

powertrac™

BATTERY DATA LOGGER



PTSP+ 12-84V

PowerTrac™ 2.1 Software Reference Guide



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SOFTWARE INSTALLATION

Minimum System Requirements

Windows®

Operating systems:

XP, Windows Vista®, Windows® 7

Communication port:

One serial or USB port

Required preinstalled:

.NET Framework 2.0 or greater

Microsoft ActiveSync® Version 4.5 for Windows®

XP or Windows® Mobile Device Center Version


6.1 for Vista® or Windows® 7

NOTES:

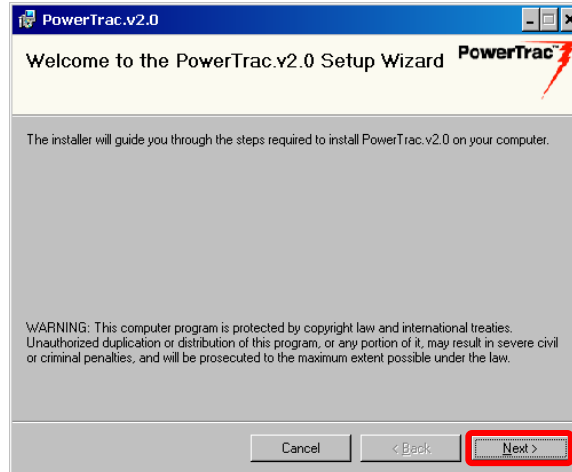
1. **All previous versions of PowerTrac™ software must first be uninstalled from the PC for proper operation.**
2. If an earlier version of the Microsoft ActiveSync® software is installed, the latest must be downloaded from the Microsoft® website:
<http://www.microsoft.com/windowsmobile/en-us/help/synchronize/device-synch.aspx>.
3. The account has administrator rights.

Installing the Windows® Application

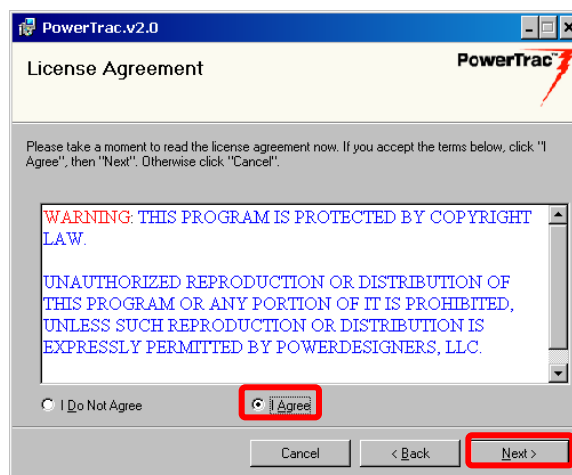
The following summary is a guide for the **PowerTrac™ SP+** installation software.

1. Uninstall all previously installed **PowerTrac™** Windows® software.
Uninstalling prior versions of **PowerTrac™** Windows® software will not remove or delete any previously saved data in the computer.
It is essential that all previous versions of PowerTrac™ Windows® software is uninstalled before installation of an updated version to ensure reliable, continuous operation.
2. Select **Start** then **Control Panel** and then **Add/Remove Programs**.
Find and select **PowerTrac**. Then select **Remove** button.
3. Double-click the  PowerTrac.v2.1Setup.msi file from the installation CD.

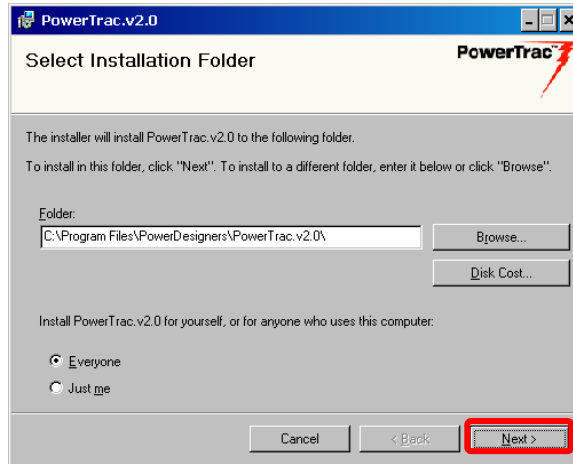
4. A new window appears. Select **Next** to continue.



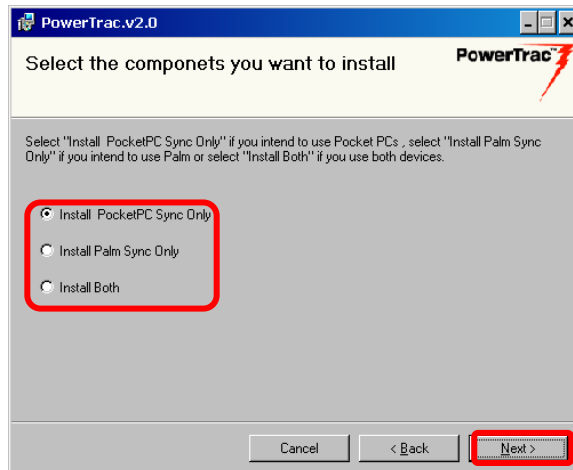
5. After reading the agreement, select **I Agree** and then select **Next**.



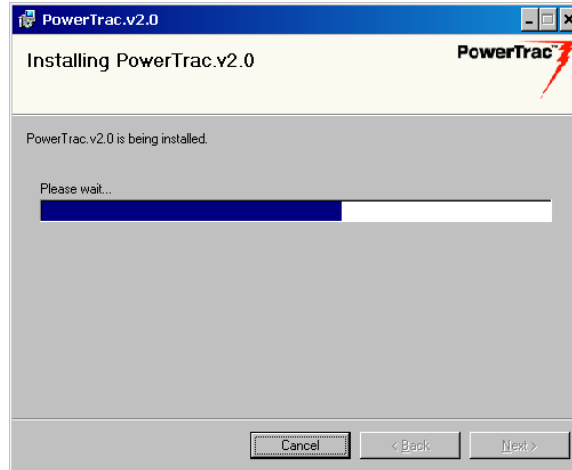
6. A “Select Installation Folder” window appears; to keep the default value, select **Next** to continue.



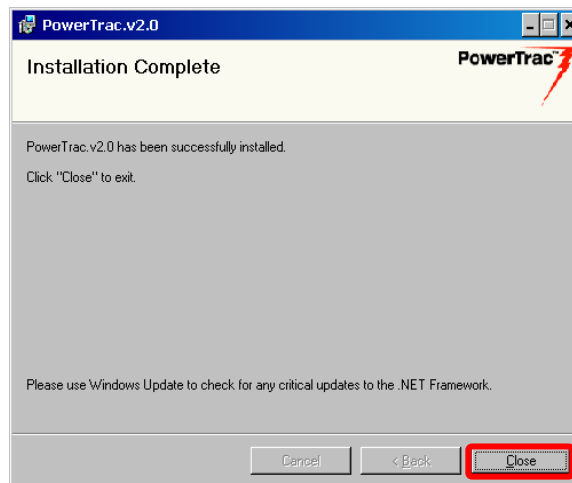
Warning: A window appears during the installation wizard prompting the selection of a Palm, a Pocket PC, or both. Select **Install Pocket Sync Only** if the intent is to use Pocket PCs; select **Install Palm Sync Only** if the intent is to use the Palm only; select **Install Both** if the intent is to use both devices.



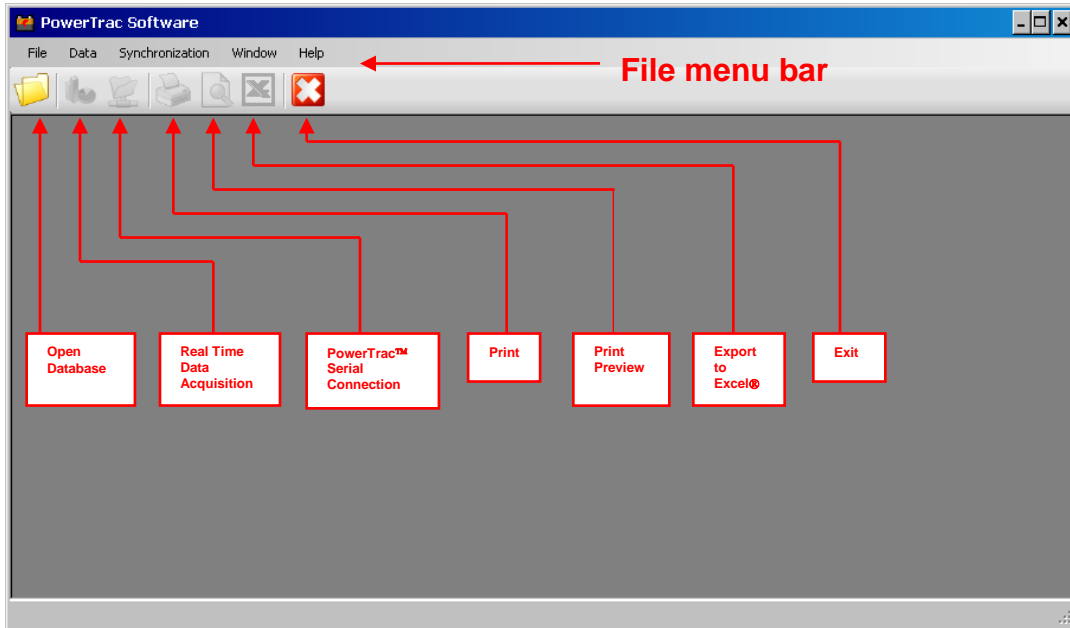
7. A window appears indicating the **PowerTrac™** software is being installed.



8. An "Installation Complete" window appears indicating the installation procedure was successful. Select **Close** to exit.



