	28.1	26.4
14 - 15	30	29	27.9	29	26.7	27.5	27.5	28.5	27.5	28.5
15 - 16	26.3	30	28.8	28.6	27.8	28.8	29	28.3	28.9	28.3
16 - 17	29	30	28.6	27.5	28.3	28.9	32	28.7	30.5	28.7
17 - 18	28	28.6	29.4	27.5	26.9	28.6	28	28.1	28.3	28.1
18 - 19	30	28.3	28	28.8	25.6	27.5	28.8	28.1	28.2	28.1
19 - 20	27	28.1	28.1	28	30	25	25	28.2	25	28.3
20 - 21	24.4	25	24.4	24.6	27	27	28.1	25.1	27.6	25.1
21 - 22	25	25	27.1	23.9	25	24.5	25	25.2	24.8	25.2
22 - 23	25	28.3	25	26.7	20.7	28.8	32.5	25.1	30.7	25.1
23 - 24	30	30	30	30	25	26.7	27.5	29	27.1	29
Totals										
% of Total										

Interpreting the Charts: Average Weekly Speeds tab

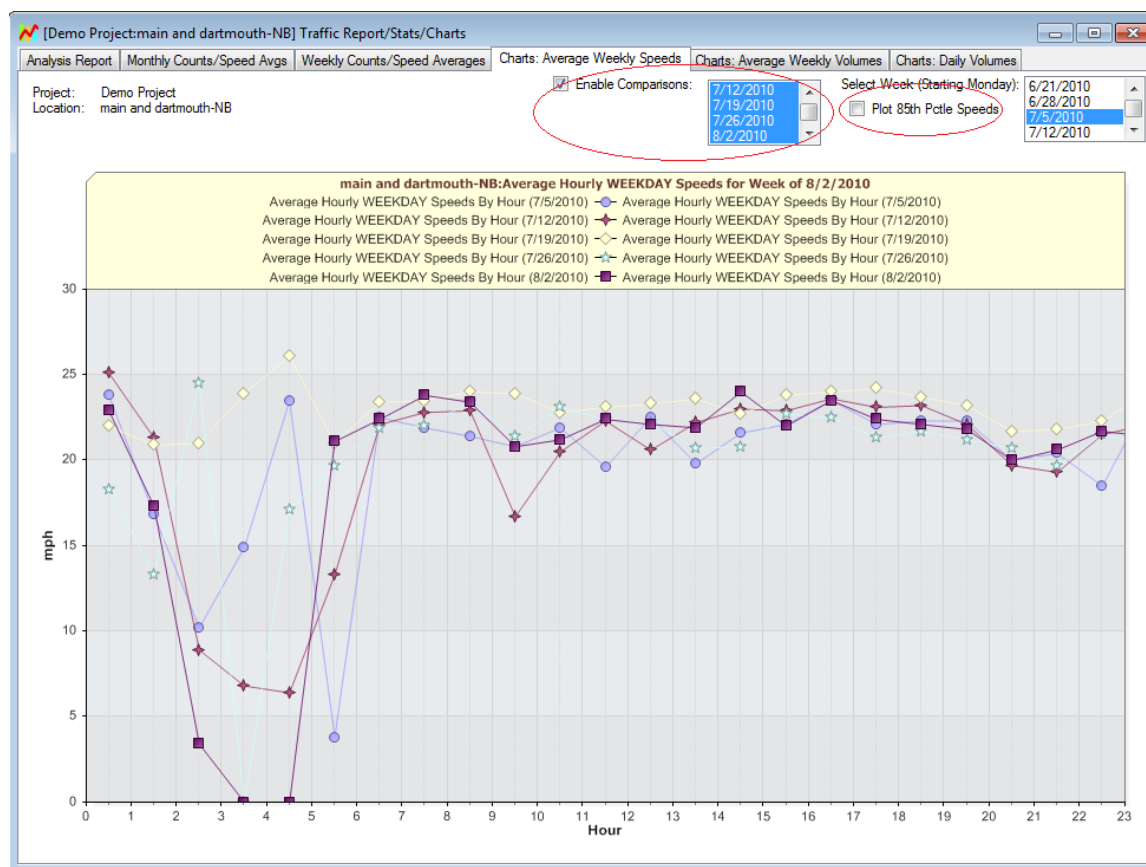
Click the **Charts: Average Weekly Speeds** tab to show an hourly graph of the average **weekday** speeds by hour for the week selected as shown below.



When you select a week on any of the weekly tabs, the selection is maintained when you click over to another tab. This way, you can simply select a week (say) on the **Weekly Counts/Speed Averages** tab and then click over to the **Charts: Average Weekly Speeds** or **Charts: Average Weekly Volumes** tab to examine the data in different views for the same week.

Comparing multiple charts

The charts also allow you to compare data from multiple weeks to see if traffic patterns are changing over time. Click the “Enable Comparison” checkbox and select more or more weeks to compare to. To select more than one week, hold down the CTRL key while clicking to make your selection.



You may also plot the 85th percentile speeds by checking the “Plot 85th Percentile Speeds” checkbox found next to the week selector box as shown by the red circle in the image above.

Filtering the data further

Notice the Filter Data by Custom Settings on the right-hand side of the Report Window. This set of controls will allow the data to be filtered more than the wide range of dates or datasets given by the previous screens. First, click the “Filter Data by Custom Settings” check box, then specify any or all of the following filters.

Free Floating vehicles do not have a vehicle “in front” of them by the amount of time as specified by the Gap Length in seconds.

Include at Least will force a minimum number of vehicles to be included in the report.

Filter Out Large Vehicles will take out any “Large” vehicles.

Start From allows a different start time to be specified (rather than where data starts).

Finally, Stop After forces the report to stop after a specified amount of time from the Start From time.

Once all filters have been selected, click the Apply button. The filter settings will be applied to the selected data and saved such that the next time the project is accessed, the same filter settings will be applied to the report.

☐ Filter Data By Custom Settings

Custom Settings

☐ Include Only "Free Floating" Vehicles.
Gap Length At Least:
3 Seconds

☐ Must Include At Least:
125 Vehicles

☒ Stop At Min Vehicles

☒ Filter Out Large Vehicles

Start From

☒ Beginning of Selected Data

☐ Selection
01 Apr 2014 03:00 PM

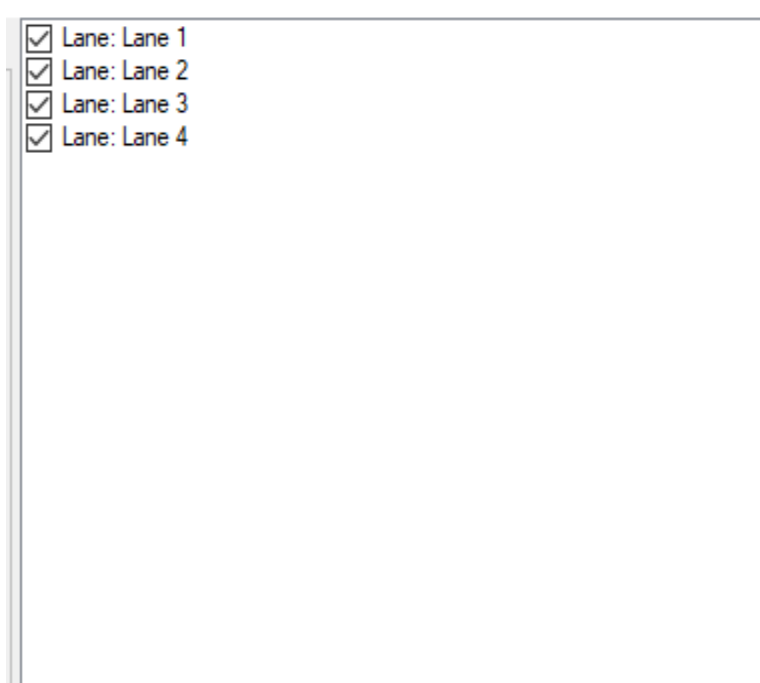
☐ Stop After:
2.00 Hours

This filter applies to all subsequent analysis and open graphs and reports when you click 'Apply'.

Apply

Filtering for Crossfire

The Crossfire radar tracks distance to target; therefore, a traffic lane is assigned to each target based on the distance. You can filter based on lanes for Crossfire traffic data.

