**PowerTrac**™
Battery Data Logger
*DT+ Series*

# PTDT+ 12-84V
# Quick Installation &
# Reference Guide

**Ver. 2.1**

**Power Designers**

**Battery Management Solutions by**
***PowerDesigners***

**Revision History**

Ver 1.0  12/13/04 BMS    New installation guide.
Ver 2.0  2/27/06  BMS    Updates to reflect hardware and
                         software changes to DT+
Ver. 2.1 3/23/06  BMS    Added Intro section and parts list

## NOTES

## PowerTrac DT+ Quick Installation and Reference Guide

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Visit our website to see our complete product offering, including updated company and product information:

http://www.powerdesigners.com

# Part Number List

Listed below are common part numbers and field serviceable parts.

| Item Description | PD Part # |
|---|---|
| PowerTrac DT+ (standard) | PTDT+ 12-84V |
| PowerTrac DT+ w/Palm | PTDT+ 12-84V-P |
| | |
| Plastic enclosure (replacement) | |

*Contact us for more information.

Visit our website (www.powerdesigners.com) to see our other PowerTrac, PowerTrac SP+, monitoring your battery throughout its life whether purchased or leased.



# Important Safety Instructions

While every care has been taken to ensure the completeness and accuracy of this manual, PowerDesigners, LLC assumes no responsibility or liability for losses or damages resulting from the use of the information contained in this document. Due to technical improvements, some information contained in this manual may change without notice.

**SAVE THESE INSTRUCTIONS --** This manual contains important instructions for the PowerTrac DT+ series product line that should be followed during installation and maintenance of the product.

Before attempting to install and begin logging data with the PowerTrac DT+ unit, please read this manual.

1) **WARNING: RISK OF ELECTRICAL SHOCK.** When working with batteries, extreme caution must be exercised. Individual safety requires plenty of ventilation. Remove jewelry, wear protective clothing and eye wear (safety glasses), and exercise caution. **Always follow the manufacturer's instructions for correctly installing batteries.**

2) **CAUTION: RISK OF ELECTRIC SHOCK AND/OR ELECTRIC ENERGY - HIGH CURRENT LEVELS.** Do not touch un-insulated battery connectors or terminals. Be sure to discharge static electricity from tools and technician by touching a grounded surface in the vicinity of the batteries but away from the cells and flame arrestors. All tools should be adequately insulated to avoid the possibility of shorting connections. Do not lay tools on the top of the battery.

## Technical Specifications

| | |
|---|---|
| **Nominal Battery Voltage** | 12V – 84V |
| **Operating Voltage** | 10V – 120V |
| **Voltage Resolution** | $\pm$ 0.01 volts |
| **Operating Temperature** | -25$^o$C – 60$^o$C |
| **Operating Current Draw** | 61mA at 12V<br>21mA at 48V |
| **Temperature Resolution** | $\pm$ 0.1$^o$C |
| **Current Resolution** | $\pm$ 1% |
| **Temperature Interface** | R$_{25}$ = 5k Ext. Thermistor |
| **Communication Interface** | Infrared (IR) port |
| **Data Storage** | 256k bytes flash memory<br>(~11 months [341 days] at 15 events/day) |
| **Battery Backup (time)** | CR 2032 |
| **Protection** | ➢ Over Voltage<br>➢ Reverse Polarity Protection |
| **Current Shunt** | 1000A / 50mV shunt |
| **Connector** | SB 350 keyless |
| **Dimensions** | 7.0"x 5.0"x 1.375" |
| **Packaging** | UL 94V-0 |



3.  From the screen shown above, you are able to view any selected event.  The next and previous buttons can be used to scroll through the stored events as well as the scroll bar on the right side of the screen.

The following explains some of the values in the above screen.

The **Evt Ahr** section is a net value for the entire event duration.  Discharge amp-hours are shown as a negative value, Charge amp-hours are shown as positive.

The **Max Current** is the highest level of current seen during the event as a 1 second average.

The **End Event Volt** is a 30 second average at the end of the event.

The **SOC** is a State-Of-Charge indicator at the end of the event.