9. Verify proper installation by starting the **PowerTrac™** software. The **PowerTrac™** software screen appears.

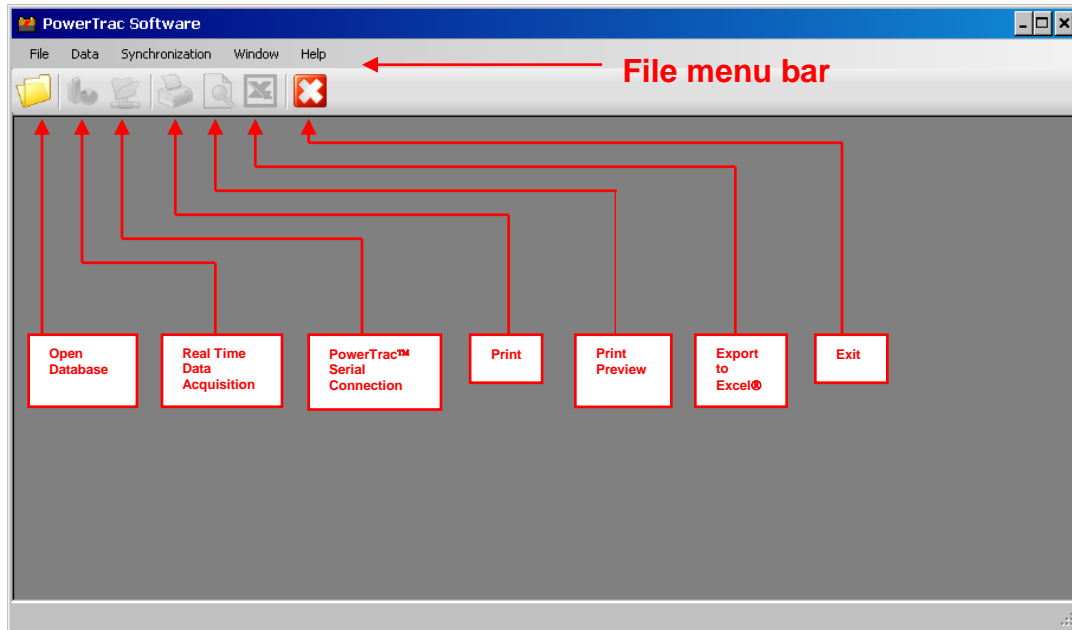


10. The **PowerTrac™** software version is found by selecting **Help**, then **About**.

USING POWERTRAC™ SP+ PC SOFTWARE

The Graphical User Interface (GUI)

The following appears when the **PowerTrac™ SP+** software is started. (The labels and arrows are added to the figure for clarity.)



PowerTrac™ SP+ Serial Connection (RS-232)

The **PowerTrac™ SP+**, with the optional RS-232 communication installed, has an additional cable and connector exiting the enclosure opposite the power, shunt, and temperature cables.

1. Connect the serial cable between the **PowerTrac™** and the computer.
2. Start the **PowerTrac™** Windows® software, and then verify **PowerTrac™** is operating by observing that one or more **Light Emitting Diodes (LEDs)** are illuminated.
3. Select **File** then select **Open Database**; select a database, then select **Open**. A new window appears listing all stored data files in the selected database.

Other Direct Connection (RS-232) Features

Downloading Events. Event download is only available after a quick look has been performed. A download progress bar is located at the bottom of the window. When the progress bar disappears the download is complete. The downloaded record is located by default in the “PowerTracSPDB” database file in the **PowerTrac™ v2.1** folder.

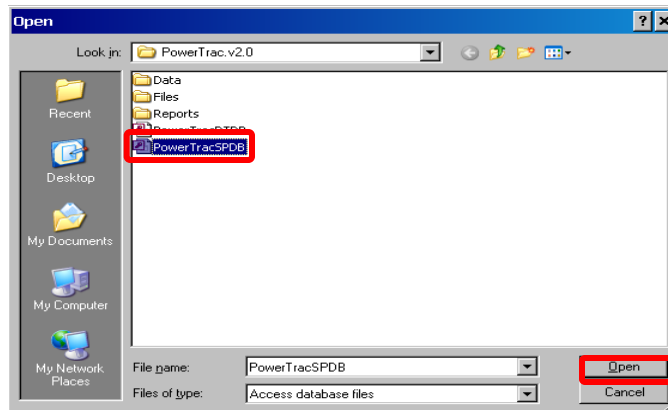
Clear Events. To clear the events in the **PowerTrac™ SP+** select the **Clear Events** button.

Start Continuous Report. Selecting **Continuous Report** performs a quick look every 1.5 seconds.

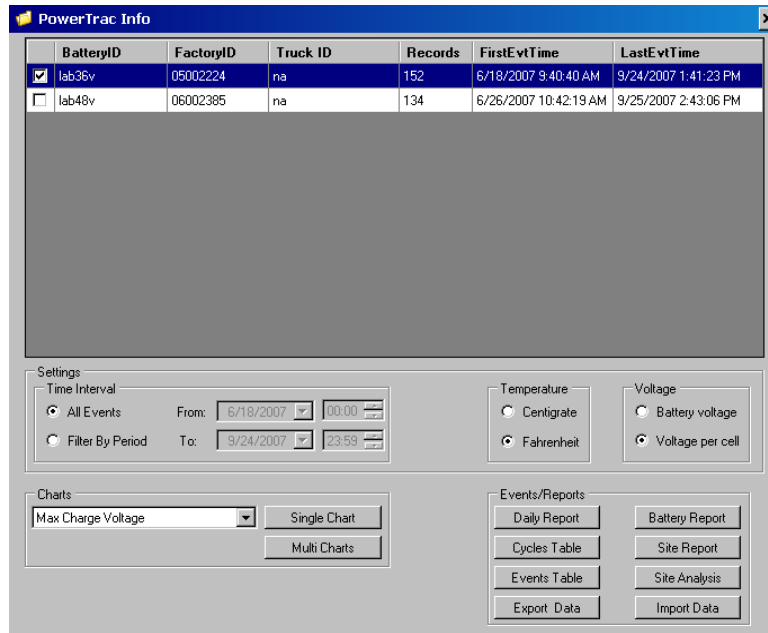
Modem Dial. This feature allows interface with **PowerTrac™** at remote locations. Contact Power Designers USA LLC for assistance in use of this function.

Viewing the PowerTrac™ SP+ Data on the PC

1. To view data, start the **PowerTrac™ SP+** Windows® software.
2. Select **File**, then select **Open Database**; select a database, then select **Open**. A new window appears listing all stored data files in the selected database.



3. Select one of the databases and select the **Open** button. A new window appears showing a list of all stored data files in the selected database.

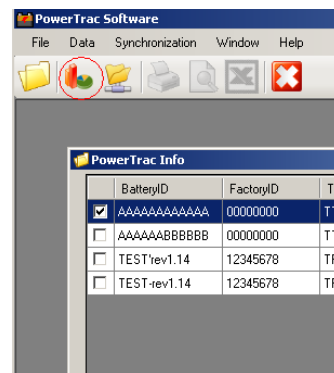
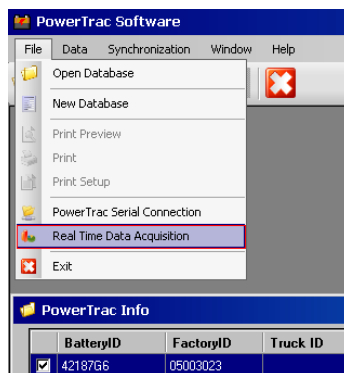


4. Any file listed may be selected to view events, generate reports or create charts.

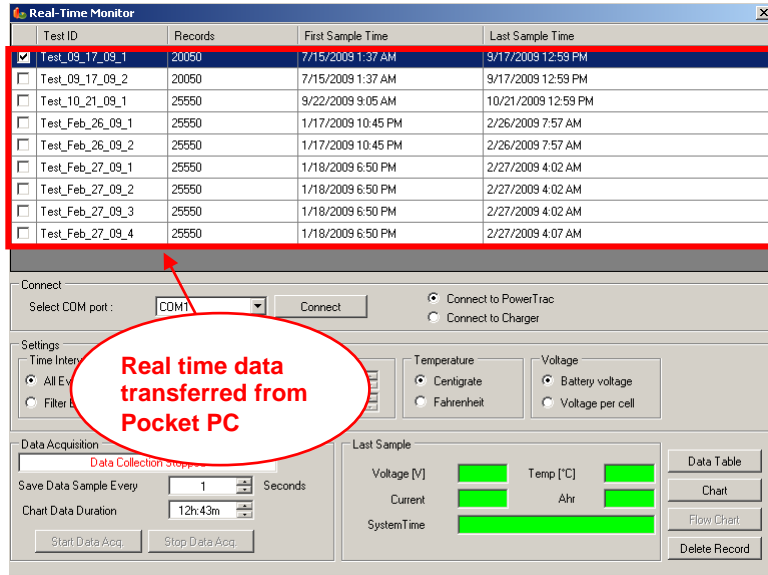
Pocket PC Real Time Data Acquisition

Real time data from the **PowerTrac™ SP+** internal memory may be transferred using Pocket PC. This feature is not supported by Palm devices.