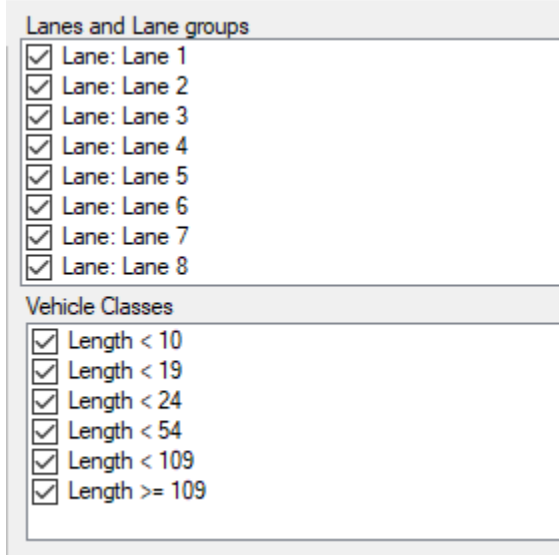


A screenshot of a software interface showing a list of four items, each with a checked checkbox and the text "Lane: Lane 1", "Lane: Lane 2", "Lane: Lane 3", and "Lane: Lane 4". The list is contained within a rectangular box with a blue border.

As these checkboxes are changed, the filter is applied.

Filtering for SpeedLane

The SpeedLane radar tracks distance to target and target length; therefore, a traffic lane is assigned to each target based on distance to target. Additionally, the target length is recorded. Lane and Vehicle classification filters are available for SpeedLane projects.



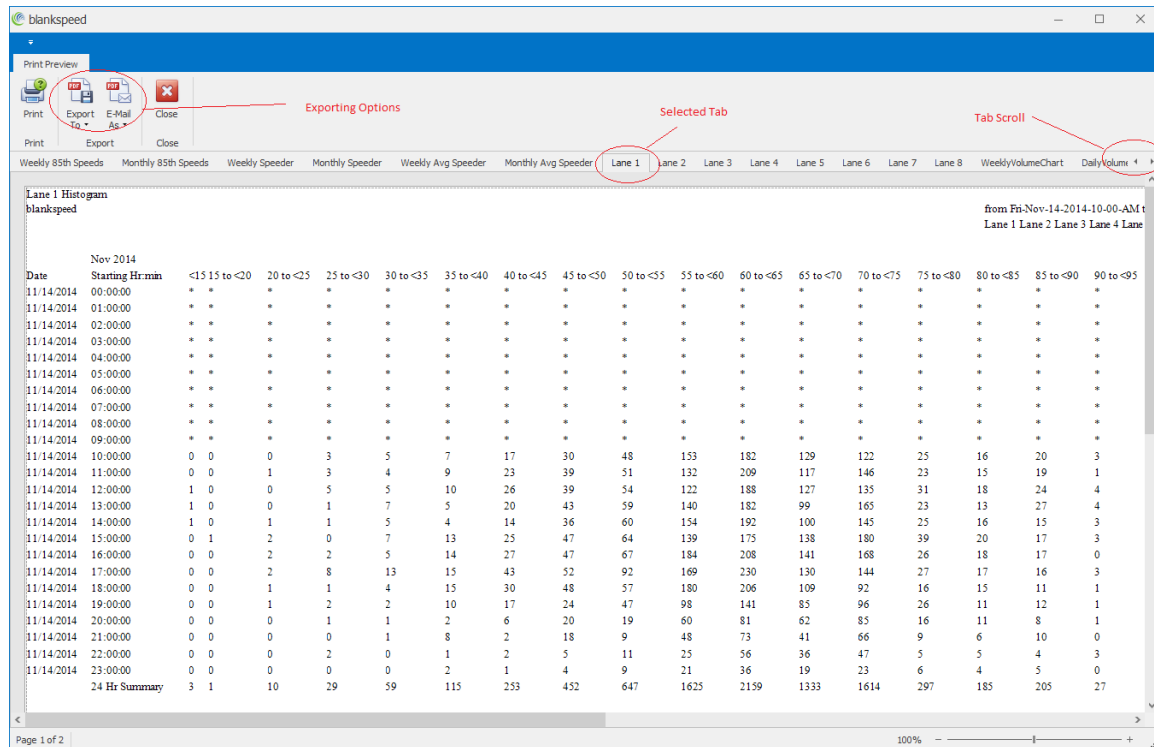
A screenshot of a software interface showing two sections of checkboxes. The first section, titled "Lanes and Lane groups", contains eight checkboxes, all of which are checked, with labels "Lane: Lane 1" through "Lane: Lane 8". The second section, titled "Vehicle Classes", contains six checkboxes, all of which are checked, with labels "Length < 10", "Length < 19", "Length < 24", "Length < 54", "Length < 109", and "Length >= 109".

As these checkboxes are changed, the filter is applied.

Exporting Report Data

In addition to the interactive reports, Stats Analyzer allows you to export 1,5,10, 15, 30 or 60 minute and daily summary data, and the other interactive reports. Once all required filtering has been performed, click the Export button in the lower right of the report form.

Stats Analyzer will create an export of all tabular data and displayed charts, then display an Export Control. Each of the reports are “unrolled” across multiple tabs in this control.



The Export Viewer provides the capability to export its contents to PDF, Excel, CSV, and other formats. To perform the export, click Export To and choose a format. A Save As dialog will appear allowing specification of location and name of the export file. Once save is clicked, the Export Viewer will save its contents to the export file in the specified format.

Generating Interactive Charts

The stats analyzer software has a powerful feature where the user may generate interactive charts of raw data and navigate through the entire dataset easily and quickly. This feature provides a bird's eye graphical view of the entire data set.

The table below indicates what interactive charts are available by radar type:

	Doppler	Armadillo Tracker	Armadillo Crossfire	Speedlane
Average Speed	X	X		X
Vehicle Volume	X	X		X
Volume By Speed Histogram	X	X		X
Percentile Speed	X	X		X
Vin & Ambient Temperature		X	X	

The image below shows the options for choosing charts to plot. The options changed based on the type of project being viewed.

The screenshot displays the software's configuration window for generating charts. It features a list of checkboxes on the left for selecting specific data visualizations, a 'Merge Settings' section with radio buttons, a large 'Analyze' button, a speed limit input field, and an 'Analyze All' checkbox.

☒ Analyze
☐ Average Speed Chart
☐ Vehicle Volumes Chart
☐ Volume by Speed Histogram
☐ Percentile Speed Chart
☐ View Raw Data
☐ Vin and Ambient Temperature

☒ Include Incoming Direction
☒ Include Outgoing Direction

Merge Settings
☐ Analyze Directions Separately
☒ Merge Directions and Analyze

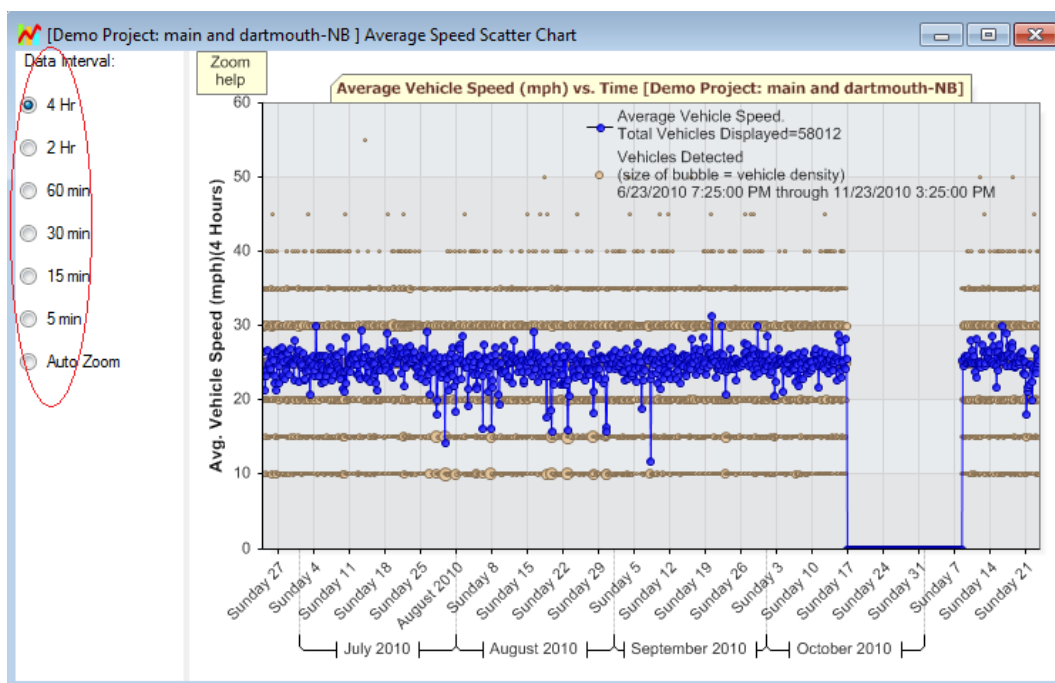
Analyze

Speed Limit: 35

Analyze All ☐

Average Speed Interactive Chart

The average speed interactive chart plots all the vehicle speeds vs. time. Depending on the amount of data being plotted in the selected dataset, the data is automatically aggregated in optimal time bins.