*D. Viewing Events on the Palm*

The PowerTrac DT+ palm software allows users to view individual events of any record stored in the **File List**. Once data is downloaded from a PowerTrac DT unit, a file record will be added to the file list. To view events of a record stored in the **File List** do the following:

1. From the application launch screen, tap the **<View Files>** button. This will take you to the **File List**. In the **File List** you will find the all of the files that have been downloaded by your Palm.
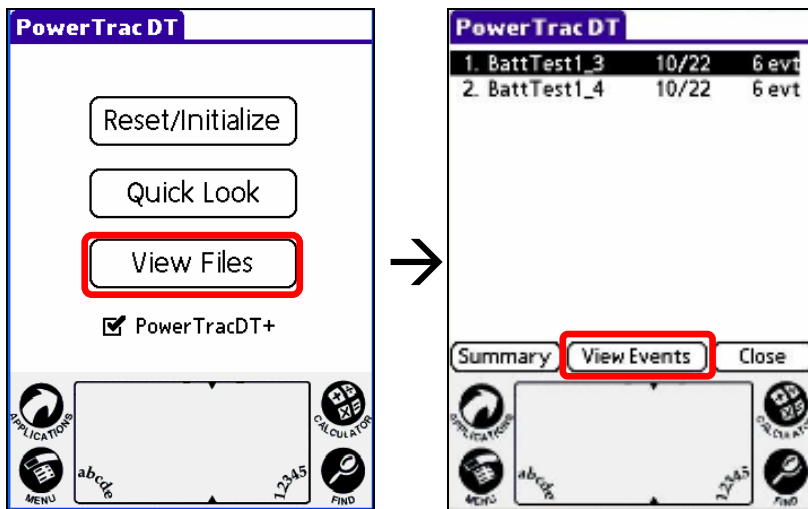


2. In the **File List**, highlight the file you wish to view. In the example above, item 1 is selected. Next, tap the **<View Events>** button.

## Introduction

The PowerTrac DT+ is a portable battery monitoring device developed specifically to meet the needs of industrial and motive battery systems. The DT+ series PowerTrac has the capability to provide valuable information to:

➢ **Service departments** – to diagnose problems

➢ **Sales departments** – to right size a battery

➢ **Engineering departments** – in battery/truck development

The PowerTrac battery monitor tracks and logs various battery performance data including battery voltage, temperature, current, and amp-hours of charge and discharge. The PowerTrac DT allows users to easily identify and solve battery problems as well as select appropriate batteries for their applications. The unit has SB 350 connectors on either end enabling plug and play installation.

The PowerTrac DT is equipped with an infrared (IR) port for wireless data transfer via PDA devices, such as a Palm Pilot. The installation is as simple as placing the unit in-line between the battery and truck and running an initialization program on the Palm. Once information is logged and downloaded into the Palm, each individual event can be viewed in sequence.

The PowerTrac DT has the capability to continuously scan battery real time parameters, process scanned information, and store relevant data if event change condition is detected. An event change condition is detected when the battery state switches between charge, discharge, and open states. When an event is detected (change of battery state), the unit saves a record associated with the elapsed event with summary information about the relevant event data. Each data field in this record is called an event parameter. The system also keeps track of global parameters such as accumulated amp hours of charge and discharge, accumulated hours of charge and discharge and etc.

Below is a list of some of the parameters stored in the PowerTrac DT+ memory:

***Real time parameters:***

- ➢ Present Battery voltage
- ➢ Present Battery Current
- ➢ Present Battery Temperature
- ➢ Present Time & Date (system clock)

***Event Parameters:***

- ➢ Event Type (charge, discharge & open)
- ➢ Event Amp Hours
- ➢ Event Hours
- ➢ Event Alarms
- ➢ Event Start Time
- ➢ Event Duration
- ➢ Event End Voltage
- ➢ Event End State-Of-Charge (SOC) *(NEW)*
- ➢ Event Max Voltage, Max Voltage Time Stamp
- ➢ Event Min Voltage, Min Voltage Time Stamp
- ➢ Event Max Temp, Max Temp Time Stamp
- ➢ Event Max Current, Max Current Time Stamp

***Global Parameters:***

- ➢ Total Amp Hours of charge and discharge since last reset
- ➢ Total Hours of charge and discharge since last reset
- ➢ Total Hours of battery open condition since last reset
- ➢ Cycle counter
- ➢ Event counter *(IMPROVED)*

## C. Downloading Events

To **Download** stored events from the PowerTrac DT unit to a Palm, the user must perform a "Quick Look" as described in section A earlier. To download events into the Palm:

1.  Perform a **Quick Look**. Then tap **<Download>**.
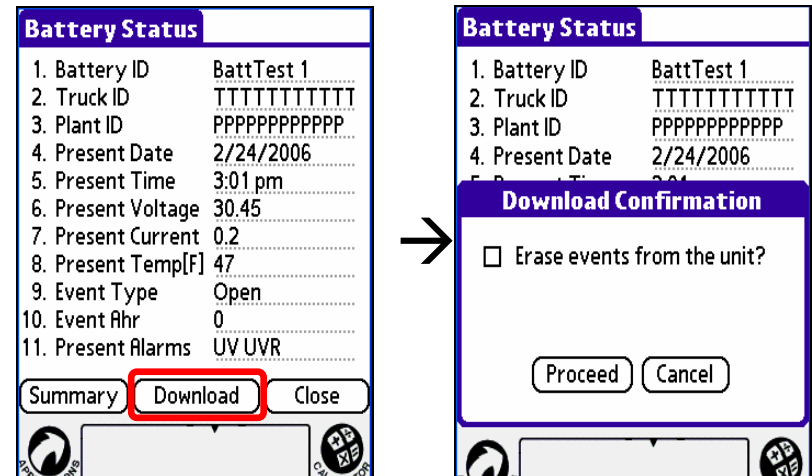


2.  Tap the **<Proceed>** button to download data. If you wish to erase all saved events after download is complete, check the <Erase events...> check box. The downloaded file will then appear in the **File List**.

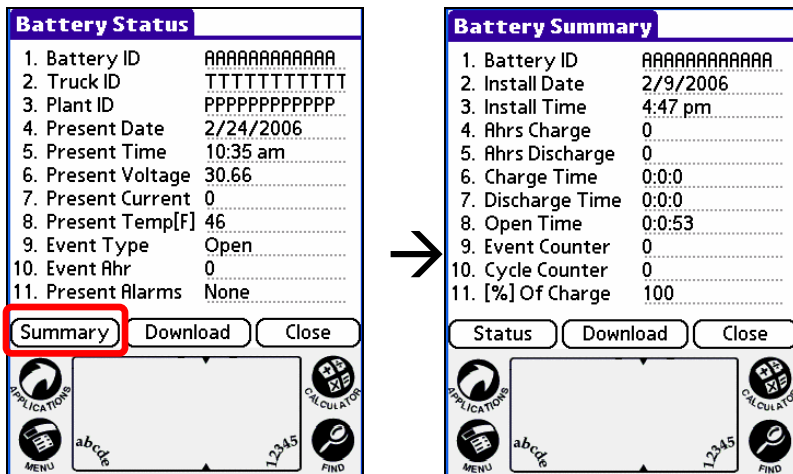# Palm Operation

## A. Present Status "Quick Look"

To find the present status of the battery, aim the Palm at the IR window and tap the **<Quick Look>** button. This will open the **Battery Status** screen. This shows all of the current battery information shown in the screen below.
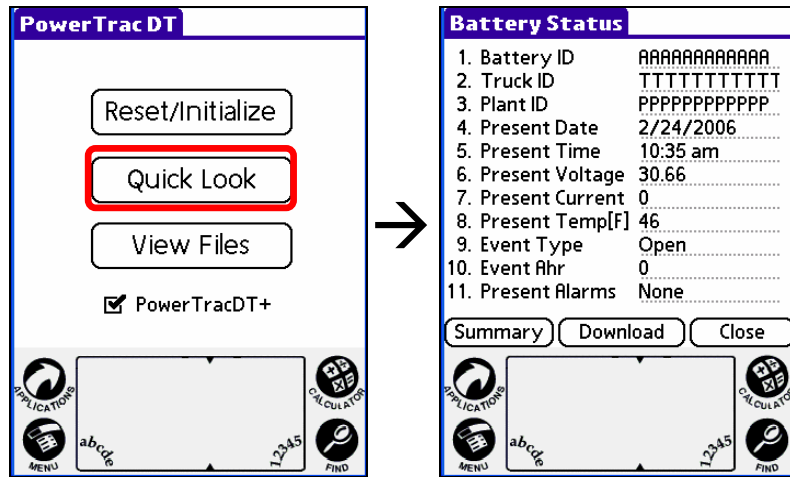


## B. Battery Summary

The **Battery Summary** screen can be accessed from the "Battery Status" screen after a Quick Look.



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# Package Contents



*PowerTrac DT+ package*

The PowerTrac DT+ package contains the following items:

- ➢ 1 PowerTrac DT+ battery data logger
- ➢ 1 CD: includes Windows & Palm S/W & user's manual
- ➢ 1 Quick Installation and Reference Guide manual
- ➢ Carrying Case

A Palm device is required and can be purchased separately with Palm s/w installed.

If any of the items listed above are missing, please contact Power Designers for a replacement.

The PowerTrac DT+ monitor is a plug and play device that requires minimal installation. The unit encompasses a 1000A/50mV shunt, two keyless SB-350 connectors (for easy connection to existing batteries, chargers, and vehicles), as well as a temperature sensor for temperature monitoring.

A close up of the PowerTrac DT+ module showing the IR window is shown on the next page. The IR receiver is accessed through the clear plastic window.