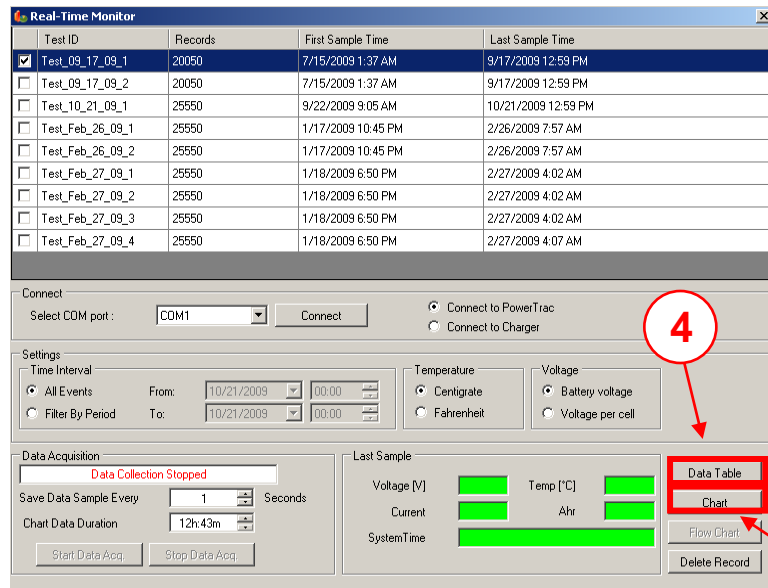
1. Open the database file containing the **PowerTrac™** Pocket PC data located by default in the "PowerTracSPDB.mdb" file.
2. Select **Real Time Data Acquisition** from the **File** menu, or select the second icon on the toolbar.



3. A “Real Time Monitor” window appears.



4. To view the collected data, select a file name from the grid view and select the **Data Table** button located at the right bottom of the window.



5. The “Real Time Data” table window appears.

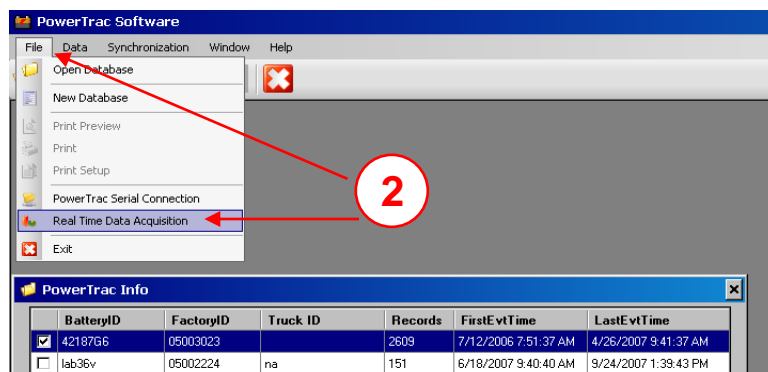
Row ID	Tests ID	Sample Time	Voltage	Current	Cumulative Ahrs	Temp'C
1	Test_09_17_09_1	7/15/2009 1:37 ...	13.1	0.5	0	-51
2	Test_09_17_09_1	7/15/2009 1:37 ...	13.13	0.5	0	-51
3	Test_09_17_09_1	7/15/2009 1:37 ...	13.1	0.4	0	-51
4	Test_09_17_09_1	7/15/2009 1:37 ...	13.1	0.4	0	-51
5	Test_09_17_09_1	7/15/2009 1:37 ...	13.1	0.4	0	-51
6	Test_09_17_09_1	7/15/2009 1:38 ...	13.13	0.4	0	-51
7	Test_09_17_09_1	7/15/2009 1:39 ...	13.1	0.4	0	-51
8	Test_09_17_09_1	7/15/2009 1:40 ...	12.95	0.4	0	-51
9	Test_09_17_09_1	7/15/2009 1:41 ...	12.98	0.4	0	-51
10	Test_09_17_09_1	7/15/2009 1:42 ...	12.95	0.4	0	-51
11	Test_09_17_09_1	7/15/2009 1:43 ...	13.07	0.4	0	-51
12	Test_09_17_09_1	7/15/2009 1:44 ...	13.07	0.4	0	-51
13	Test_09_17_09_1	7/15/2009 1:45 ...	13.04	0.5	0	-51
14	Test_09_17_09_1	7/15/2009 1:46 ...	13.01	0.4	0	-51
15	Test_09_17_09_1	7/15/2009 1:47 ...	13.01	0.4	0	-51
16	Test_09_17_09_1	7/15/2009 1:48 ...	13.04	0.4	0	-51
17	Test_09_17_09_1	7/15/2009 1:49 ...	13.13	0.4	0	-51

6. Select the **Chart** button to create the chart.

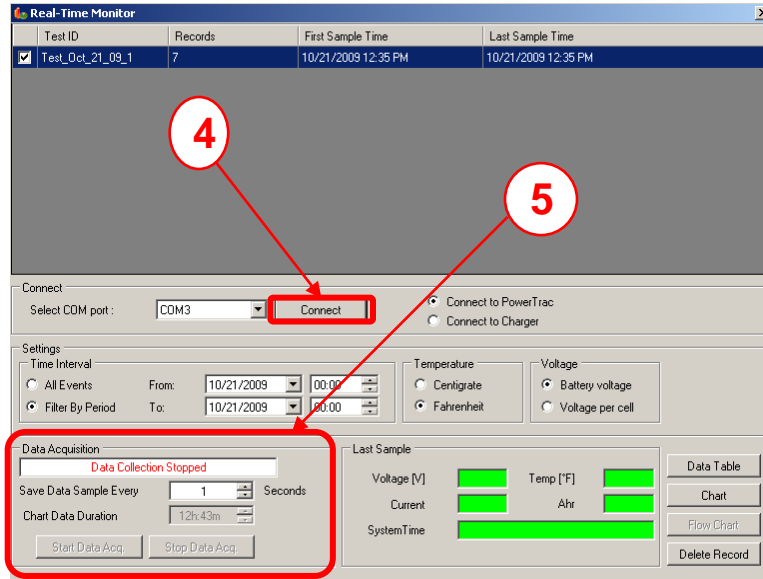
Serial Real Time Data Acquisition

The real time data acquisition feature of the **PowerTrac™ SP+** hardware and software is most often used in a lab or R&D environment to track battery, truck or charger performance. The use of this feature requires the RS-232 option and continuous connection to a PC that records the information.

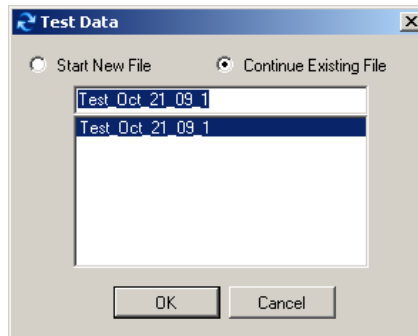
1. Connect the RS-232 cable to the PC and **PowerTrac™** device and start the **PowerTrac™ Windows®** software.
2. From the File menu bar select **File**, then select **Real Time Data Acquisition**.



3. The following window appears:

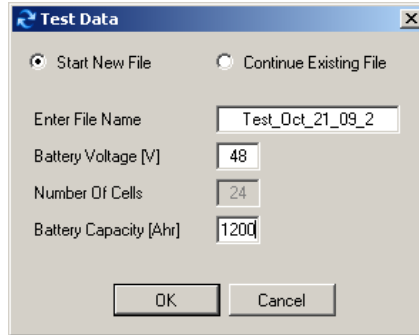


4. Select the desired Com port and select **Connect**. The button reads “Disconnect” while the port is open.
5. In the “Data Acquisition” section, set the “Data Sample” rate to 1–60 seconds, then select **Start Data Acquisition**.
6. A “Test Data” window appears.

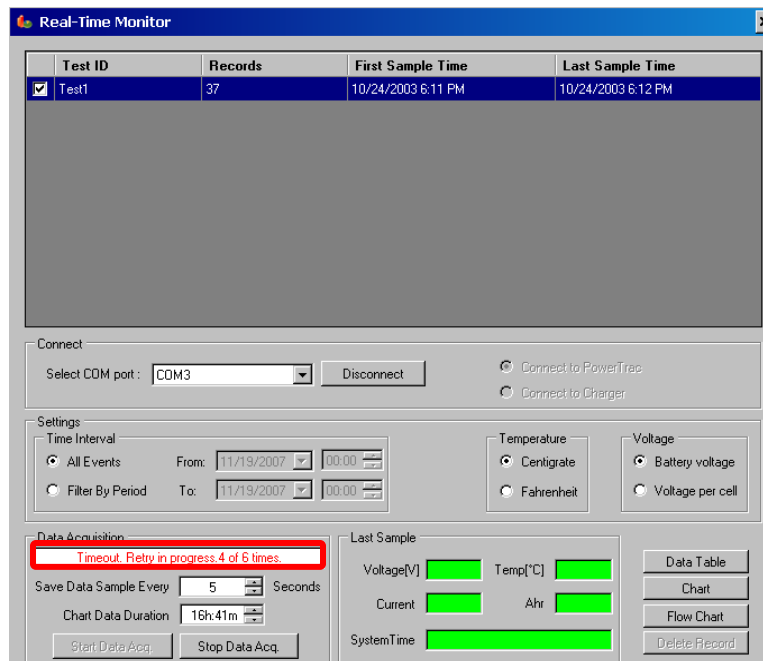


7. Select **Continue Existing File** to continue recording data into a previously created file, or select **Start New File** to create a new file.

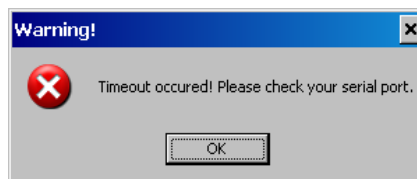
8. Select **OK** to start recording.



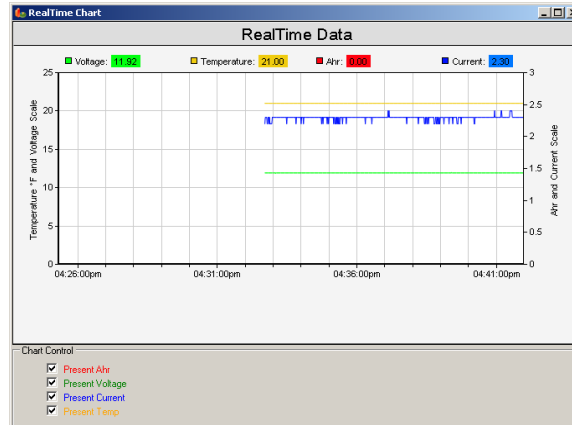
9. Each new sample is displayed in the “Last Sample” section.



