

Power  ***Designers***

Maximize

Battery Performance

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PowerTrac SP – Battery Monitors





PowerTrac SP – Overview

- **Advanced & cost effective battery monitoring products for motive & stationary applications**
- **Monitors critical battery performance parameters including:**
 - ◆ Voltage, current, temperature, amp-hours
 - ◆ Charge, discharge and idle cycles
 - ◆ Lifetime amp-hours and hours of charge and discharge
- **Patented technology**

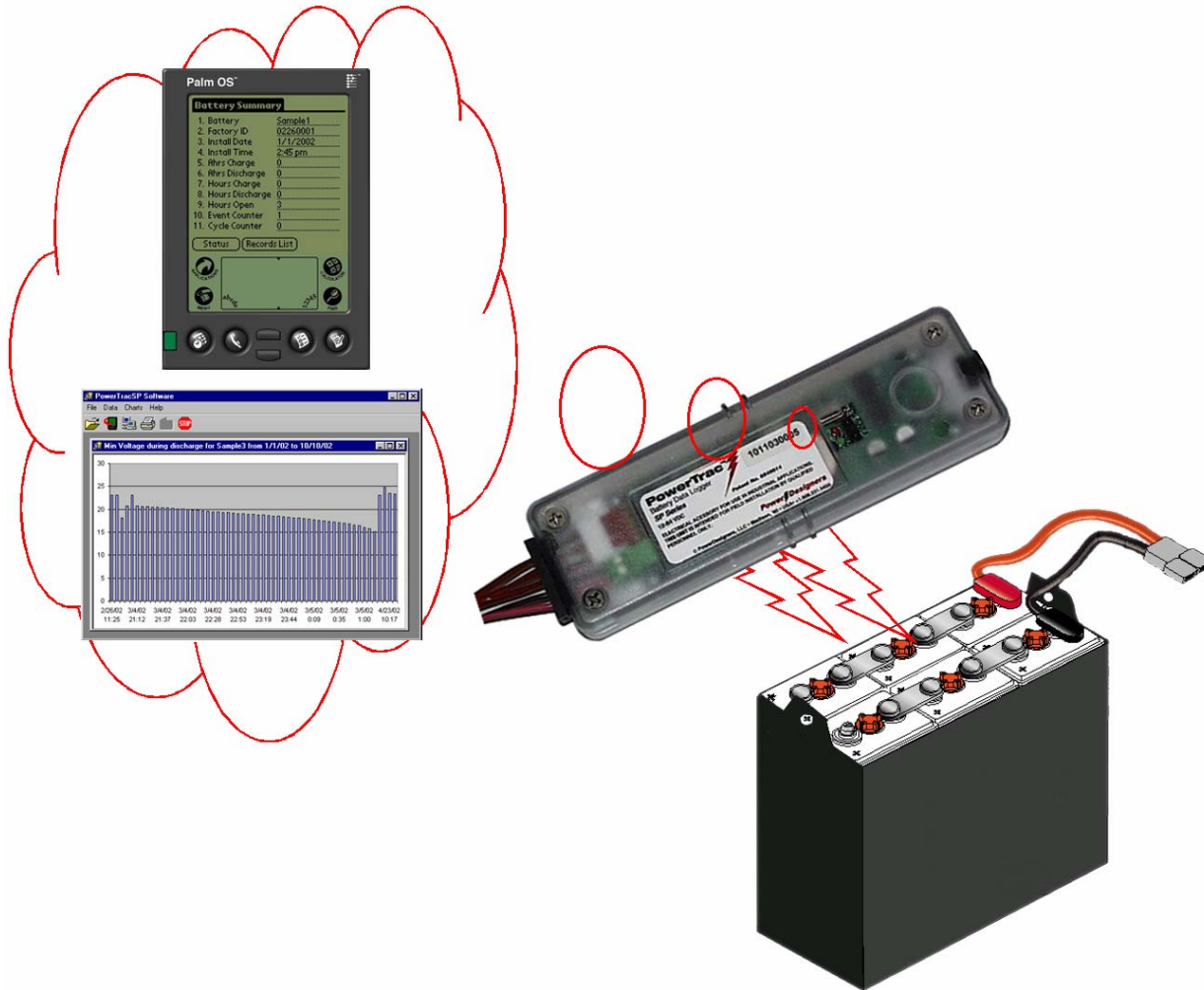


PowerTrac SP – Benefits

- **Adds intelligence to industrial battery systems**
- **Accurately identifies & solves battery field problems**
- **Increases battery service life & reduces maintenance costs**
- **Offers a new way to offer and manage warranties based on amp-hours**
 - **Warranted Amp-Hours**