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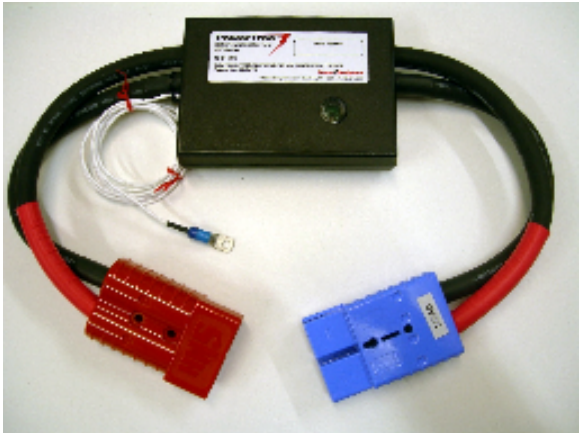
*The PowerTrac DT+ unit*



**IR Window**

*Close up top view of the PowerTrac DT+ unit*

The SB-350 connectors are marked with "**Battery**" and "**Load**" labels. **It is important to connect the "Battery" labeled connecter (Red) to the battery and Blue connector labeled "Load" is connected to a charger or to the vehicle.**

Note also that disconnecting the unit will not cause the data to be lost as all settings and data is stored in non-volatile memory.

## C. *Changing Passwords*

To view and change information in the PowerTrac a password is not required until the password is changed from the default "0000". To change the password perform the following:

1.  Tap the **<PowerTrac DT>** label at the top of the **File List** screen. A menu bar will appear with **Setup**, **Admin**, **Info** and **Help** pull-down menus.

2.  Tap the **<Admin>** pull-down menu and select the **<Passwords>** submenu as shown below. A new window will appear which you can use to enter the new password.
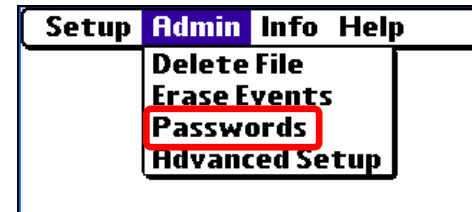


3.  Enter the old (Default is 0000) and the new passwords, then align the Palm with the IR window of the PowerTrac and tap the **<Change>** button at the bottom of the window. A confirmation window will appear confirming the new password has been accepted.

    **Note:** If you forget your password, record the **Factory ID** of the unit and call Power Designers to obtain a new password.

The table below lists the **Settings** screen parameters description as well as their factory pre-programmed values.

**Settings** Screen Parameters

| Parameter | Description | Programmed Value |
|---|---|---|
| **Battery ID** | A unique battery name to be programmed. The Battery ID can consist of no more than 12 characters and/or numbers.  This value is most commonly the business customers name. | **AAA…AAA** |
| **Plant ID** | A unique plant name to be programmed. The Plant ID can consist of no more than 12 characters and/or numbers. | **PPP…PPP** |
| **Truck ID** | A unique truck name to be programmed. The Truck ID can consist of no more than 12 characters and/or numbers. | **TTT…TTT** |
| **Nominal Voltage** | The nominal voltage of the battery | **48 (V)** |
| **Nominal Capacity** | The nominal capacity in Amp Hours | **1200 (Ahrs)** |
| **Present Date** | Present date.  **Verify After Installation.** | **Present Real Date** |
| **Present Time** | Present time.  **Verify After Installation.** | **Present Real Time** |
| **Install Date** | The installation date of the unit. Need to Set After Installation. | **Date of Factory Test** |
| **Install Time** | The installation time of the unit. Need to Set After Installation | **Time of Factory Test** |

# Hardware Installation

The PowerTrac DT+ unit has two keyless SB-350 connectors and one temperature sense lead (not shown).



*PowerTrac DT+ Unit*

BATTERY side connector

CHARGER / LOAD side connector
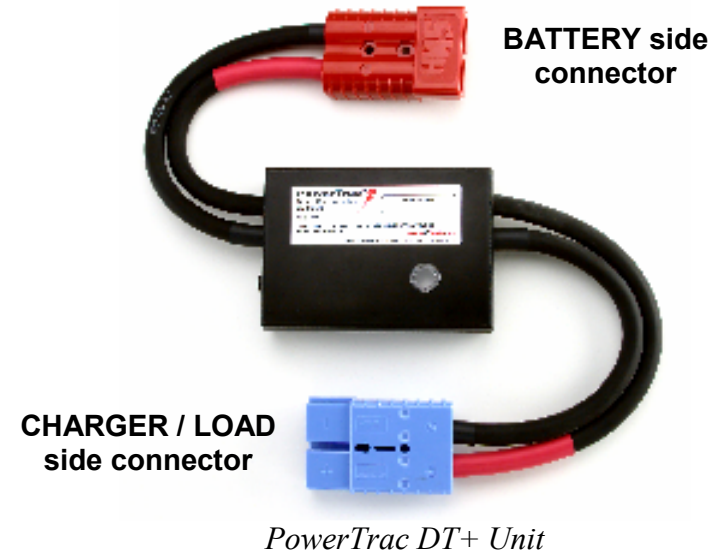
*Connecting the PowerTrac DT Unit:*