NOTE: The software attempts to connect six times to the **PowerTrac™**. If there is no connection established with the **PowerTrac™** after the sixth attempt, a warning message is displayed. Verify the **PowerTrac™** is energized by observing that at least one LED is illuminated. Verify the serial cable is connected, and then attempt to connect again.



10. To generate charts while data is being gathered, select **Flow Chart**.



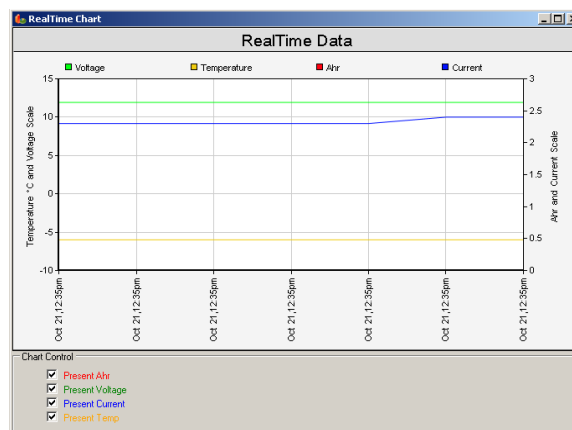
11. To stop the real time data acquisition, select the **Stop Data Acq** button.

12. To view the collected data, select the **Data Table** button.

The screenshot shows a 'Real Time Data For Test : Test_Oct_21_09_1' window containing a data table. The table has the following columns: Row ID, Tests ID, Sample Time, Voltage, Current, Cumulative Ahrs, and Temp C. The data is as follows:

Row ID	Tests ID	Sample Time	Voltage	Current	Cumulative Ahrs	Temp C
1	Test_Oct_21_09_1	10/21/2009 12:3...	11.92	2.3	0	-6
2	Test_Oct_21_09_1	10/21/2009 12:3...	11.92	2.3	0	-6
3	Test_Oct_21_09_1	10/21/2009 12:3...	11.92	2.3	0	-6
4	Test_Oct_21_09_1	10/21/2009 12:3...	11.92	2.3	0	-6
5	Test_Oct_21_09_1	10/21/2009 12:3...	11.92	2.3	0	-6
6	Test_Oct_21_09_1	10/21/2009 12:3...	11.92	2.4	0	-6
7	Test_Oct_21_09_1	10/21/2009 12:3...	11.92	2.4	0	-6

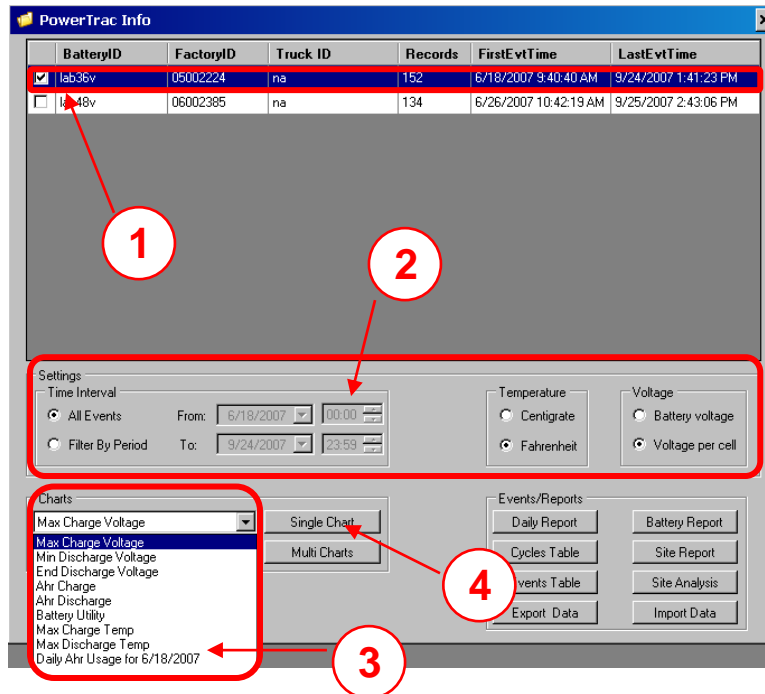
13. To view the collected data in a chart, select the **Chart** button.



CREATING CHARTS AND GENERATING REPORTS

Creating Charts

1. To create charts using downloaded data, select the desired battery file.
2. In the “Settings” area, select the time interval of interest, all events, or a specific time interval. Select the format for Battery **Voltage (V)** or **Volts Per Cell (VPC)** and the temperature (°C or °F).



3. Choose the desired chart from the “Charts” drop-down menu.
4. Select **Single Chart** to the right of the drop-down menu.

This figure depicts a sample chart for the battery minimum discharge voltage in VPC for the period of 7/27/06 through 4/23/07.

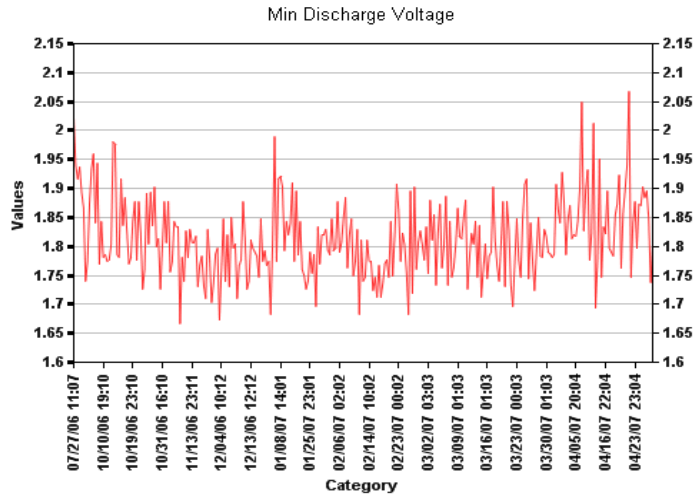


Chart Options

After the chart is displayed, further options are available to enhance its presentation. Some of the chart options include:

- Showing the date and time of individual data points
- Showing values of individual data points
- Adding lines for minimum and maximum operating limits
- Changing the graph type: line, line markers or column
- Adding names to the X and Y axes

To view the “Chart Options” window, right select the chart and select **Chart Settings**.

Multi Charts

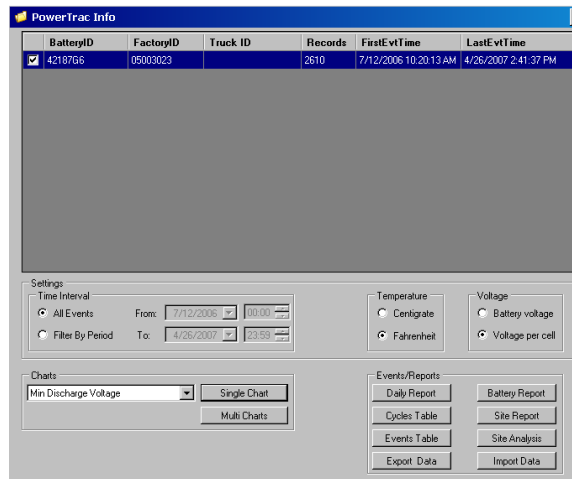
The **Multi Charts** button allows the display of up to six charts in a grid. The resolution of multiple charts is not as detailed as a single chart.

Available Charts

Chart	Action
Max Charge Voltage	Charts the maximum voltages for all charge events that occurred for the selected time interval.
Min Discharge Voltage (two second average)	Charts the minimum voltages for all discharge events that occurred for the selected time interval.
End of Discharge Voltage (30 second average)	Charts the end of discharge voltages for all discharge events that occurred for the selected time interval.
Ahrs Charge	Charts in bar format the charge amp-hours for the selected time interval.
Ahrs Discharge	Charts in bar format the discharge amp-hours for the selected time interval.
Battery Utility	Charts in two-bar format the charge and discharge amp-hours.
Max Charge Temp	Charts in bar format the maximum temperature during charge for the selected time interval.
Max Discharge Temp	Charts in bar format the maximum temperature during discharge for the selected time interval.
Battery SOC (State of Charge)	Charts the percentage of total battery capacity available.
Daily Ahr Usage	Charts amp-hour usage on a daily basis.
Battery Assessment	Charts in pie format: Battery Usage Summary, Battery Ahr Usage, Equalize Charge Summary, Battery Temp. Distribution, End Discharge Voltage, Battery SOC.
Daily Ahr Turnover	Charts the battery amp-hour utility for a single day.
Ahr Turnover	Charts in two-bar format the cumulative charge and discharge amp hours.