For

example, in the chart shown above, the entire data contains over four months of data for 58012 vehicles. This is so much data, that the software has automatically re-aggregated it in 4-hour intervals. Aggregation level is shown on the left side via selected “4 Hr” radio box as well as printed on the y axis.

The above selection means that the count values (shown as gold circles) and the average speeds (shown as blue circles) are count totals and average speeds over 4 hours.

Also, from the bird’s eye view it becomes apparent that there is a large gap in the data from around the 16th of October through the 7th of November.

There are a few ways to navigate around this data. To examine a smaller time period, click the left mount button at the start date you want to examine and then click the left mouse button again at the end date. The graph will automatically zoom to this range.

Once you zoom in, you can easily click another aggregation period on the left pane and the data will redraw with higher resolution (e.g. 30 minutes or 15 minutes as you choose).

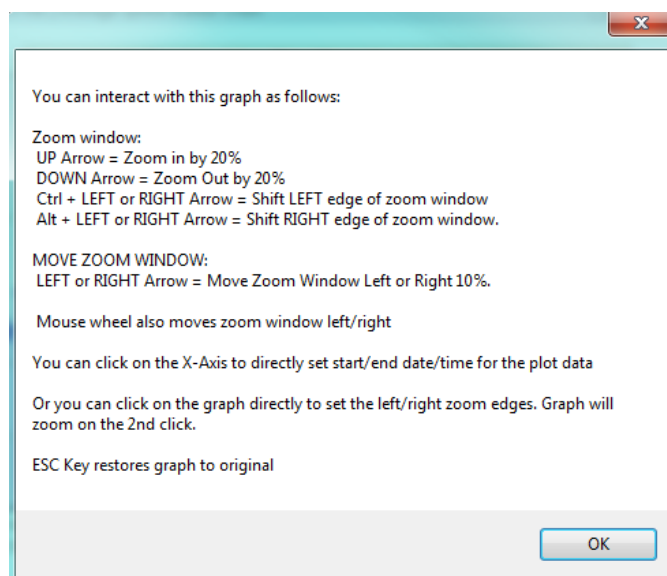
If you want the software to automatically pick the best resolution automatically, select “Auto Zoom” on the left pane. Now the software will automatically determine the

optimal aggregation period based on how much data can be displayed on the screen without too much clutter.

As you zoom around in the data, the total number of vehicles in the view is automatically recalculated and displayed on the top in the legend area. This is a great way to get vehicle totals across different or non-standard time periods.

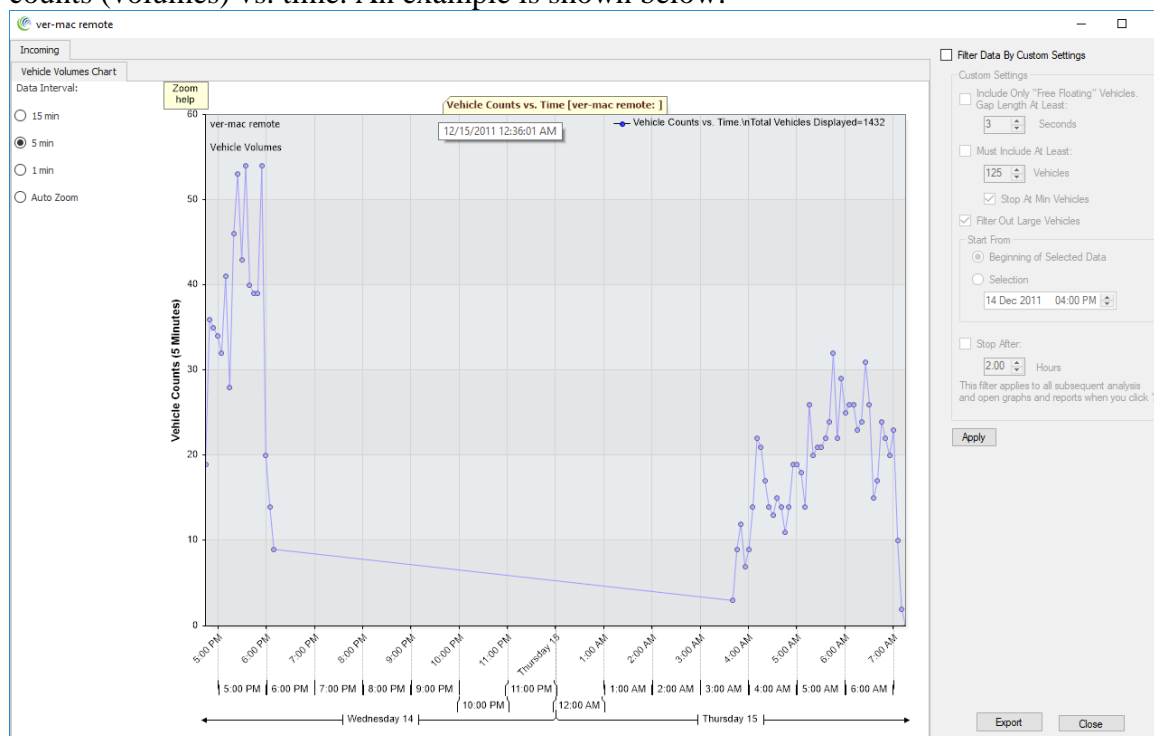


You can also use the arrow keys and mouse wheel to zoom in/out and scroll the chart left or right. Click on the “Zoom Help” button in the chart area to get a help screen on the keys supported. This window is reproduced below.



Total Counts (Volume) Interactive Chart

Check the *Generate Vehicle Volume Chart* checkbox to get an interactive chart of vehicle counts (volumes) vs. time. An example is shown below:

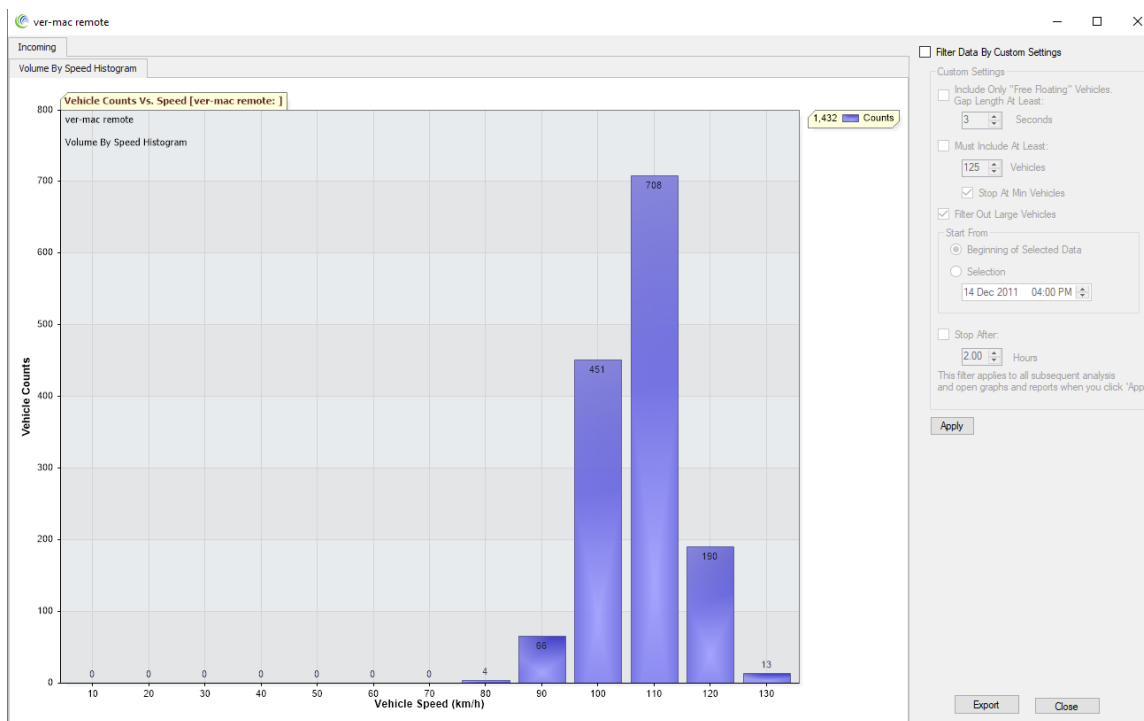


Selecting the 60-minute aggregation option is a great way to get a bird's eye view of the hourly volume of traffic throughout the dataset.