PowerTrac SP – Motive Battery Monitors





PowerTrac SP – Motive Battery Monitors

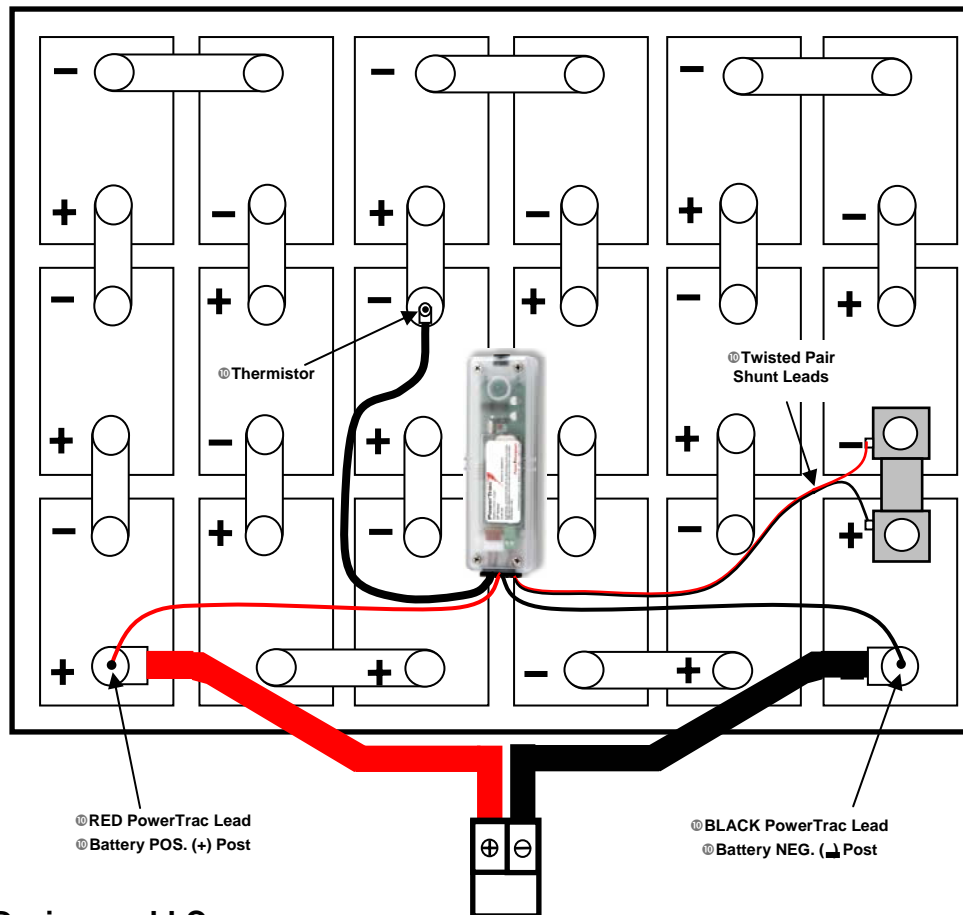
- Designed for permanent installations
- Logs and saves battery performance data over the battery service life
 - ◆ Amp-Hours of charge and discharge
 - ◆ Charge, discharge, and idle cycles
- Tracks battery warranties & maintenance schedules
- Saves up to 2700 distinct events
 - ◆ Non-volatile data storage memory
- Uses a **shunt** to measure battery current