Generating Reports—Battery Performance Report

1. Generate a *Battery Performance Report* by selecting the desired battery and time interval.



2. Select the **Battery Report** button at the bottom of the screen. A progress bar appears. The battery report shows summary data including:
 - **Battery Info**
 - Number of cells, nominal voltage and capacity
 - Number of posts (intercell connectors) and shunt size
 - **PowerTrac™ SP+ Settings**
 - Programmed settings of the **PowerTrac™**
 - **PowerTrac™ Lifetime Accumulated Summary**
 - Date and time of installation and first discharge cycle
 - Cumulative amp-hours and hours of charge, discharge, and open circuit
 - Warranted amp-hours and remaining amp-hours under warranty
 - **Event Summary [Over the Selected Time Interval]**
 - Total amp-hours and hours of charge, discharge, and open circuit
 - Percent usage of each event state
 - The minimum and maximum event voltage, current, and temperature with time stamps
 - Equalize opportunities and times performed
 - State-of-charge distribution and low-electrolyte level

Sample Battery Performance Report

PowerTrac Battery Performance Report

Print Date : 10/30/2007

Download Date	4/26/2007 8:23:55 PM	Battery ID	42187G6
Truck ID	N/A	Plant ID	N/A
Nominal Voltage	48 V	Nominal Capacity	1,190 Ahr

PowerTracSP Settings

High Voltage Alarm	62.4 [VPC]
Low Voltage Alarm	40.8 [VPC]
High Current Alarm	500 A
High Temp Alarm	126 °F
Open->CD Delay	600 seconds
CD->DC Delay	-1 seconds
CD->Open Delay	5 seconds
Open Circuit Limit	5 A
Shunt Size	500 A
Number of Posts	3
Current Sharing	121 %
Current Zeroing	0 counts
Firmware Version	0

PowerTrac Battery Lifetime Accumulated Summary Since Installation

Install Date and Time	7/12/2006 10:20:00 AM		
Weeks of Operation	0		
Hours of Operation Summary	<u>Charge</u>	<u>Discharge</u>	<u>Open</u>
Total	540 Hrs	1,051 Hrs	5,330 Hrs
% Usage	7.80%	15.19%	77.01%
Total Ahrs of Operation	<u>Charge</u>	<u>Discharge</u>	<u>% Ahr Returned</u>
	137,489 Ahrs	125,659 Ahrs	109.41%
Total KWH of Operation	<u>Charge</u>	<u>Discharge</u>	
	0 KWH	0 KWH	
Waranted Ahrs Summary	<u>Total</u>	<u>Used</u>	<u>Remaining</u>
	600,000 Ahrs	125,659 Ahrs	474,341 Ahrs
Event Counter	2610		
Cycles Counter	0		

Download Date	4/26/2007 8:23:55 PM	Battery ID	42187G6
Truck ID	N/A	Plant ID	N/A
Nominal Voltage	48 V	Nominal Capacity	1,190 Ahr

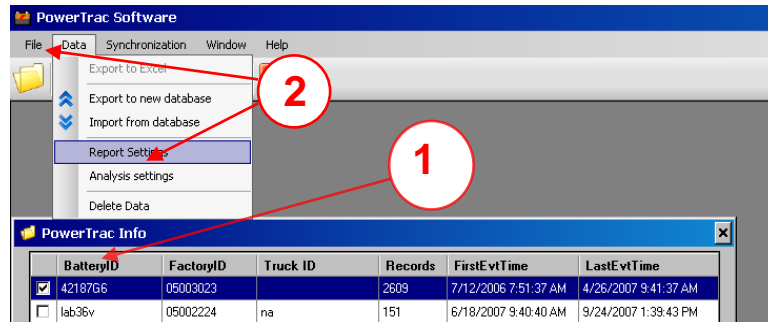
Downloaded Events Summary [All Events]

Weeks of Operation	41		
Hours of Operation Summary	<u>Charge</u>	<u>Discharge</u>	<u>Open</u>
Total	542 Hrs	1,201 Hrs	5,176 Hrs
% Usage	8%	17%	75%
Connect Time Summary	<u>Connect</u>	<u>Run</u>	<u>Plug-In Opportunities</u>
Total	2,063 Hrs	1,201 Hrs	3,654 Hrs
% Summary	30%	17%	53%
Total Ahrs of Operation	<u>Charge</u>	<u>Discharge</u>	<u>% Ahr Returned</u>
	137,490 Ahrs	125,446 Ahrs	110%
Total KWH Summary	<u>Charge</u>	<u>Discharge</u>	
	0 KWH	0 KWH	
Average Daily Ahrs Summary	<u>Charge</u>	<u>Discharge</u>	<u>Ahr Turnover</u>
	790 Ahrs	720 Ahrs	0.61
Total Charge Ahr Distribution	<u>Charge</u>	<u>Regen</u>	<u>% Regen</u>
	137,192 Ahrs	297 Ahrs	0%
Equalization Charge Summary	<u>Opportunities</u>	<u>Performed</u>	<u>% of Eq. Cycles</u>
	41	25	61%
Min Discharge Voltage (2 sec)	<u>> 1.70 VPC</u>	<u>1.70 - 1.70 VPC</u>	<u>< 1.70 VPC</u>
Total	70 Days	0 Days	71 Days
% Usage	50%	0%	50%
End Discharge Voltage (30 sec)	<u>> 1.70 VPC</u>	<u>1.70 - 1.70VPC</u>	<u>< 1.70 VPC</u>
Total	141 Days	0 Days	0 Days
% Usage	100%	0%	0%
Battery Temperature Distributions	<u>< 60°F</u>	<u>60 - 100°F</u>	<u>> 100°F</u>
Total	0 Days	283 Days	5 Days
% Usage	0%	98%	2%
SOC Distributions	<u>> 50%</u>	<u>25 - 50%</u>	<u>< 25%</u>
Total	257 Days	22 Days	9 Days
% Usage	89%	8%	3%
Low Electrolyte Level Days	<u>< 7 days</u>	<u>7 - 14 days</u>	<u>> 14 days</u>
Total	0 Days	0 Days	0 Days
% Usage	0%	0%	0%

Adjusting Report Settings

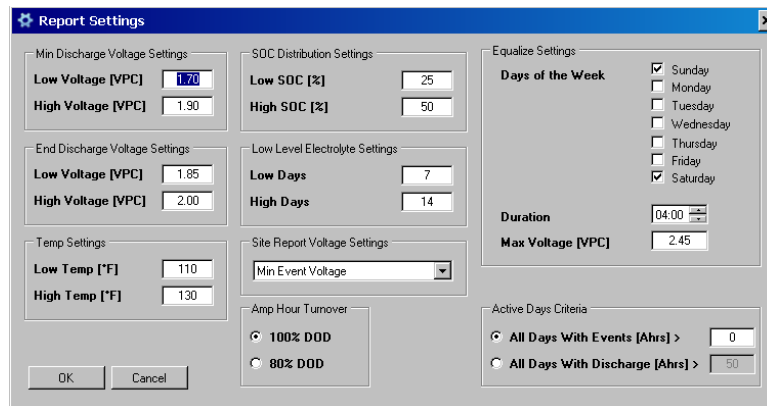
Report Settings enables customization of the battery report to reflect specific acceptable operating parameters. Access the **Report Settings** screen by:

1. Selecting the desired battery file.
2. Selecting **Data**, and then selecting **Report Settings**.



3. A new window appears, where parameters may be adjusted as desired for the battery. These settings affect minimum discharge voltage, end of discharge voltage, battery temperature distribution, equalization charge summary, state-of-charge distribution, low-level electrolyte, and amp-hour turnover.

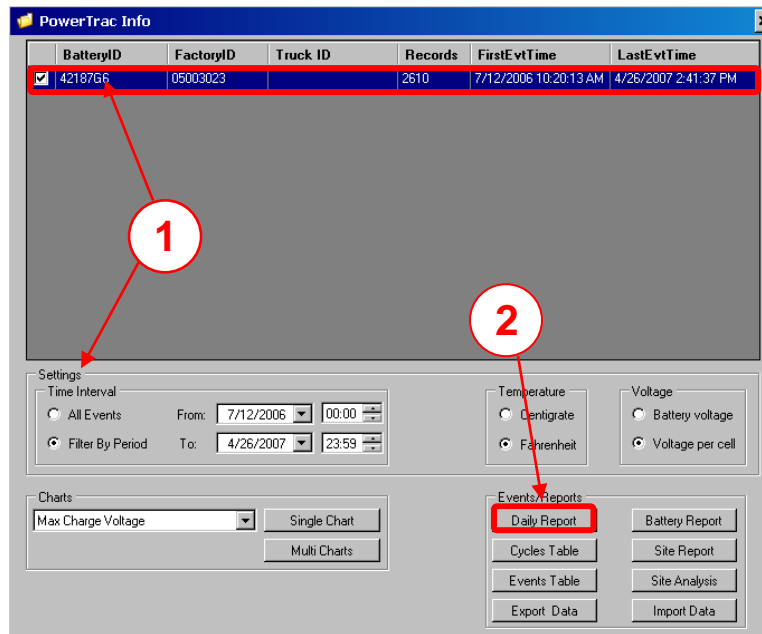
NOTE: Settings must be adjusted prior to generating a report. If a report has already been generated, the current report must be closed and regenerated for the changes to take effect.



Generating Reports—Daily Report

The **PowerTrac™ SP+ Daily Report** feature is the best method of analyzing battery usage. A daily report tabulates total amp-hours removed and returned to the battery, and a summary of the accumulated hours of charge, discharge, turnover, and open time. The end voltage is a 30-second average value. Other items reported are lowest daily value, maximum temperature, minimum and maximum percent of state of charge and electrolyte level. This report also provides total, minimum, maximum, and average of the daily values for the selected interval.