1. Plug the "**BATTERY**" labeled connector into the battery connector.
2. Plug the "**LOAD**" labeled connector into the load connector (charger or vehicle).
3. Attach the wire with the heavy **Blue** lug (temp sensor) to the innermost cell connector.
4. Connect the temperature lug to one of the inner cells of the battery.  The temp. sensor is not required for operation.  If it is not used, it should be secured so as not to affect operations, do not cut it off.
5. Seat the unit properly and use a tie wrap to secure it.

**CAUTION:**  **DO NOT CUT THE TEMPERATURE SENSE WIRE.  This wire has a thermocouple integrated into the lug and is used to measure battery temperature. Cutting this wire will result in erroneous temperature readings.**

# Software Installation

*A. Minimum Systems Requirements*

<u>Windows</u>

**Operating systems:**                98, ME, 2000, XP, NT
**Communication port:**            One serial or USB Port
**Required pre-installed S/W[2]:**    Microsoft Access

<u>Palm</u>

**Operating system[3]:**              3.5 and above
**Palm Desktop S/W[3]:**            4.0 and above
**Communication[4]:**                HotSync cable/cradle

**Notes:**

1. **All previous versions of PowerTrac software must first be un-installed from your PC for proper operation.**

2. If Microsoft Access is not installed on your PC, you will need to install the Microsoft Access Runtime version of the software to be able to view events and display charts (included on the PowerTrac CD).

3. If you have an earlier version of the Palm OS or Palm Desktop software, you can download an update from the Palm website: http://www.palmone.com/us/support/

4. To download data from your Palm to your PC, you will either need a HotSync cradle (USB or Serial) or USB (A) to mini-USB (B) cable.

5. The **Palm Zire, Zire 31, Zire 72, Tungsten E2, T3, T5 and TX** PDAs have been tested and work properly with the PowerTrac SP unit. Visit our website to see a list of other Palm's that are known to work with our products.

   **Note:** PDAs with Windows OS systems (Pocket PC) will not work. Also the Palm Zire 21 and Palm Tungsten E PDA's will not work with the PowerTrac units.

5. The user can set various parameters including the battery ID, nominal voltage and capacity and the date and time. Set these parameters to match your specific battery ratings.

   **Note:** You do not have to continue the alignment between the Palm device and the PowerTrac IR window while entering the various parameters.

6. Re-align the Palm device with the IR window of the PowerTrac and tap the **<Save>** button at the bottom of the screen. Continue to hold the alignment. When the data transfer is complete, a confirmation window will appear.

   **If you are prompted for a password:** The default password is "**0000**" but can be changed, by the user, via the password function in the **Admin** menu. Tap the **<Proceed>** button to transfer data to the PowerTrac unit.
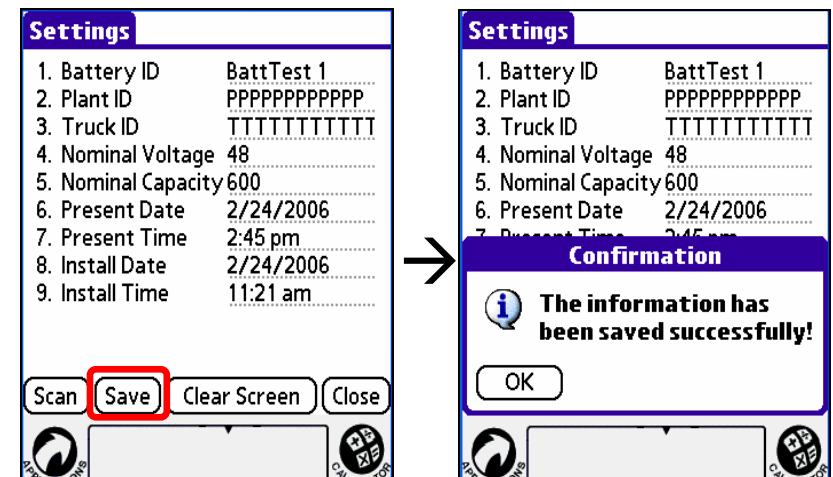


7. To verify the new settings, tap the **<Clear Screen>** button then tap the **<Scan>** button while aligning the Palm device with the IR window of the PowerTrac. The present settings of the unit will be displayed.