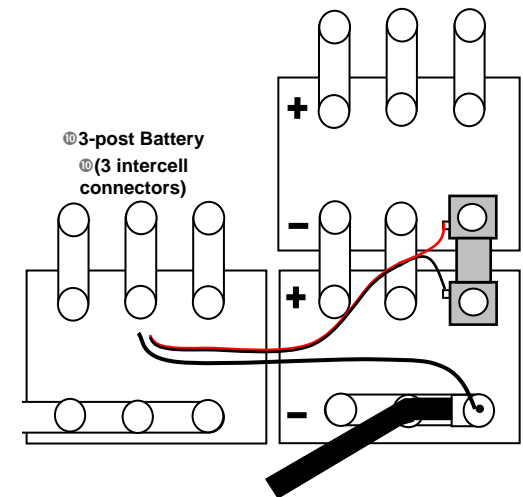


PowerTrac SP – PowerTrac SP

■ Shunt Installation



Multi-post Battery





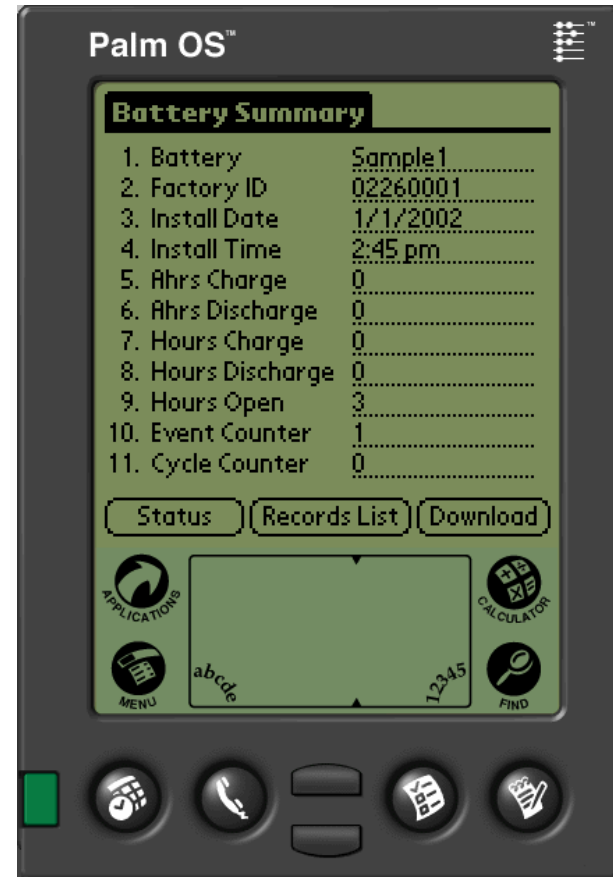
PowerTrac SP – Features

- **Wireless Palm User Interface**
 - ◆ Uses standard Palm devices to program and download data
 - ◆ User friendly screens for programming and viewing data
 - ◆ Password protected administration screens
 - ◆ Downloads data from multiple batteries into separate data files
 - ◆ Uses the **Hotsync** program to download data to a PC