Just as with the average speed chart, this chart is completely interactive and you can navigate around in it by mouse clicks, mouse scroll wheel and arrow keys. Click on the "Zoom Help" button in the chart area for instant help.

Histogram Chart

Click on the Generate Volume by Speed Histogram Chart to generate the following chart. This chart plots the number of vehicles in the data set vs. the speed bin they were recorded in.



Percentile Vs. Speed Interactive Chart

Determining the 85th percentile speed of traffic on the road is an important requirement for a speed study. [As is well known](#), studies have shown that the 85th percentile speed is an appropriate starting point to determine the optimal speed limit.

The software allows you to automatically calculate the 85th percentile speed on the road. Additionally, it also calculates the speed associated with all percentiles of vehicles from 0 to 100. This information is plotted as a well-known “S” chart.

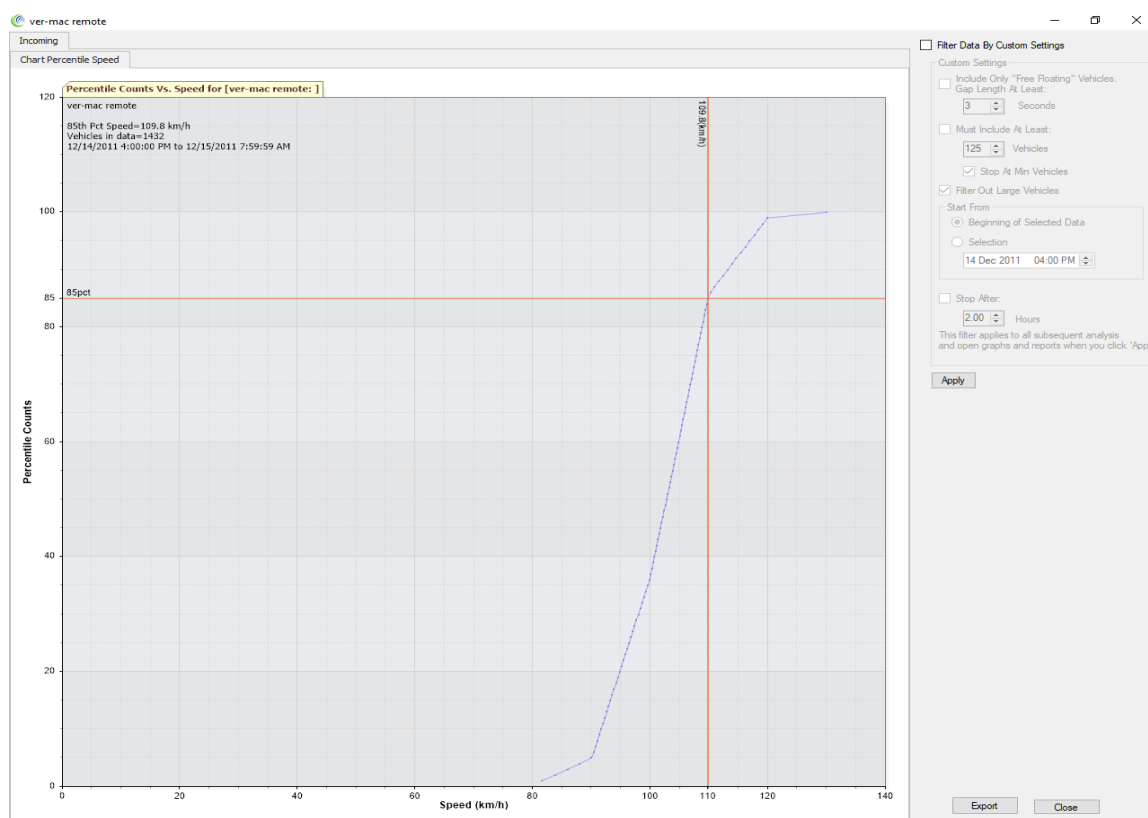
Check the *Generate Percentile Vs. Speed Chart* checkbox and click the *Analyze* button to generate the following chart.

This chart plots the total percentile counts of vehicles on the road traveling at every speed up to the maximum speed in the dataset.

The 85th percentile speed is also automatically marked by the red crosshairs.

For example, in this data set, the 85th percentile speed is 28mph.

You may also click anywhere on the chart and obtain the percentile value and speed at that point.



Houston Radar Armadillo Tracker Specific Functionality

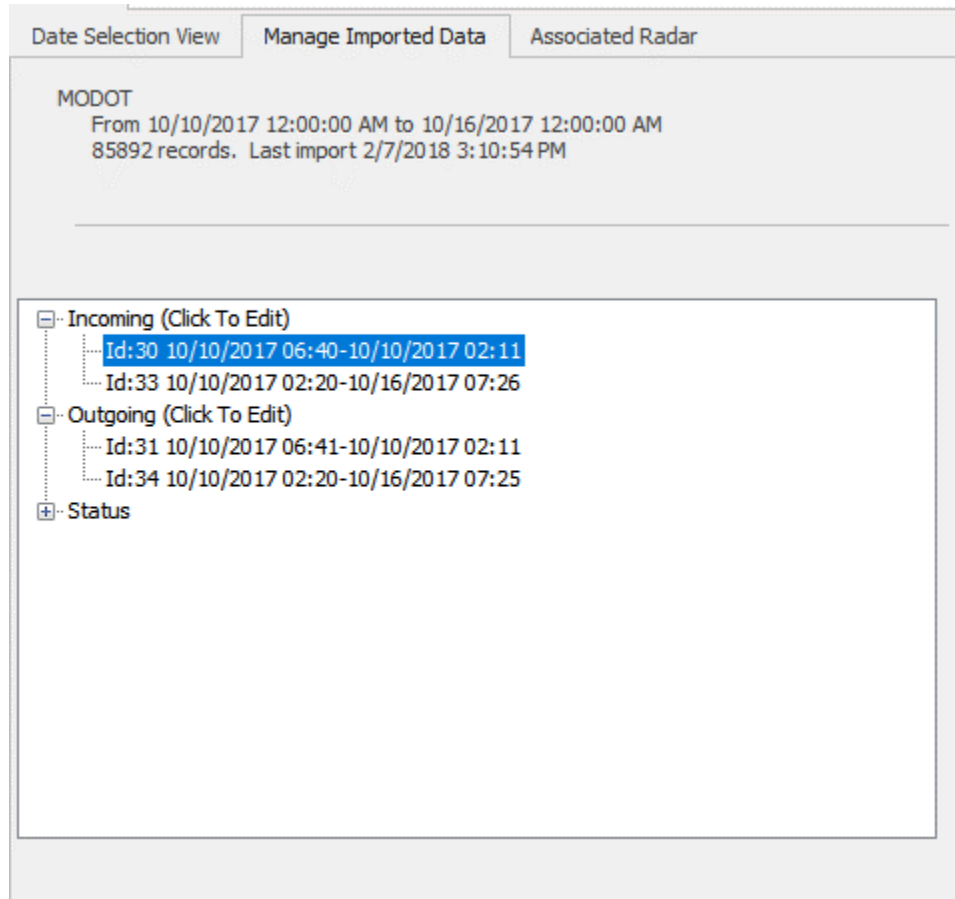
The Houston Radar Armadillo Tracker traffic collector has certain additional features not found in our OEM based Advanced In-Radar traffic statistics. These are:

1. Simultaneous bi-directional data logging
2. Individual vehicle logging with 1 mph (or 1 Km/h) speed resolution
3. Vehicle Classification into 3 vehicle size bins
4. Hourly logging of:
 - a. Battery charge status (mAh of battery capacity remaining)
 - b. Battery voltage
 - c. Ambient Temperature
5. Tally Report Generation
6. GPS option to automatically tag data location and allow splitting of data into location chunks during importing into the Stats Analyzer.