8. Tap the **<Close>** button when complete.

## B. Manual Setup of Battery Parameters

Using this method of setup will allow users to set the desired parameters **but will not clear the events and zero the global registers**.

1.  Start the Palm application by tapping the "**PwrTracDT** " program icon on the Palm home screen.
2.  At the three button screen, aim the Palm at the device and tap **<Quick Look>**.
3.  Tap the **<Battery Status>** label at the top of the screen. A menu bar will appear with **Setup**, **Admin**, **Info** and **Help** pull-down menus.
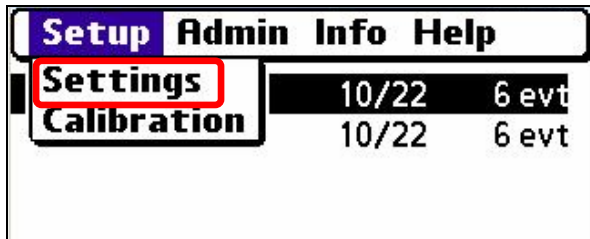


4.  Tap the **<Setup>** pull-down menu and select the "**Settings**" submenu as shown above.  The **Settings** screen will appear as shown below.  To find what is currently programmed in the settings aim the Palm at the device and tap **Scan**.
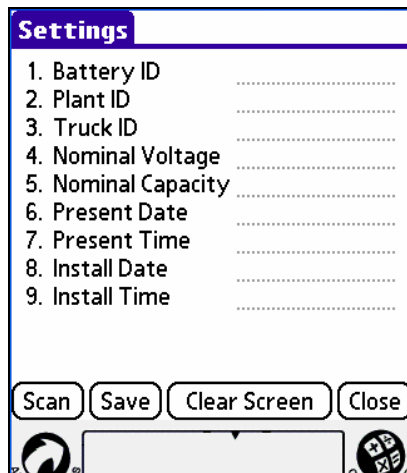


## B. Installing the Palm Application to the Handheld

If you have not already done so, the Palm Desktop software must be installed and be able to perform a HotSync before the software can be loaded on the Palm.

1.  Connect your Palm handheld to your PC using the cable or place it in the cradle (if equipped).
2.  Double click the **PowerTracDT.prc** file from the PowerTrac DT+ installation CD.
3.  The Palm Install Tool program will appear on the screen. Confirm the file selection. If the Install Tool does not appear automatically, launch it from the **Start** button, first click the **Add** button, then select the file **PowerTracDT.prc** from the installation CD.  Click **Done**.
4.  Start the **HotSync** program from your cradle or handheld. This will install the PowerTrac DT palm software.

The installation procedure has been successful if you are able to see the "**PwrTracDT**" icon on the handheld home screen as shown below.

## C. *Palm Installation Check*

To verify proper installation, do the following:

1. Start the application by tapping the **<PwrTracDT>** icon on the Palm home screen. The application screen is shown below.



Note: The Palm software is backwards compatible. When communicating with a DT+ unit, a check mark must be in the box as shown above. When communicating with a previous version DT unit, the box must not be checked. When communicating with a old version DT series, the box must not be checked or the error "Communication Timeout" will be displayed.

2. From a distance of **3-24 inches**, aim the Palm device towards the PowerTrac IR window and tap the **<Quick Look>** button at the center of the screen.

3. The **Battery Status** screen will be displayed, as shown on the next page, which shows the present status of the battery.
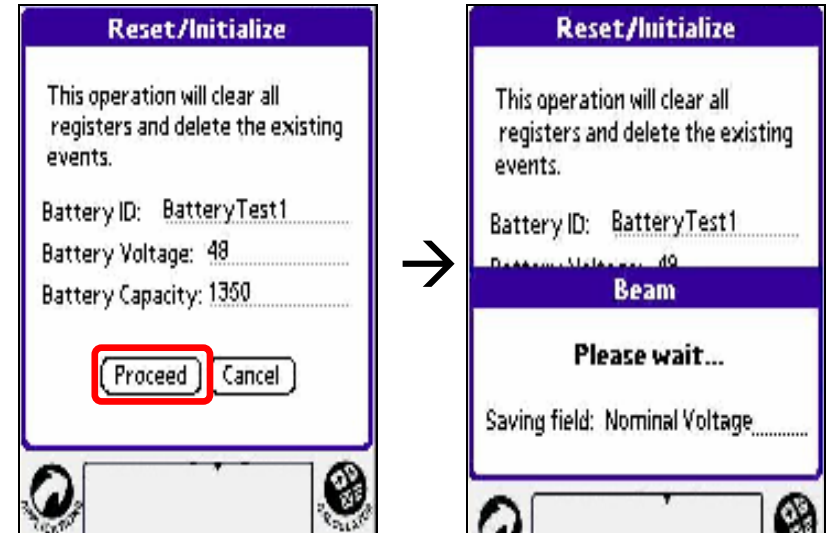


3. When the Palm is finished programming and initializing the unit, a confirmation message will appear.

## PowerTrac DT+ Setup

There are two ways to perform the setup of a PowerTrac DT, an automatic and a manual method.