PowerTrac SP – Palm Interface

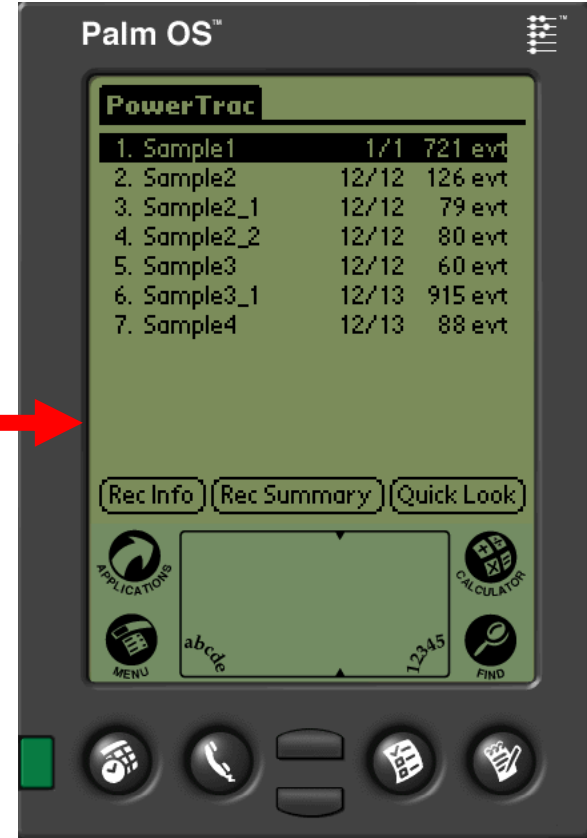
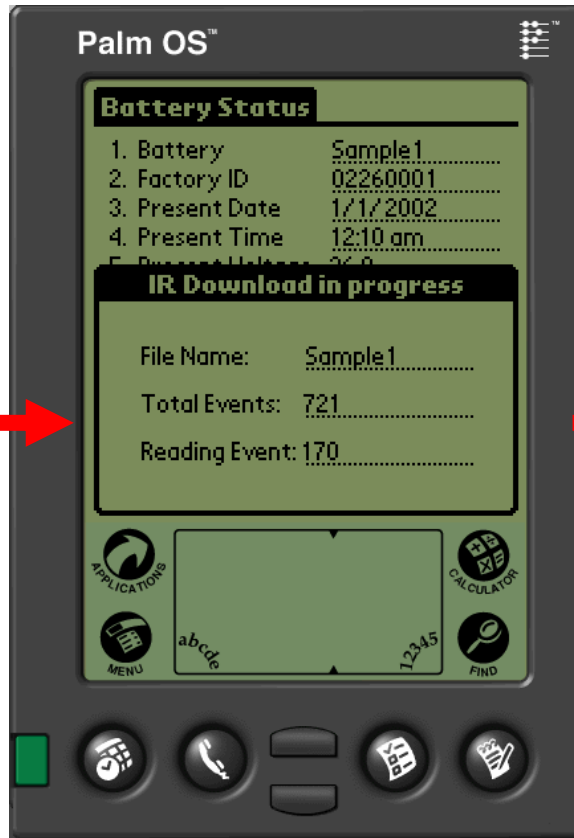
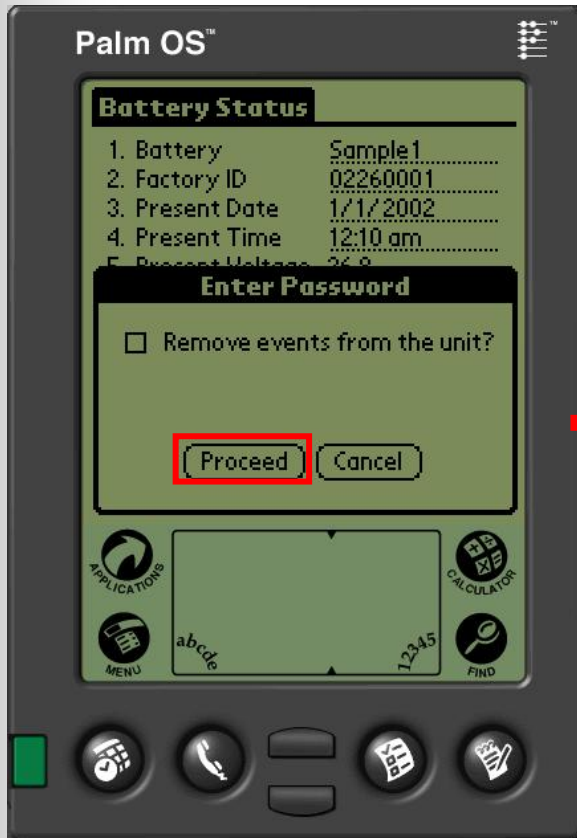
One Click Data View