The Houston Radar Stats Analyzer supports these features as described below:

Bidirectional Analysis of Data

The Houston Radar Armadillo can log bi-directional traffic. When you import data that has bi-directional information present, the data is imported separately for both directions. See screenshot below:



When doing Analysis on an Armadillo Tracker Project, you can either Analyze the data separately for each direction, or you can merge them together. Use **Merge Settings** to customize your report.

The screenshot displays the configuration window for the Houston Radar Advanced Traffic Statistics Analyzer. On the left, a list of checkboxes allows users to select the types of data to analyze: 'Analyze' (checked), 'Average Speed Chart', 'Vehicle Volumes Chart', 'Volume by Speed Histogram', 'Percentile Speed Chart', 'View Raw Data', and 'Vin and Ambient Temperature'. To the right, there are checkboxes for 'Include Incoming Direction' and 'Include Outgoing Direction', both of which are checked. Below these is a 'Merge Settings' section with two radio buttons: 'Analyze Directions Separately' and 'Merge Directions and Analyze', with the latter being selected. At the bottom left is a large 'Analyze' button. At the bottom right, there is a 'Speed Limit' dropdown menu currently set to '35' and an 'Analyze All' checkbox which is unchecked.

Tally Report Generation

The Tally Report is derived from the TXDOT Form 1882 Tally Sheet. Stats Analyzer will create this report when the Tally Sheet configuration has been selected in the [Stats Analyzer configuration](#) (Item number 5). The Tally Sheet is shown on the Export Control when this configuration item is selected **and** the radar type for the project is an Armadillo Tracker. Below is an example of the tally sheet as shown in a PDF viewer. Note, part of the output has been clipped out as there were no vehicles at those speeds.

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RADAR MOTOR VEHICLE SPEED						Form 1882 (Rev. 02/12)	
Date:	04/01/2014	County		Hwy		Location:	
(from):	03:00 PM	(to):	05:00 PM	Weather:			
Surface Type:				Surface Condition:		Wet:	Dry:
						Smooth:	Rough:

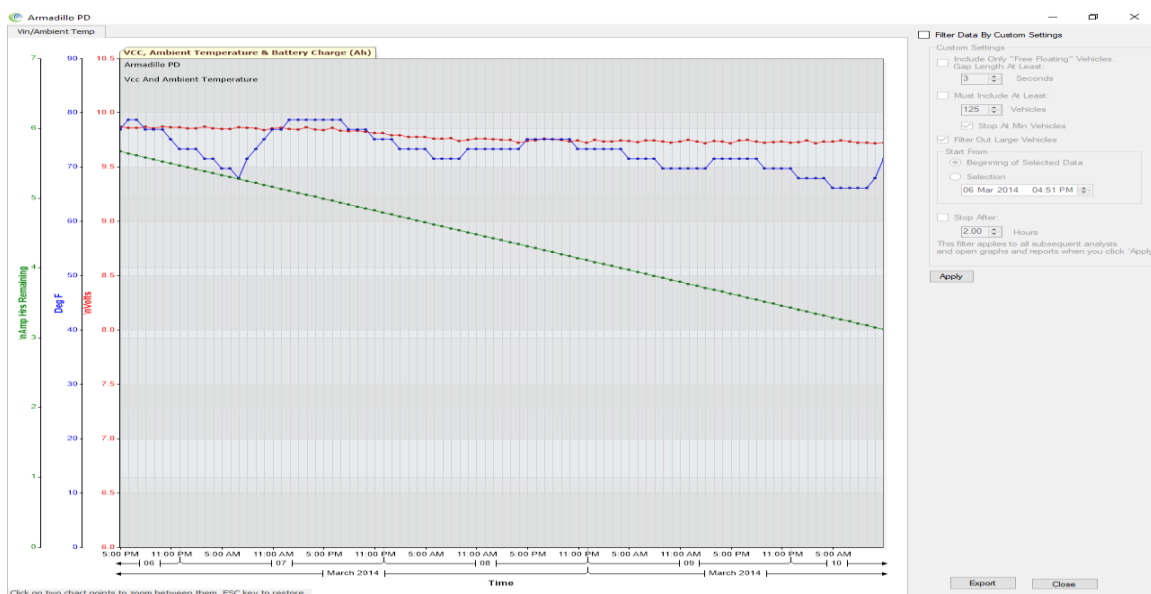
AUTOMOBILES			AUTOMOBILES		
mph	Direction	Total	mph	Direction	Total
>= 80		3	>= 80		
79		0	79		
78		0	78		
77			77		
49		0	49		
48		4	48		
47		2	47		
46		3	46		
45		7	45		
44		5	44		
43		10	43		
42		12	42		
41		12	41		
40		9	40		
39		11	39		
38		5	38		
37		2	37		
36		5	36		
35		5	35		
34		6	34		
33		11	33		
32		3	32		
31		3	31		
<= 30		6	<= 30		
		128			
		x 0.85			x 0.85
85th Percentile Vehicles (counts)		109	85th Percentile Vehicles (counts)		
85th Percentile Speed		45	85th Percentile Speed		

Plotting Battery Status and Ambient Temperature

The Armadillo logs the remaining battery capacity, battery voltage and ambient temperature hourly. If these records are detected during data import, they are placed in a tab called “Advanced Info”. You can then plot all three in the Stats Analyzer to get graphical view of these values. This can be of a great benefit to validate a solar powered installation (you would ensure that the solar panel can keep the battery capacity above 0 “Amp Hours Remaining” over time). Alternatively, you may want to simply view the ambient temperature changes during the time the data was being collected.

To select data over multiple imports, select multiple entries by pressing the CTRL key and then click the desired rows. Then click the “Plot Vin and Ambient Temperature” button to plot them all together in one graph. An example plot is shown below.

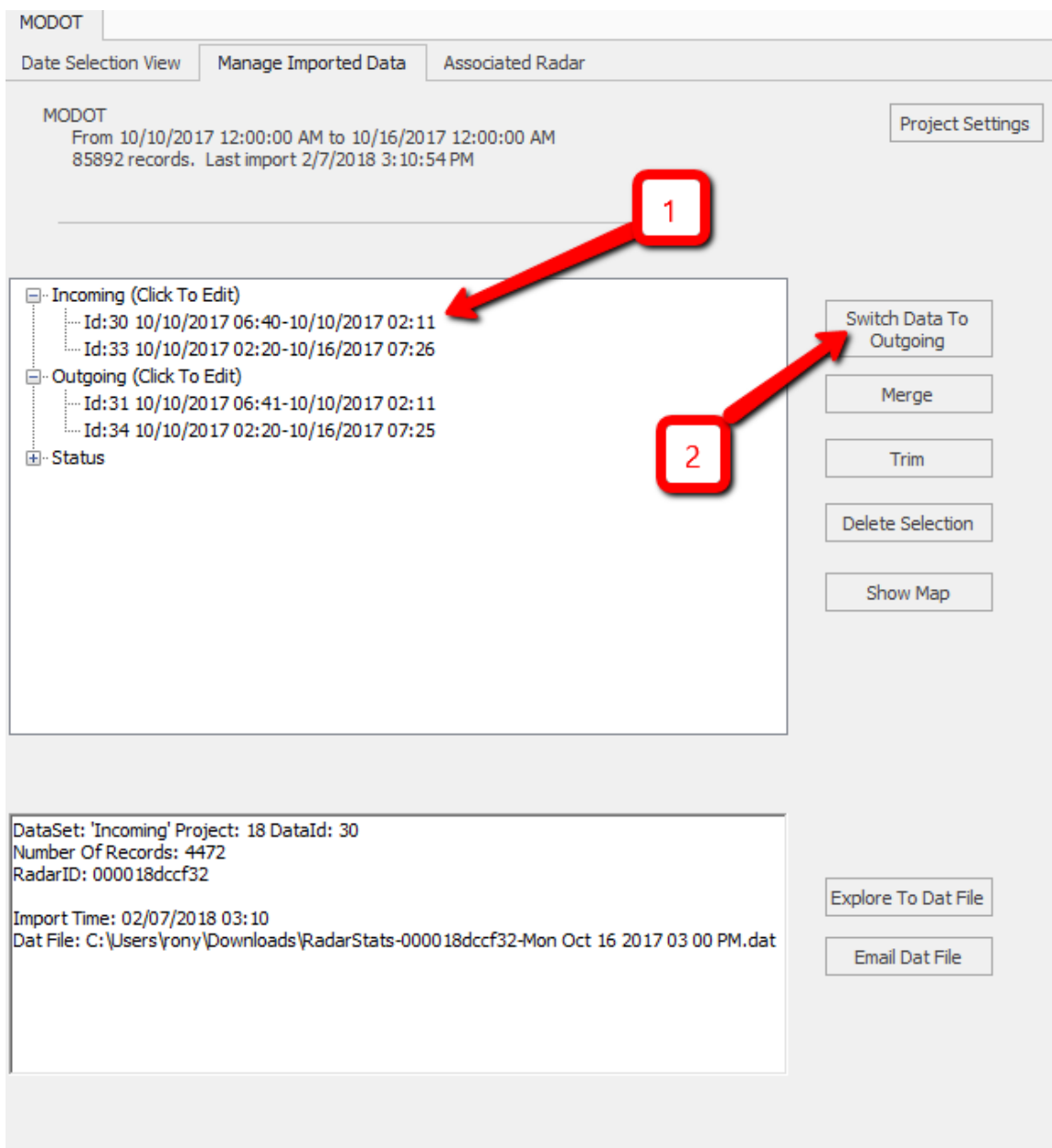
Houston Radar Advanced Traffic Statistics Analyzer User Manual