### A. Automatic Setup

The automated method of setup **will fully clear all recorded events and reset all global registers (cumulative parameters)** including total hours and amp-hours of charge/discharge.   Only the PowerTrac settings will remain. As such, before proceeding with the automatic setup, ensure that you download any data of interest.

The present and install time and dates will be set using your Palm devices date and time.  To perform the setup:

1. Starting from the application launch screen, tap the <**Reset/Initialize**> button.
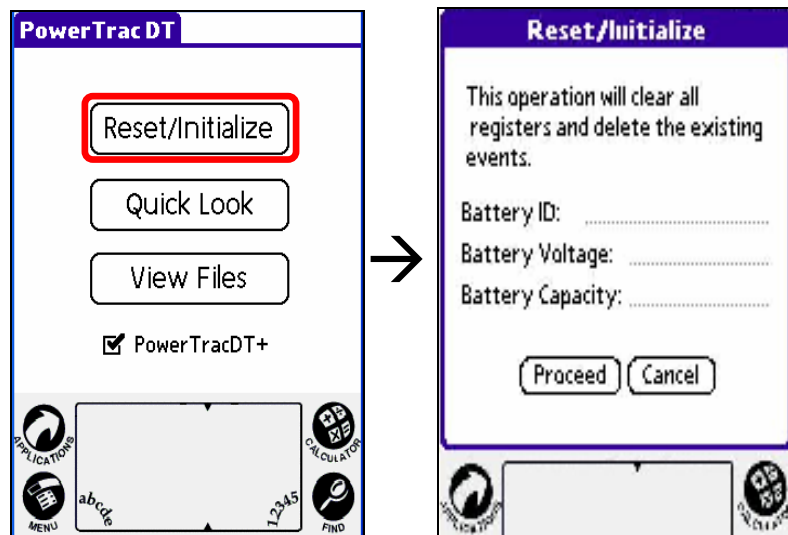


2. Enter the new Battery ID, Battery Voltage and Battery Capacity (Ahr) on the lines provided.  Then aim the Palm at the PowerTracs IR window and tap <**Proceed**>.
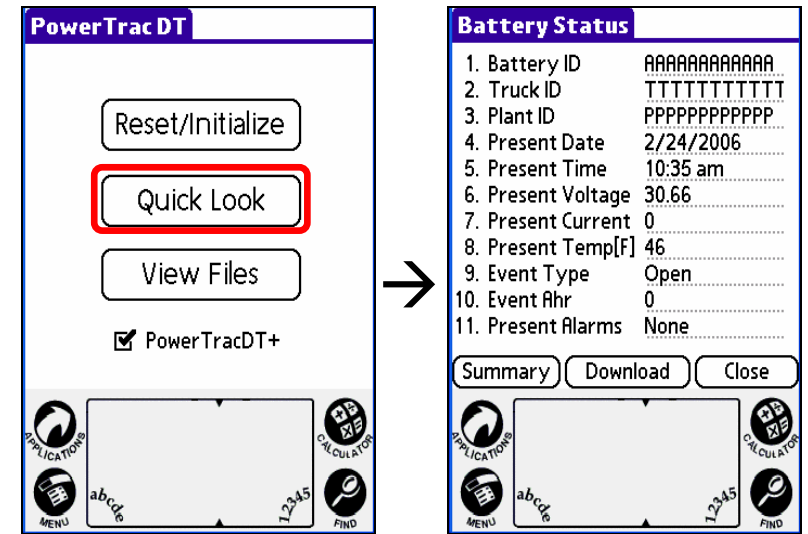