PowerTrac SP – Palm Interface

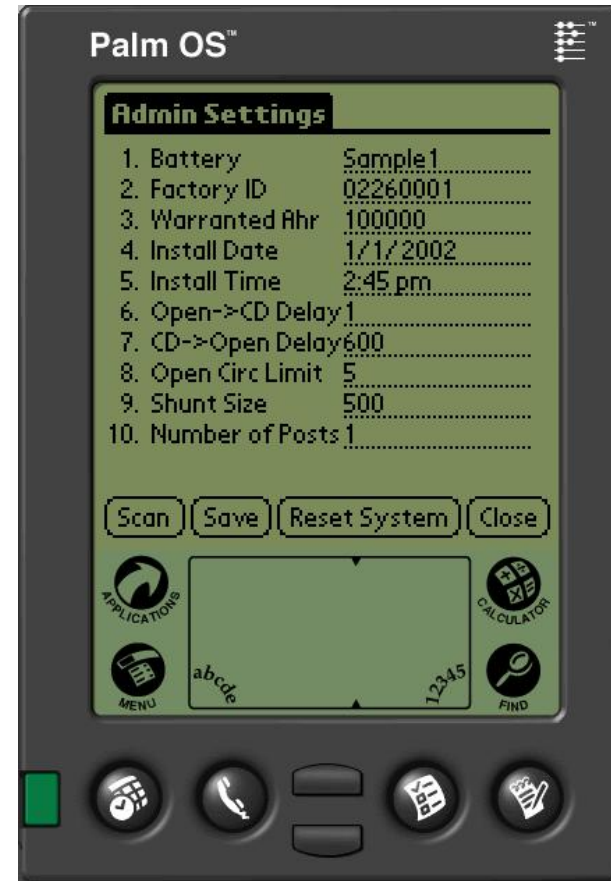
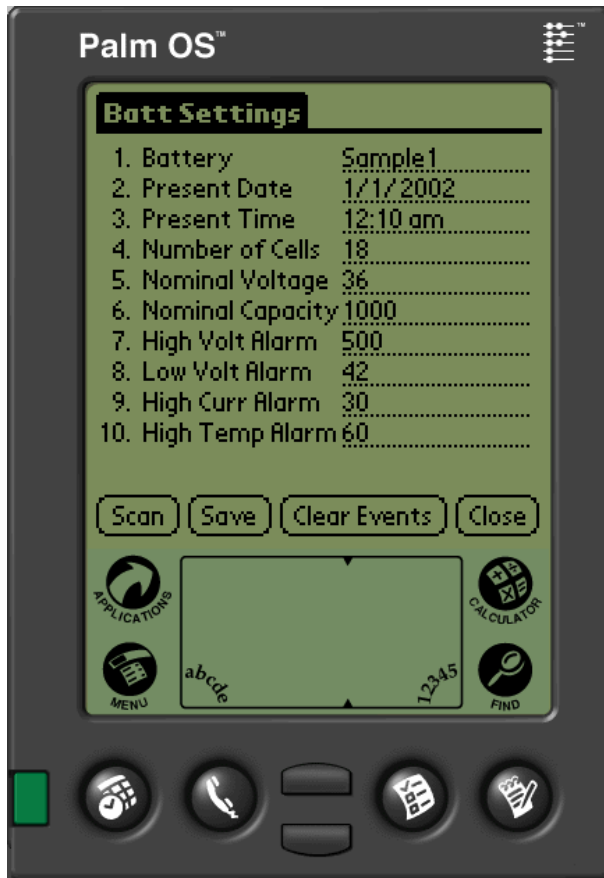
Simple Data Download





PowerTrac SP – Palm Interface

Two Programming Screens






PowerTrac SP – Hotsync Window

PowerTrac Synchronization

Select Item	File Name	Factory ID	Date	Events
<input checked="" type="checkbox"/>	Sample1	02260001	8/1/02 1:56:25 AM	721
<input checked="" type="checkbox"/>	Sample2	02260002	8/1/02 1:57:12 AM	126
<input checked="" type="checkbox"/>	Sample2_1	02260002	8/1/02 1:57:27 AM	79
<input checked="" type="checkbox"/>	Sample2_2	02260002	8/1/02 2:01:52 AM	80
<input checked="" type="checkbox"/>	Sample3	02260003	8/1/02 2:02:43 AM	60
<input checked="" type="checkbox"/>	Sample3_1	02260003	8/1/02 2:02:58 AM	915
<input checked="" type="checkbox"/>	Sample4	02260004	8/1/02 2:03:54 AM	88

Synchronizing file: Sample2 



PowerTrac SP – Features

■ Advanced and User Friendly Windows User Interface

- ◆ Simple user interface makes it easy to quickly download, view, and print data
- ◆ Comprehensive reporting and charting
 - Standard charts and reports makes data analysis straightforward
- ◆ Simple file and database management
 - Import and export database files with ease
 - Share data and files with other users



PowerTrac SP – Windows Interface

PowerTrac Software

Battery ID	Factory ID	Records	First Event Time	Last Event Time
<input checked="" type="checkbox"/> J030400104	11030193	283	1/5/2001 4:33:17 PM	3/30/2004 1:17:34 PM
<input type="checkbox"/> Sample1	00000001	180	6/5/2002 11:30:25 AM	6/12/2002 3:44:28 PM
<input type="checkbox"/> Sample2	00000002	180	6/5/2002 11:30:25 AM	6/12/2002 3:42:42 PM
<input type="checkbox"/> Sample3	00000003	144	2/20/2002 4:14:00 PM	4/24/2002 12:47:00 PM