1. Access the daily report by selecting the desired battery file and the time interval.



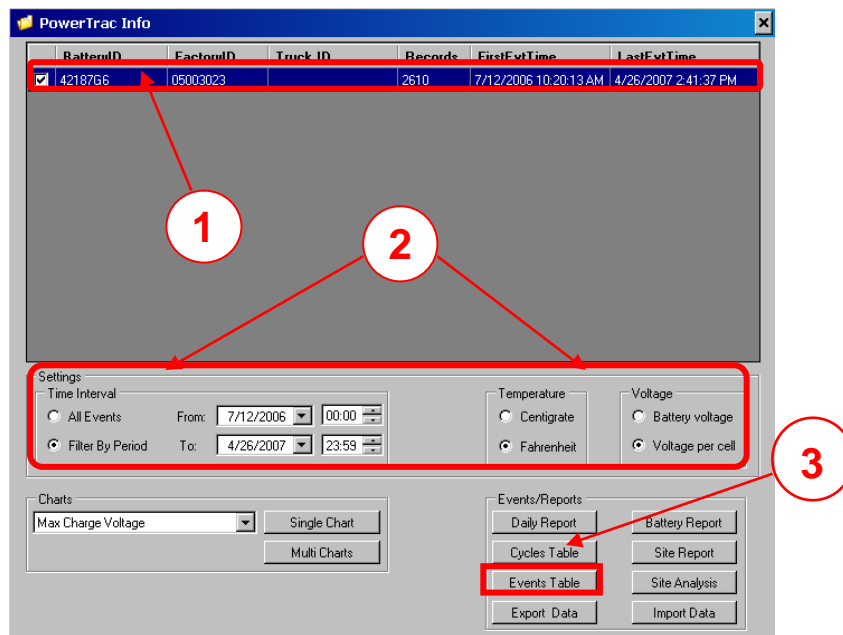
2. Select Daily Report.

Day	Date	Ahr Charge	Ahr Discharge	Ahr Turnover	Open Hours	Discharge Hours	Charge Hours	End Volt/cell	Max Temp°F	Min SOC	Max SOC	Electrolyte Level
Friday	8/17/2007	0	0	0	23h:59m	0h:0m	0h:0m	2	75	0	0	0
Saturday	8/18/2007	0	0	0	23h:59m	0h:0m	0h:0m	1.98	75	0	0	0
Sunday	8/19/2007	0	0	0	23h:59m	0h:0m	0h:0m	1.97	73	0	0	0
Monday	8/20/2007	315	144	0.21	16h:17m	6h:18m	1h:23m	2.19	81	0	20	0
Tuesday	8/21/2007	540	52	0.08	18h:23m	3h:9m	2h:27m	2.29	90	16	51	0
Wednesday	8/22/2007	0	57	0.08	20h:23m	3h:36m	0h:0m	2.08	86	69	80	0
Thursday	8/23/2007	0	0	0	13h:29m	0h:0m	0h:0m	2.07	79	69	69	0
Thursday	8/28/2007	0	0	0	0h:1m	0h:0m	0h:0m	0.75	-60	0	0	0
Wednesday	9/12/2007	0	31	0.05	9h:6m	0h:11m	0h:0m	2.73	75	50	100	0
Thursday	9/13/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.72	75	50	50	0
Friday	9/14/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.72	75	48	48	0
Saturday	9/15/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.72	73	49	49	0
Sunday	9/16/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.72	72	48	48	0
Monday	9/17/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.72	73	47	47	0
Tuesday	9/18/2007	336	0	0	16h:11m	0h:0m	7h:48m	3.09	88	47	82	0
Wednesday	9/19/2007	123	0	0	19h:59m	0h:0m	4h:0m	3.19	90	95	100	0
Thursday	9/20/2007	8	0	0	23h:49m	0h:0m	0h:11m	3.32	81	100	100	0
Friday	9/21/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.85	79	100	100	0
Saturday	9/22/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.85	79	100	100	0
Sunday	9/23/2007	0	0	0	23h:59m	0h:0m	0h:0m	2.85	77	100	100	0
Total	8/17/2007 - 9/23/2007	1322	284	0.42	16 days 17h:13m	13h:16m	15h:51m	-	-	-	-	-
Max	9/23/2007	540	144	0.21	23h:59m	6h:18m	7h:48m	3.32	90	100	100	-
Min	8/17/2007	0	0	0	0h:1m	0h:0m	0h:0m	0.75	-60	0	0	-
Avg	7 active days	189	41	0.02	20h:4m	0h:39m	0h:47m	2.49	72.00	57	49	-

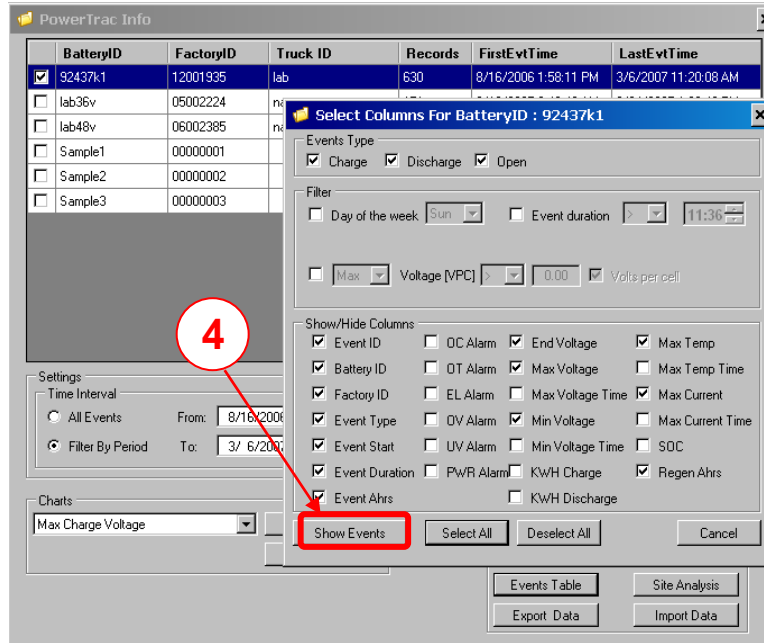
Creating an Events Table

The *Events Table* displays battery states—charge, discharge, or open—as a unique, time-stamped item.

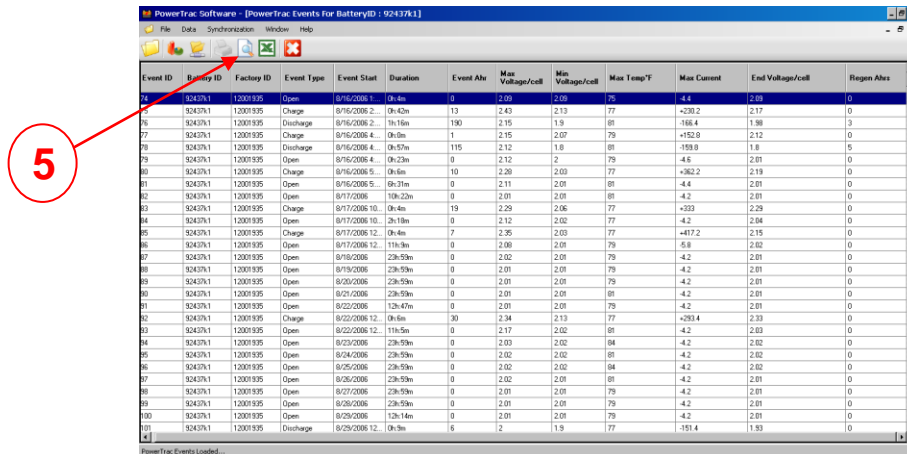
1. Select the desired battery file to be loaded.
2. Use the settings area of the screen to select the time interval of interest and the format for battery voltage and temperature.



3. Select the **Events Table** button at the bottom of the screen. An “Events Type” dialog box appears.
4. Select the desired data columns and filters to be displayed.



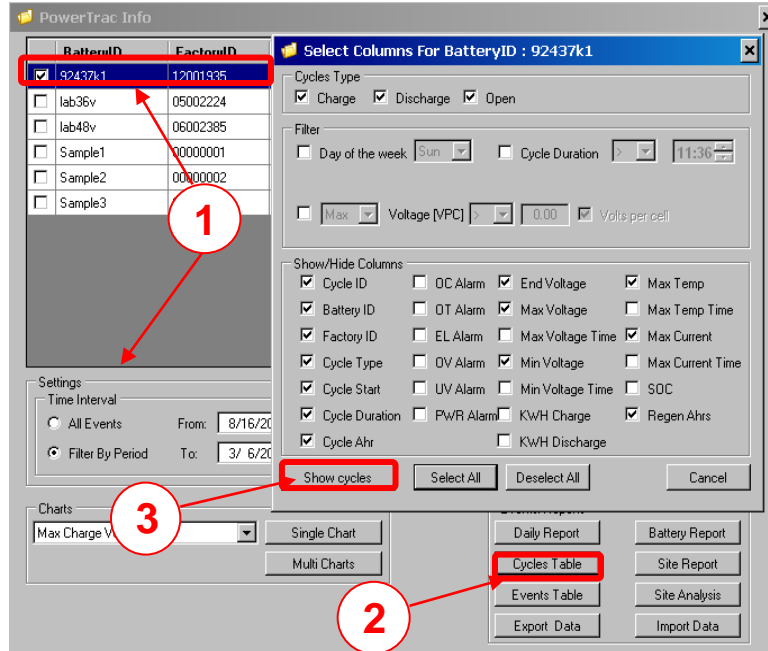
5. The event table may be exported to Excel® by selecting the **Export to Excel®** button located on the submenu. A “Save As” window appears. An Excel® sheet with the event table appears. Use the Excel® application to print or otherwise display the data.



Creating a Cycles Table

The *Cycles Table* uses information taken from the events table and groups the events into cycles of charge, discharge, and open. For example, when the events logged are discharge, charge, discharge, each event is a cycle. When the logged events are charge, open, charge, open, charge, the cycles table logs a single charge and a single open cycle by combining the three charges into one cycle and the two opens into one cycle.

1. Select the desired battery file and the time interval.



2. Select the **Cycles Table** button.
3. A window appears allowing selection of the data columns to be displayed. Select the **Show Cycles** button.