Switch Directions for Imported Data

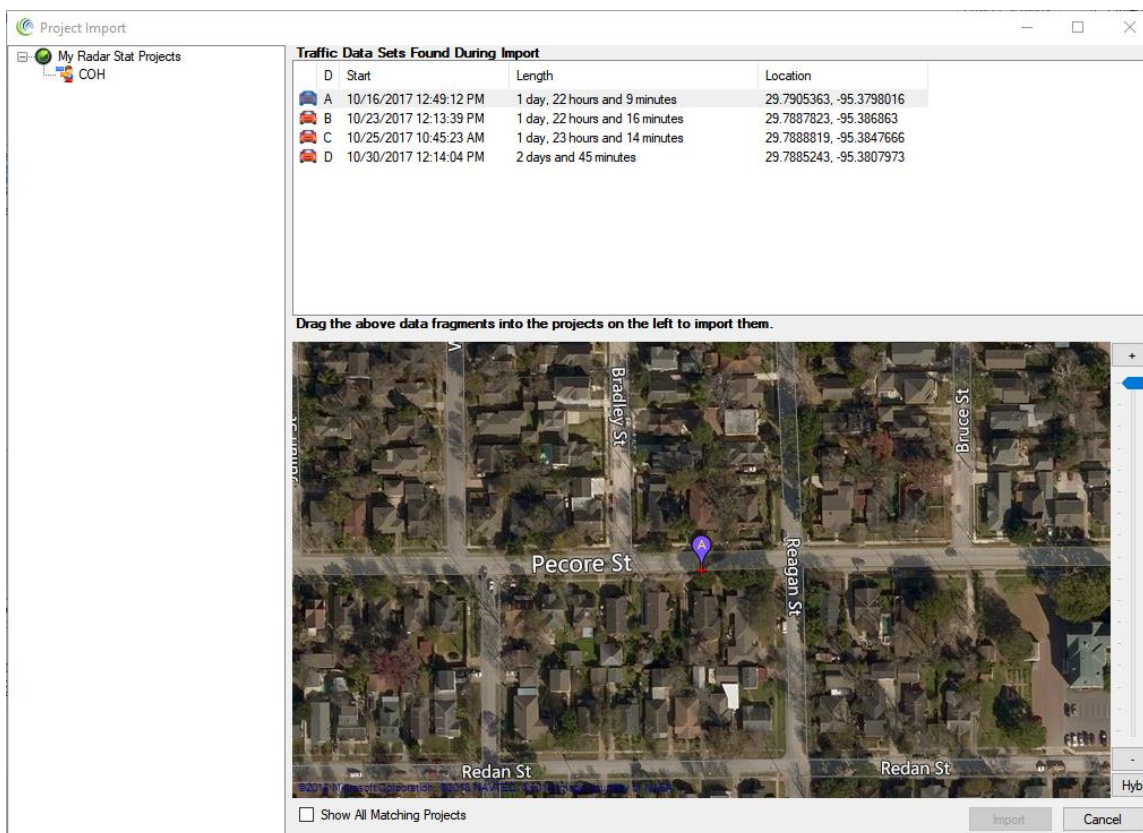
For data imported from an Armadillo tracker with both incoming and outgoing directions, you can optionally switch the directions of the imported data. This feature is useful if the radar mounting was changed between traffic studies. To switch the direction of a dataset current shown as **Incoming**, select the imported data and click on the **Switch Data to Outgoing** button.

Houston Radar Advanced Traffic Statistics Analyzer User Manual



Downloading Data from Armadillo with GPS Option

Connect to your Armadillo Tracker (refer [Connecting To a Local Radar to Retrieve Data](#)) and import data from it (refer [Downloading Data From The Radar](#)). On the Project Import screen, you will see all the different locations your data was collected in. Clicking on the rows will place a pin on the map. You may zoom in or out by using the scroll bar on the right.



To import into an existing project, simply select the data chunk and drag it to one of the existing projects on the left. You may create a new project by right clicking on the left pane.

To finish the import, you must click the “Import” button at the bottom.

Houston Radar Armadillo Crossfire Specific Functionality

Houston Radar Armadillo Crossfire Traffic Collector uses a FMCW (Frequency Modulated Continuous Wave) radar to track vehicle presence and distance from the radar. This allows you to count vehicles on a per-lane basis.

For Armadillo Crossfire Projects, you can create Lane Groups from the **Lane Configuration** tab. Each lane group can have one or more lanes. Typical examples are lane groups for direction (northbound/southbound) or destination (Toronto). See screenshot below.

Houston Radar Advanced Traffic Statistics Analyzer User Manual

Crossfire

Date Selection View

Manage Imported Data

Associated Radar

Lane Configuration

Lane Number	Lane start (M)	Lane stop (M)	Name
L1	0	0.3	Lane 1
L2	0	0.3	Lane 2
L3	0	0.3	Lane 3
L4	0	0.3	Lane 4

User Defined Lane Groups

Groups	L1	L2	L3	L4	Name
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Northbound
2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Southbound

Add New Group

Delete Group

OK

Cancel

Once the lane groups are defined, you can use these groups to filter data for the various reporting screens. See below.

[Crossfire] Traffic Report/Stats/Charts

Analysis Report

Monthly Counts

Weekly Counts

Charts: Average Weekly Volumes

Charts: Daily Volumes

Project: Crossfire

Location: Lane Data

Weekly vehicle counts for the week of: 3/30/2015

Total Vehicles this week: 9323 Vehicles

Select Week of (Starting Monday): 3/30/2015

Hour	Monday 3/30/2015	Tuesday 3/31/2015	Wednesday 4/1/2015	Thursday 4/2/2015	Friday 4/3/2015	Saturday 4/4/2015	Sunday 4/5/2015	Week Day Avg	Weekend Avg
0 - 1	*	*	35	*	*	*	*	35	0
1 - 2	*	*	21	*	*	*	*	21	0
2 - 3	*	*	28	*	*	*	*	28	0
3 - 4	*	*	29	*	*	*	*	29	0
4 - 5	*	*	43	*	*	*	*	43	0
5 - 6	*	*	192	*	*	*	*	192	0
6 - 7	*	*	519	*	*	*	*	519	0
7 - 8	*	*	806	*	*	*	*	806	0
8 - 9	*	*	749	*	*	*	*	749	0
9 - 10	*	*	456	*	*	*	*	456	0
10 - 11	*	*	436	*	*	*	*	436	0
11 - 12	*	*	698	*	*	*	*	698	0
12 - 13	*	*	782	*	*	*	*	782	0
13 - 14	*	*	598	*	*	*	*	598	0
14 - 15	*	*	472	*	*	*	*	472	0
15 - 16	*	*	674	*	*	*	*	674	0
16 - 17	*	*	768	*	*	*	*	768	0
17 - 18	*	*	827	*	*	*	*	827	0
18 - 19	*	*	468	*	*	*	*	468	0
19 - 20	*	*	267	*	*	*	*	267	0
20 - 21	*	*	172	*	*	*	*	172	0
21 - 22	*	*	122	*	*	*	*	122	0
22 - 23	*	*	108	*	*	*	*	108	0
23 - 24	*	*	53	*	*	*	*	53	0
Totals	0	0	9323	0	0	0	0		
% of Total	0%	0%	100%	0%	0%	0%	0%		

☒ Group: Northbound
☒ Group: Southbound

☐ Filter Data By Custom Settings

☐ Include Only "Free Floating" Vehicles.
 Gap Length At Least:
 3 Seconds

☐ Must Include At Least:
 125 Vehicles
☒ Stop At Min Vehicles

☒ Filter Out Large Vehicles
 Start From:
☒ Beginning of Selected Data
 01 Apr 2015 12:00 AM

☐ Stop After:
 2:00 Hours

This filter applies to all subsequent analysis and open graphs and reports when you click 'Apply'.