4. By tapping the <**Summary**> button at the bottom of the **Battery Status** screen, the **Battery Summary** screen will be displayed as shown below.
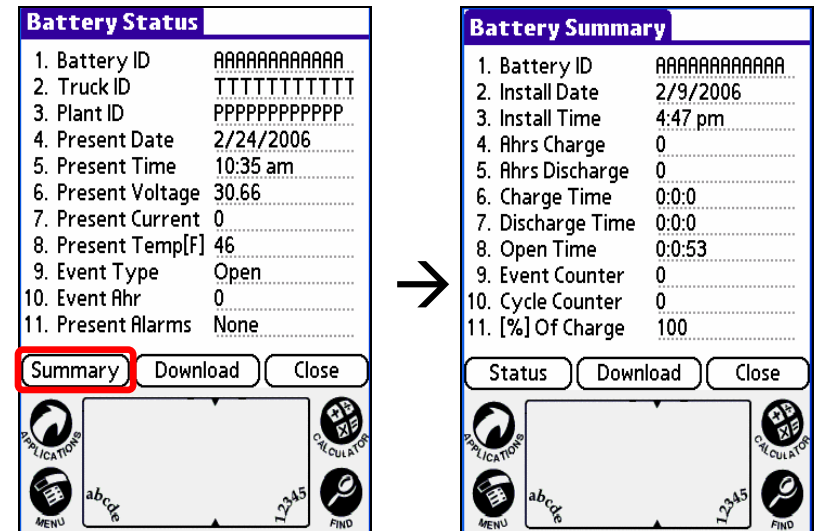
The **Battery Summary** screen lists the accumulated battery data since installation. These include:

➢ Installation date and time

➢ Total amp-hours of charge and discharge since installation

➢ Total hours of charge, discharge and open since installation (hhh:mm:ss)

➢ Events counter (total # of events residing in the memory).

➢ Cycle counter (charge-discharge-charge cycles)

➢ State of Charge in percent (%) *(NEW)*

**Note:** The **Quick Look** does not save data to the Palm. In order to save the data, you must tap the **Download** button at the bottom of the **Battery Status** or **Battery Summary** screens.

## *D. Un-Installing previous PowerTrac Windows Applications in your PC*

It is very important to uninstall any previous version of PowerTrac windows software to ensure reliable, continuous operation. The windows software includes the conduit to transfer the data from a Palm to PC. If the software is not uninstalled the conduit will not update and the data from the DT+ units will not transfer from the Palm to PC.

To un-install:

1. click on Start→ Control Panel→ Add/Remove Programs

2. When the window updates with a list of installed programs, find and select **PowerTrac**. The click the **<Remove>** button.

This will un-install the PowerTrac windows software but will not remove or delete any data previously saved in your computer.

## *E. Installing the Windows Application to your PC*

1. First un-install any previously installed PowerTrac windows software. See previous section.

2. Double-click on the "**PowerTrac-vxxx.exe**" file from the installation CD (xxx refers to the software version).

3. Follow the installation procedure. After the installation is complete, you will be able to see the "**PowerTrac**" group in your **Start→Programs** menu.

4. Go to **Start→Programs→PowerTrac** and select the **"Register Conduit-PTDT"** application. This will automatically add the software to the Palm HotSync manager, which will allow downloading data to the PowerTrac database during the HotSync operation.

5. To verify proper installation, start the PowerTrac software on your computer. The PowerTrac software screen should appear as shown below.
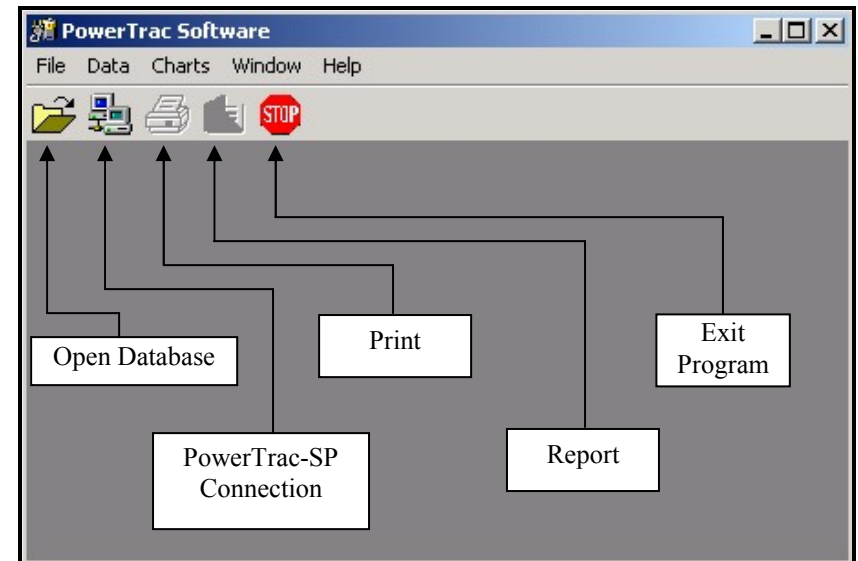


6. To find the software version click Help, then click About.