Cycle ID	Battery ID	Factory ID	Cycle Type	Cycle Start	Duration	Cycle Ahr	Max Voltage/Cell	Min Voltage/Cell	Max Temp/T	Max Current	End Voltage/Cell	Program Ahrs
1	92437k1	10001935	Charge	8/16/2008 2:04:46	0h:45m	13	2.43	2.13	77	4.8	2.17	0
2	92437k1	10001935	Discharge	8/16/2008 2:14:16	1h:16m	190	2.15	1.9	80.6	-788.4	1.98	0
3	92437k1	10001935	Charge	8/16/2008 4:06:36	0h:36m	1	2.15	2.07	78.9	+412.8	2.12	0
4	92437k1	10001935	Discharge	8/16/2008 4:06:57	0h:57m	115	2.12	1.8	80.6	-159.0	1.9	0
5	92437k1	10001935	Open	8/16/2008 4:08:29	0h:29m	0	2.12	2	78.9	-4.6	2.05	0
6	92437k1	10001935	Charge	8/16/2008 6:08:29	0h:29m	18	2.09	2.03	77	+477.2	2.13	0
7	92437k1	10001935	Open	8/23/2008 12h:14m	0h:14m	0	2.05	2.05	78.9	-4.2	2.05	0
8	92437k1	10001935	Discharge	8/23/2008 12:08:12	0h:11m	9	2	1.89	77	-155.4	1.89	0
9	92437k1	10001935	Open	8/24/2008 19h:21m	0h:21m	0	2	2	77	-4.2	2	0
10	92437k1	10001935	Charge	8/24/2008 10:08:16	0h:16m	61	2.37	2.1	77	+264.0	2.26	0
11	92437k1	10001935	Open	8/31/2008 11h:26m	0h:26m	0	2.02	2.02	77	-4.2	2.02	0
12	92437k1	10001935	Discharge	9/11/2008 11:08:46	0h:46m	62	2.05	1.83	77	-183	1.87	0
13	92437k1	10001935	Open	10/2/2008 0h:30m	0h:30m	0	1.98	1.98	75.2	-0.4	1.99	0
14	92437k1	10001935	Charge	10/2/2008 9:08:59	0h:59m	16	2.25	2.03	75.2	+163.6	2.25	0
15	92437k1	10001935	Open	10/2/2008 17h:25m	0h:25m	0	2.07	2	75.2	-0.6	2	0
16	92437k1	10001935	Discharge	10/3/2008 9:08:59	0h:39m	8	1.98	1.85	75.2	-188.2	1.86	0
17	92437k1	10001935	Open	10/4/2008 18h:25m	0h:25m	0	2.07	2	75.2	-0.6	2	0
18	92437k1	10001935	Charge	10/4/2008 4:08:46	0h:46m	219	2.41	2.05	78.9	+302.2	2.23	0
19	92437k1	10001935	Discharge	10/4/2008 2:08:08	0h:08m	0	2.13	2.03	78.9	-186.6	2.13	0
20	92437k1	10001935	Charge	10/4/2008 2:08:08	0h:08m	0	2.27	2.14	78.9	+10	2.17	0
21	92437k1	10001935	Discharge	10/4/2008 2:08:08	0h:08m	6	2.18	1.98	78.9	-178.8	2.05	0
22	92437k1	10001935	Charge	10/4/2008 2:08:08	0h:08m	8	2.44	2.1	80.6	+279.4	2.42	0
23	92437k1	10001935	Discharge	10/4/2008 2:08:08	0h:08m	1	2.2	2.02	78.9	-176.2	2.25	0
24	92437k1	10001935	Charge	10/4/2008 2:08:26	0h:26m	26	2.38	2.11	82.4	+189	2.38	0
25	92437k1	10001935	Discharge	10/4/2008 3:08:26	0h:26m	63	2.28	1.96	80.6	-194.8	1.96	0
26	92437k1	10001935	Charge	10/4/2008 3:14:44	0h:44m	74	2.42	2.1	104.4	+207.8	2.41	0
27	92437k1	10001935	Open	10/9/2008 12:40:37m	0h:37m	0	2.28	2.11	75.2	-0.4	2.11	0
28	92437k1	10001935	Discharge	10/9/2008 6:08:26	0h:26m	71	2.1	1.93	75.2	-136	1.96	0

Parameter	Description
Event ID	Unique ID for stored events.
Battery ID	A user-assigned serial number uniquely identifying the battery (e.g., use the battery serial number).
Factory ID	Factory-assigned, PowerTrac™ ID.
Event Type	Charge, discharge, or open.
Event Start	Event start date and time.
Event Duration	Duration of the event.
Event A-hrs	Total amp-hours used or returned during the event.
OC, OT, EL, OV, UV, PWR Alarms	Number of times the battery voltage, current, and temperature exceeded the alarm limits during the event.
Max or Min Volt, Max Current, Max Temp	A one-second average of the maximum or minimum battery voltage, maximum current, and maximum temperature recorded during the event.
Max or Min Volt Time, Max Current Time, Max Temp Time	Time stamps of the maximum or minimum values recorded.
End Voltage	A 30-second average of the battery voltage at the end of the event.
KWH Charge/Discharge	Total kilowatts used or returned during the event.
State of Charge	Battery state of charge at the end of the event.
Regen A-hrs	Returned amp-hours due to regenerative braking during discharge.

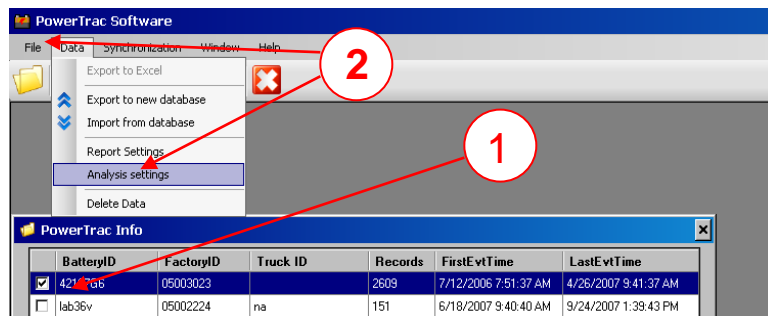
Creating a Site Analysis

Site Analysis compares a group of batteries to a set of predetermined limits. Exceptions to the limits are highlighted in red in the report. Analysis limits must be set prior to running the site analysis.

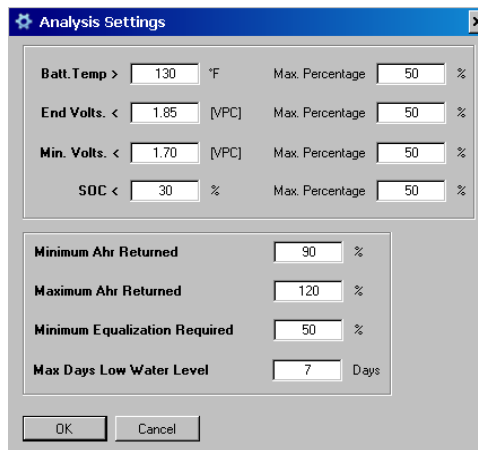
Analysis Settings

Analysis Settings is a tool that allows users to easily generate exception reports for a given site.

1. Select the desired file.
2. Select **Data**; then select **Analysis Settings**.




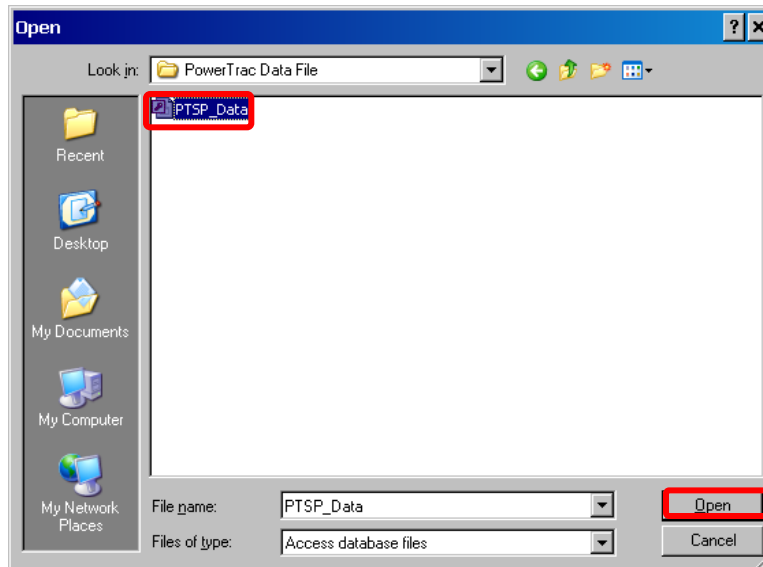
3. A window appears. Adjust the desired limits and then select **OK**.



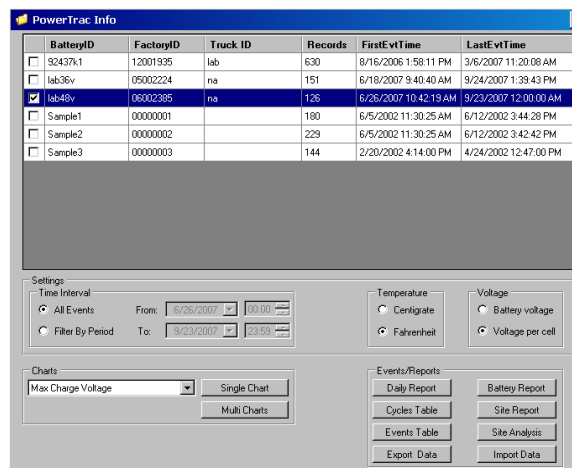
MANAGING DATABASES

Opening a Database File

1. Start the **PowerTrac™ SP+** Windows® software.
2. Select **Open Database** using either the  button on the top menu bar, or by using the command from the file menu. A new window appears listing all database files.