Apply

Export

Close

Houston Radar SpeedLane Specific Functionality

The Houston Radar SpeedLane traffic collector combines two FMCW radars to track vehicle presence, distance from radar, speed, and length to be detected.

For SpeedLane Projects you can configure both Lane Configuration and Vehicle Classification Configuration.

For details about Lane Configuration, refer [Houston Radar Armadillo Crossfire Specific Functionality](#).

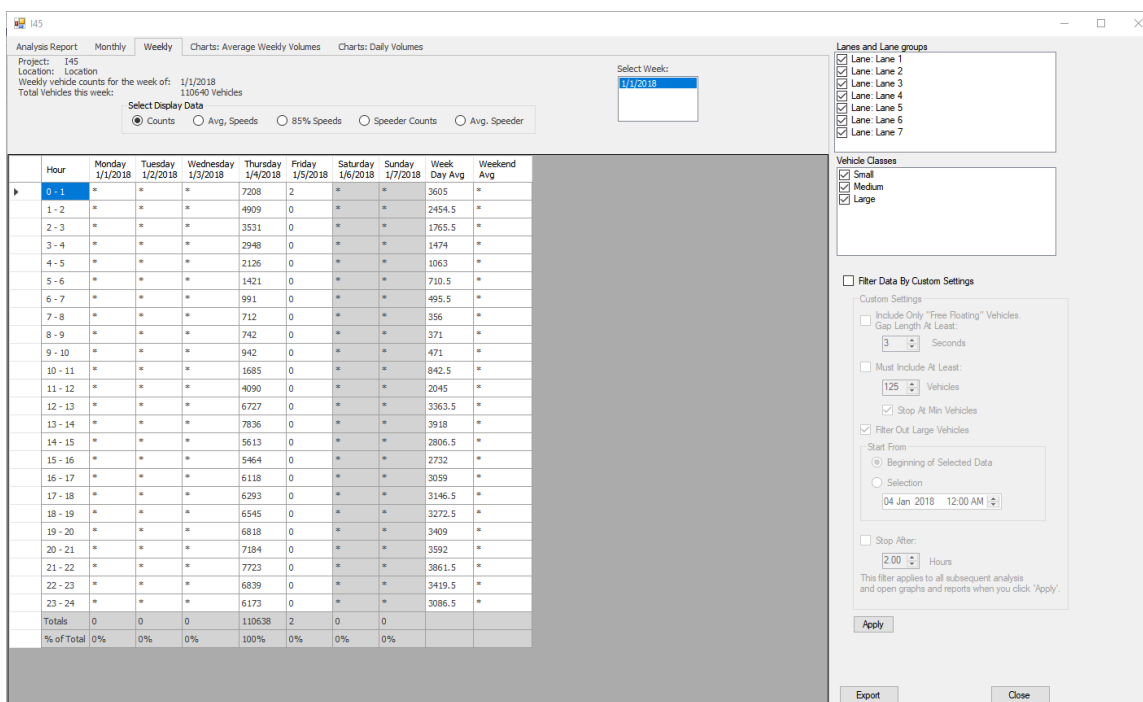
To configure the Vehicle Classification Configuration, use the Vehicle Configuration Tab. The original vehicle classification is derived from the configuration settings in the SpeedLane itself. User-defined names and vehicle lengths may be assigned to each class.

Name	Vehicle Length (ft)
Vehicle Class 1: Small	0 to < 25
Vehicle Class 2: Medium	25 to < 40
Vehicle Class 3: Large	40 to < 255
Vehicle Class 4:	255+ to <
Vehicle Class 5:	to <
Vehicle Class 6:	to <
Vehicle Class 7:	to <
Vehicle Class 8:	to <

OK Cancel

Once the lane groups and vehicle configurations are defined, you can use these groups to filter data for the various reporting screens. See below.

Houston Radar Advanced Traffic Statistics Analyzer User Manual



Setting Up Remote TCP/IP Radar Connections

The advanced stats analyzer software can communicate directly over TCP/IP (Internet and Intranets) to a radar at a remote location connected to a cellular modem or a TCP/IP to serial server. A cellular connection option will be available in the Armadillo in the future. Please contact us if you have this requirement.

An example of an Ethernet TCP/IP to Serial port server that will allow remote connection to a radar over an Ethernet network is the Lantronix [xDirect](#).

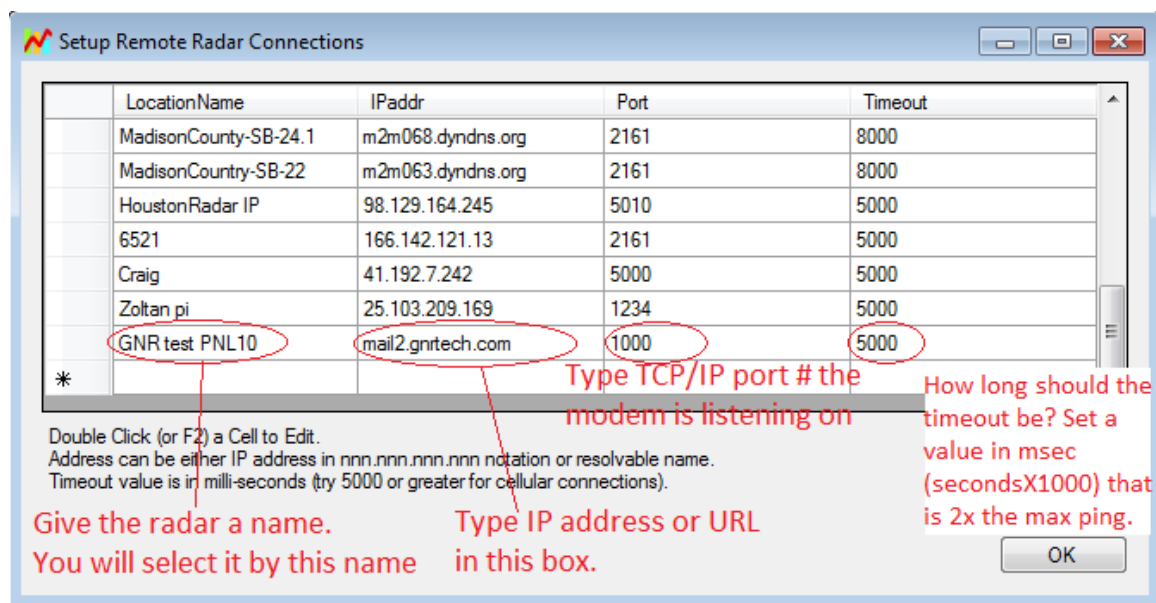
An example of a GPRS modem that will allow remote cellular access to the radar is [Teltonika G10](#).

Both these methods provide an IP address or host name of the modem with TCP/IP port number and allow you to forward connections from this TCP/IP port to the local serial port of the radar.

To communicate with a radar in such a setup, you first need to setup a Remote Radar Connection. Once the connection is configured, connecting to the radar and downloading data works exactly the same way as with a local serial port.

To setup the remote radar connection, click on *File* and then *Setup Remote Radar Connections...*

This will bring up the window shown below.



Note that the IP address or the host name should be reachable from the computer. In most cases you need an external world routable IP address with the address preferably being static in nature. 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 setup 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 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.

A screenshot of the 'Advanced' radar setup window. The 'Connection' tab is active, showing a list of connections. 'COM10' is selected in the 'Connect To Radar On:' dropdown. A red circle highlights the list of connections, which includes local COM ports and various remote TCP/IP addresses. To the right, there are sections for 'Connected Radar Info' (showing status, version, tag, type, package, serial ID, and clock) and 'Traffic Stats Collection Info' (showing start/end times, current record time, and page read). At the bottom right, the 'Radar Output' section shows 'Data Transferred (kB)' as '000.'.