Settings

Time Interval

All Events **Start Date** 01 January ,2003 12:00 AM

Select Interval **End Date** 28 April ,2004 11:59 PM

Temperature

Centigrade Fahrenheit

Voltage

Battery voltage Voltage per cell

Charts

Max Charge Voltage Single Chart Multi Charts

Events/Reports

Events Table Summary Report Summary Table Delete Record

Filtering

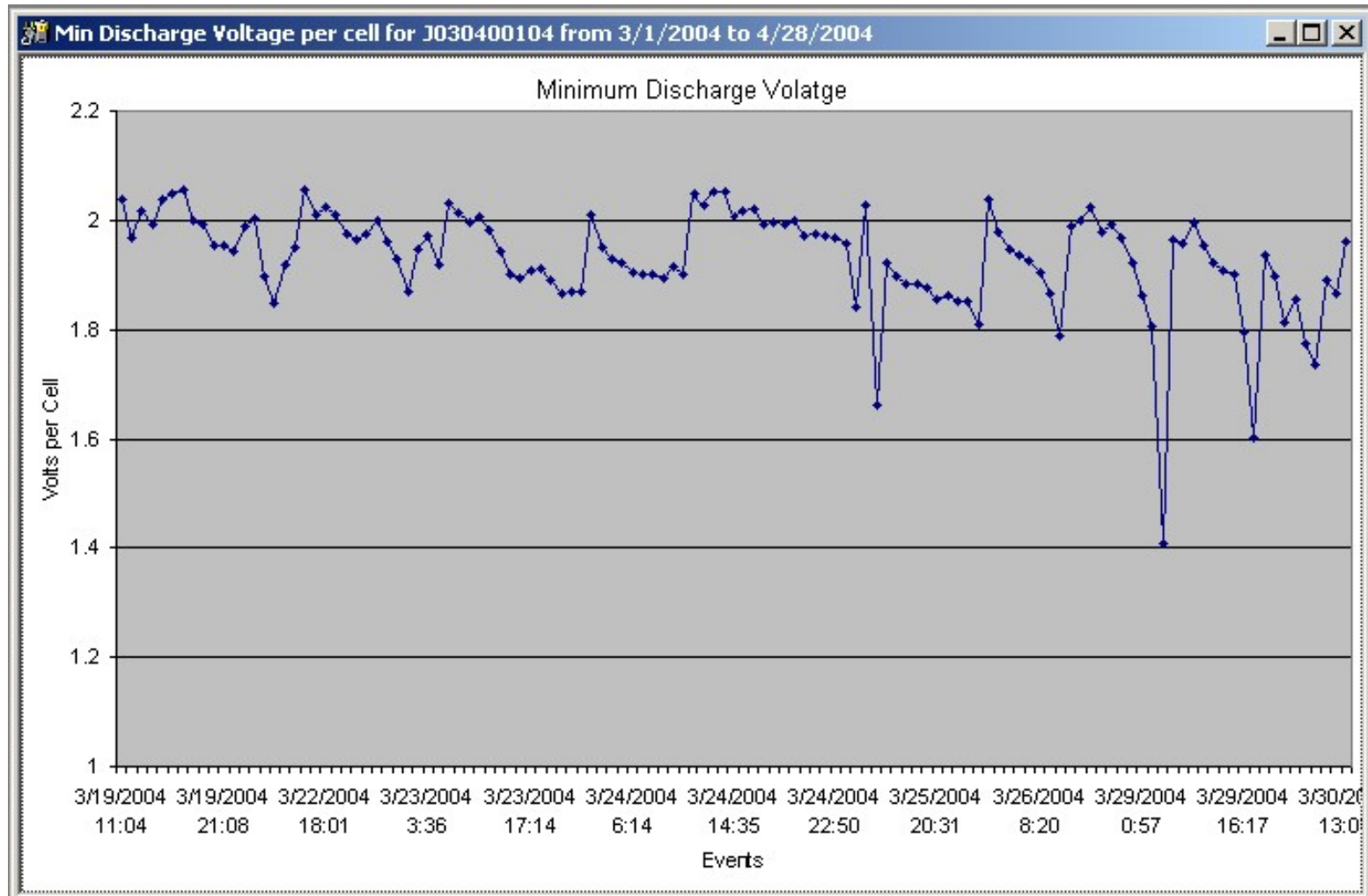
Formatting

Charting

Reporting



PowerTrac SP – Typical Chart





PowerTrac SP – Typical Report

The screenshot shows a software window titled "Battery Report" with a standard toolbar and a menu bar. The main content area displays the following information:

PowerTrac Battery Performance Report

Battery ID J030400104
Factory ID 11030193

PowerTrac Battery Info

Number of Cells	18
Nominal Voltage	36 V
Nominal Capacity	510 Ahr
Shunt Size	500 A
Number of Posts	1

PowerTrac Battery Lifetime Accumulated Summary Since Installation

Install Time	3/13/2004 4:52:00 PM
First Charge	3/19/2004 11:48:08 AM
First Discharge	1/5/2001 4:30:02 PM
Amp Hours of Charge	3845 Ahr
Amp Hours of Discharge	4288 Ahr



PowerTrac SP – Typical Events Table

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
Event ID	Battery ID	Factory ID	Event Type	Event Start	Event Duration	Ahr	OV Alarm	UV Alarm	OC Alarm	OT Alarm	Max Voltage	Max Volt Time	Min Voltage	Min Volt Time	Max Temp	Max Temp Time	Max Current	Max Curr Time	End Voltage	Palm File
1	123	ABC	Discharge	3/19/04 12:42	0:25	18	0	0	0	0	37.26	3/19/04 12:43	35.86	3/19/04 12:50	30	3/19/04 12:42	547.0	3/19/04 12:43	35.93	16779A4
2	123	ABC	Charge	3/19/04 13:08	0:33	97	0	0	0	0	44.30	3/19/04 13:27	38.00	3/19/04 13:12	32	3/19/04 13:33	538.0	3/19/04 13:12	44.28	16779A4
3	123	ABC	Discharge	3/19/04 13:41	0:52	34	0	0	0	0	38.55	3/19/04 13:41	36.72	3/19/04 14:08	32	3/19/04 13:41	551.5	3/19/04 13:43	36.68	16779A4
4	123	ABC	Open	3/19/04 14:54	0:22	0	0	0	0	0	37.90	3/19/04 14:54	37.88	3/19/04 15:14	32	3/19/04 14:54	0.5	3/19/04 14:56	37.89	16779A4
5	123	ABC	Discharge	3/19/04 15:26	0:56	29	0	0	0	0	38.36	3/19/04 15:26	36.00	3/19/04 16:12	32	3/19/04 15:29	551.5	3/19/04 15:28	35.99	16779A4
6	123	ABC	Discharge	3/19/04 16:24	0:50	30	0	0	0	0	37.44	3/19/04 16:31	35.88	3/19/04 17:02	32	3/19/04 16:24	551.5	3/19/04 16:40	35.87	16779A4
7	123	ABC	Discharge	3/19/04 17:26	1:28	71	0	0	0	0	37.17	3/19/04 17:35	35.20	3/19/04 18:53	32	3/19/04 17:26	551.5	3/19/04 17:26	35.18	16779A4
8	123	ABC	Charge	3/19/04 18:55	0:19	84	0	0	0	0	43.24	3/19/04 19:04	39.85	3/19/04 18:55	34	3/19/04 19:00	539.0	3/19/04 18:58	43.2	16779A4

- A** Unique ID # for each event
- B** This ID is placed on the battery by the user
- C** This ID is placed on the battery by PowerDesigners, LLC
- D** Type of Event .. **Discharge** .. **Charge** .. **Open**
- E** The Date & Time when the Event started
- F** The length in time ... **Hour** : **Minute**
- G** Total Ahrs used/returned during the event.
- H** Over Voltage Alarm
- I** Under Voltage Alarm
- J** Over Current Alarm

- K** Over Temperature Alarm
- L** Time stamp of the Max Voltage
- M** Time stamp of the Max Voltage Time
- N** Time stamp of the Min Voltage
- O** Time stamp of the Min Voltage Time
- P** Time stamp of the Max Temperature
- Q** Time stamp of the Temp Time
- R** Time stamp of the Max Current
- S** Time stamp of the Max Current Time
- T** A 30 second average of the battery voltage at the end of the event
- U** File number from the Palm



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