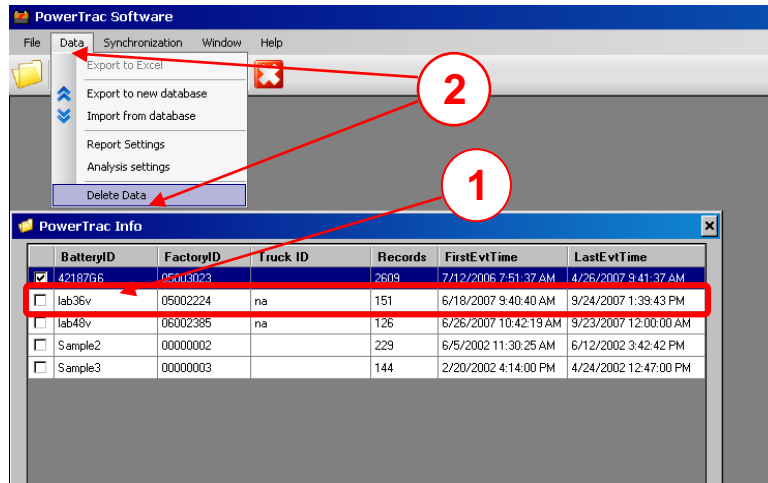


3. Select one of the databases followed by the **Open** button. A new window appears showing a list of battery files in the selected database.
4. Select the battery file of interest to view events, generate reports or create charts.



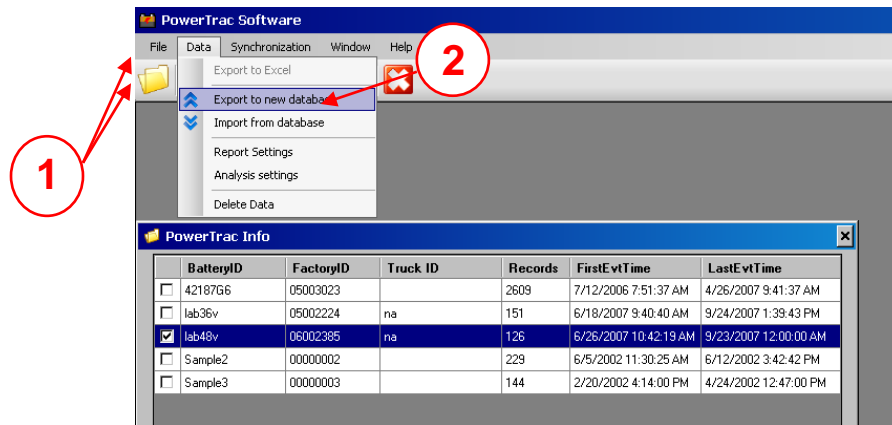
Deleting a Record From a Database File

1. Open the database containing the file to delete, and then select the file.
2. Select the **Data** button at the top menu bar and then select **Delete Data**.

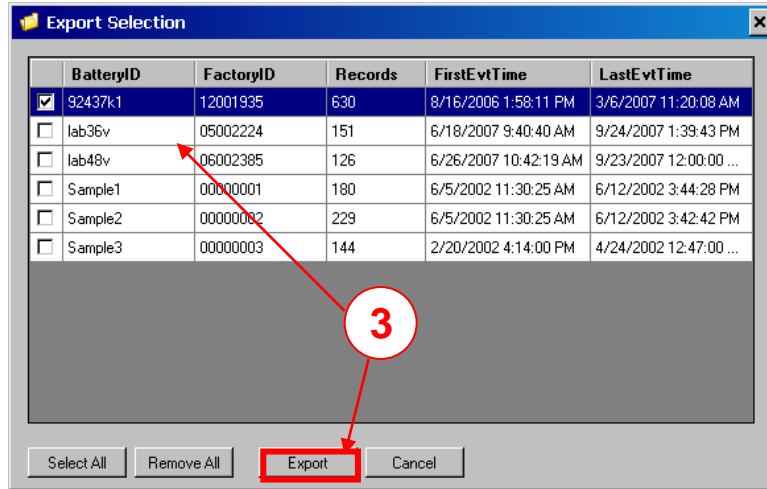


Exporting Data to a New Database File

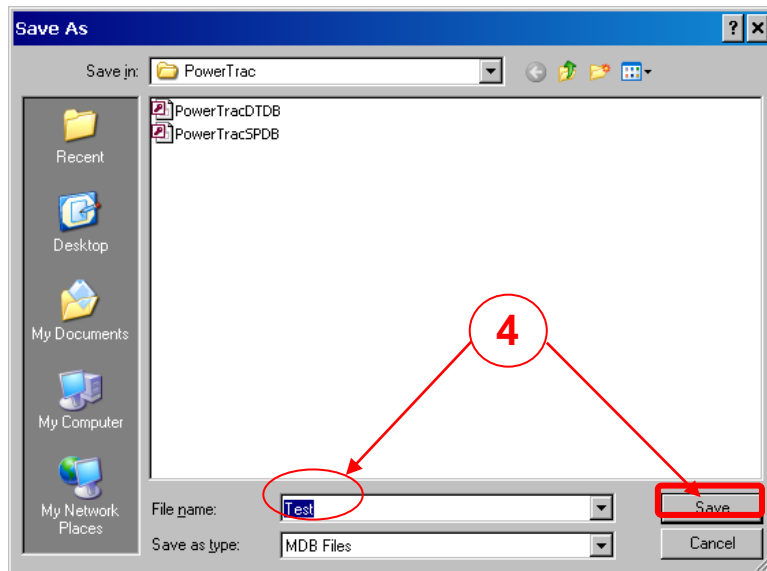
1. Open the database containing the file to export and then select the file.
2. Select the **Data** button at the top menu bar and select the **Export to new database** option from the pull-down menu.



- An “Export Selection” window appears, showing a list of all existing battery files. From the “Export Selection” window, select the batteries to export and then select the **Export** button.

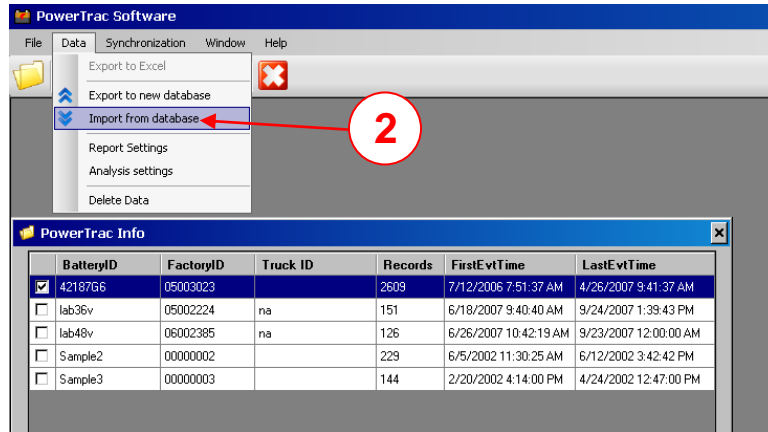


- Enter a new database file name. Select the **Save** button to move data into the new database.

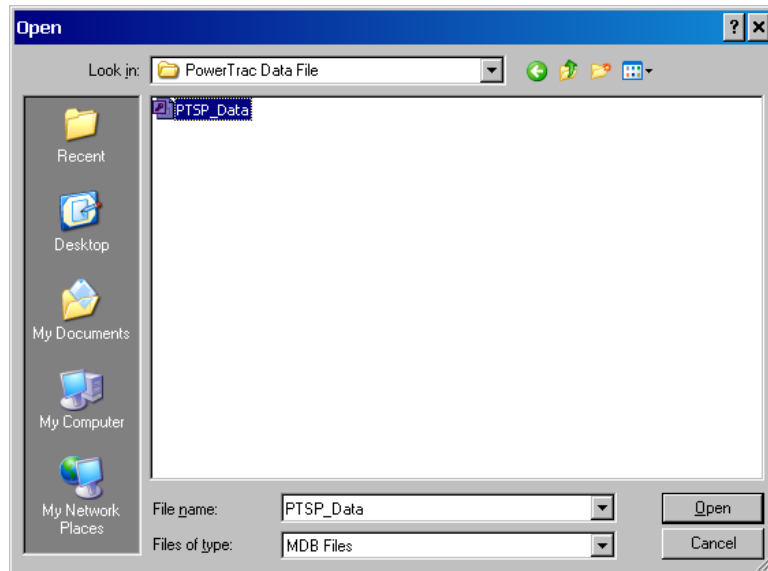


Importing Data into an Existing Database File

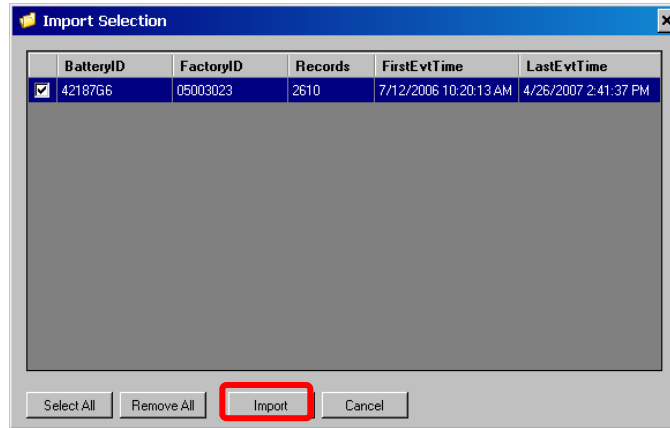
1. Open the database that will contain the file after import.
2. Select the **Data** button at the top menu bar and select the **Import from Database** option from the pull-down menu as shown.



3. From the pull-down menu locate the database to import.



4. The “Import Selection” window appears; select the batteries to import. Select the **Import** button. A progress bar appears.



5. When the import completes, a “Success” window appears, select **OK** to continue. The battery record will now appear in the list of batteries in the exported database and the original database.

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