Advanced

Connection Radar Setup

Connection

Connect To Radar On:

COM10

Auto Detect Port

COM1

COM3

COM6

COM7

COM8

COM10

REMOTE:test(127.0.0.1)

REMOTE:ver-mac-17(m2m017.dyndns.org)

REMOTE:ver-mac-002(m2m002.dyndns.org)

REMOTE:localhost(127.0.0.1)

REMOTE:RMS#1(172.16.19.240)

REMOTE:RMS#2(172.16.19.240)

REMOTE:localhostbounce(127.0.0.1)

REMOTE:qbsvr-edit(192.168.44.2)

REMOTE:dumbar(dumbar.dhs.org)

REMOTE:ver-mac DEBUG(6028fa88)

REMOTE:WiSnap(192.168.1.113)

REMOTE:Wisnap-work(192.168.0.1)

REMOTE:MadisonCounty-NB-34.2(m2m0342.dyndns.org)

REMOTE:MadisonCounty-NB-25.5(m2m0255.dyndns.org)

REMOTE:KinderMorgan-Train(74.19.1.1)

REMOTE:MadisonCounty-SB-24.1(m2m0241.dyndns.org)

REMOTE:MadisonCounty-SB-22(m2m0222.dyndns.org)

REMOTE:HoustonRadar IP(98.129.1.1)

REMOTE:6521(166.142.121.13)

REMOTE:Craig(41.192.7.242)

REMOTE:Zoltan pi(25.103.209.169)

REMOTE:GNB test_PNL10(mail2.gnr.com)

Connected Radar Info:

Connection Status: COM

Radar Software Ver. #: 4

Radar Tag #: 2

Radar Type/HW Ver: 0

Stats Package: 8

Serial ID: 0

Radar Clock: 2

Traffic Stats Collection Info:

Data Start Time:

Data End Time:

Current Record Time:

Page Read:

Radar Output

\ Data Transferred (kB):

000.

Associating a Radar with a Project for Automated Data Import

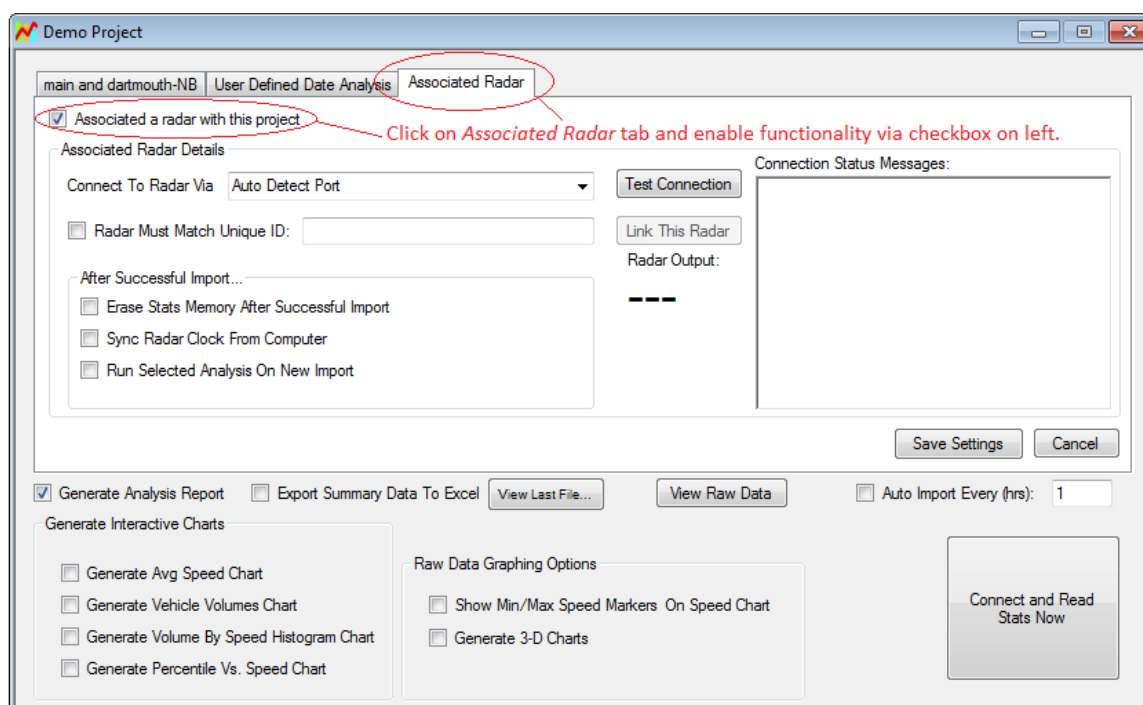
You may associate a radar with a project and import data, synchronize radar clock and erase radar data automatically after successful import by just one click of the mouse.

This is very convenient option when importing from remote radars, especially when multiple remote radars exist, where there is a chance that a user may select wrong remote radar accidentally, thus importing data from wrong remote radar.

To use this feature, associate the correct remote radar connection at time of initial setup. For subsequent imports, the user simply goes to the project and imports the data from the pre-associated remote radar.

Setup the remote radar connection first, then create a project (or open an existing project), and then click on the *Associated Radar* tab as highlighted below.

Then enable this functionality by marking the *Associate a radar with this project* checkbox. Select a radar connection from the drop box and if this radar is currently online, you can test communication via the *Test Connection* button. Select the additional functionality you require from the *After Successful Import...* group of checkboxes. Be sure to click on the *Save Settings* button once you are done. Whenever you are ready to import the data, click on the *Connect and Read Stats Now* button and the data will be imported into the project.





You may choose to have the program double check the unique radar id before it starts to import the data. This will ensure during future imports that you are not accidentally importing data from a different radar.

*To enable this feature click on the **Link This Radar** button after you have tested the connection to the radar. This will link the unique id of the radar to this project.*



*To automatically import the data from the associated radar on a periodic basis, you may check the **Auto Import Every (hrs)** checkbox. The program will automatically connect and import the data at the specified intervals. The project window must remain open for this feature to work. Multiple project windows may be open simultaneously which will allow you to import data from multiple radars.*

Accessing a Common Database File from Multiple Computers by Different Users

The Houston Radar Stats Analyzer program keeps all imported data and settings in a database file on the computer. By default, this database file is kept on the same computer running the stats analyzer program.

For multi-user situations requiring multiple users to access the same data or to put data in a common location, it is possible to install a common database file on a “shared drive” and then access it simultaneously from multiple computers running the Stats Analyzer program.

You may do this as follows:

1. Install the Houston Radar Stats Analyzer program **version 8.01.0009 or later** on all computers requiring access to the data. It is advisable to install the same version on all computers and keep the versions up to date. You may request the latest version from us if you have an older version. Upgrades are offered for no extra charge.
2. From one computer (preferably the computer with the most data on it), relocate its database file from the local drive to the designated “shared drive” on the network as follows:
 - a. Click on “File->Database Location...” menu
 - b. Click on “Select New Database Location” button.
 - c. Pick a designated folder on the “shared drive” on the network.
 - d. Select “Yes” if the program asks you if you want to move or copy your database to this new location.
3. For all other computers/users wanting access to the above common database file follow the above steps except choose “No” when asked if you want to overwrite the existing database file.

Now all computers will access a common database file and all users may access projects/data created by other users.

Note: If one user has a project or data window open and a change is made to the data behind the scenes by another user, the user with the open project will not be notified.

You may also choose to locate the program’s “Data Directory” for all users on a common folder on the “shared drive”. You can do that by going to File->Settings menu and picking a common folder by clicking on the “Change...” button in the “Default Data Save/File Export Directory” section.



It is highly advisable that periodic backups be made of the database file on the “shared drive”. The program does not make automatic backups. This will minimize the disruption in the case of data corruption or user error.

APPENDIX A

Installing a COM port to a MS Windows computer and debugging problem with USB to RS232 COM port adapters

If your computer does not include a built-in RS232 COM port you may easily add a COM port by using an external USB to RS232 COM port adapter.



The Houston Radar Armadillo traffic collector has a USB Interface built-in which shows up as a COM port on the PC when you plug it in. Thus, you may use this section to debug connection issues for the Armadillo as well.

Plug in the USB end of the dongle (or Armadillo) into the USB port of the computer. Windows should automatically recognize the adapter and either install a driver for it or prompt you for a driver disk. If Windows prompts you for a driver disk, insert the driver disk that came with your adapter and follow the instructions provided. The Armadillo USB drivers are provided on the supplied CD ROM. Windows will also automatically find these drivers on-line if your computer is connected to the Internet.

To ensure that the COM port was successfully installed, you can check in the “Device Manager” by using the following procedure:

Click on “Start” button and then “Run” and type in **devmgmt.msc**

You should see the following window pop up. Check that you have a USB Serial Port Entry under “Ports (COM & LPT)”. You are now ready to connect to the radar.

