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## **PCT User Guide**

PCTWIN Ver: 1.3

LaMantia Products Ltd.  
[www.lamantia.ca](http://www.lamantia.ca)

## **Read This Safety Message First**

The Programmable Charger Tester (PCT) modules together with the PCTWIN software program create a system that allows the user full control to specify the battery charge, discharge and test parameters. In addition, the system provides the optional ability to adjust the calibration data that is required to ensure proper operation. This capability is designed to provide the user with maximum flexibility to manage many different battery types in many different situations. This capability, by its very nature, also creates the possibility for the user to use improper charge, discharge, test or calibration parameters. When used improperly, by accident, inadvertently, by mistake or with lack of proper knowledge and training or if the software files become damaged, the system can fail to properly manage the battery under charge, discharge or test. **This can damage batteries and as a result a battery could leak, overheat, explode or catch fire. This could create a dangerous situation involving fires, property damage, personal injury or death.**

It is expected that this system will be used with this information in mind. The user understands this situation and agrees to use due diligence when using this system. This means that after modifying, writing or downloading a program (bp3 file) the user will verify that the PCT module is working as expected in all possible situations. This means monitoring the operation after downloading, measuring the actual voltage and current with your own meters and not leaving the PCT module unattended until you are satisfied that everything is working properly.

User should only charge Lilon and LiPo batteries that have built in protection circuitry to protect against the possibility of applying improper voltage or current to the battery. Most consumer type Lilon batteries do have built in protection circuitry. If you are uncertain if the Lilon or LiPo battery has built in protection circuitry, check with the battery manufacturer.

Always charge, discharge and test batteries according to the battery manufacturer's specifications.

This manual is a guide to using the PCT system. It is not a training manual for understanding proper battery management, charging, discharging and testing. It is expected the user will have this knowledge. The PCT should only be programmed by knowledgeable trained staff. After the PCT has been satisfactorily programmed and tested, the PCT must be labeled appropriately for its intended application. For example - label the battery type & voltage so that users will not inadvertently connect an incorrect battery type.

This is not a consumer type product. It should only be programmed by knowledgeable trained personnel. Since the PCT is programmed by the user it is impossible for LaMantia Products Ltd. to be liable for any problem associated with improper battery charging, discharging or testing parameters.

## **Software License Agreement**

Users who purchase a PCT module receive a license to use the PCTWIN software program. You must read and agree to the license agreement listed below before continuing with the use of the software.

Users who receive this software with a PCT module or download it from our web site have a license to use it subject to the license agreement listed below:

Under the terms of this license NO warranties of any kind are made with respect to the contents or functionality of this software, nor its fitness for a particular purpose.

LaMantia Products Ltd. shall not be liable for errors in the software or documentation, or for any direct, indirect or consequential damages or financial losses arising from the use of this software or the PCT modules. Always follow the battery manufacturer's recommended charging and discharging procedures.

LaMantia Products Ltd. reserves the right to change the specifications and software without notice. Users agree to make their own determination as to the suitability of this analyzer for their particular application.

You accept the terms of this license by continuing with the use of the PCTWIN software. If you do not agree to the terms of this license then return your PCT module to your dealer within 30 days of purchase for refund.

The software program PCTWIN for Windows™ and its associated documentation are copyright © 2008 LaMantia Products Ltd. London, Ontario, Canada. All rights are reserved. Unauthorized duplication or distribution is strictly prohibited.

Please read the entire user guide, supplied with your PCT before attempting to use your PCT module.

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## **Overview**

This guide will explain how to use the PCTWIN program. This will allow you to install the PCTWIN software, connect to the computer and open a bp3 file for modification and loading into your PCT module.

Note that if your PCT module was supplied to you fully programmed then there is no need to modify the program in any way. However if you wish to view the on screen console, to view operational information, then you will still need to install the PCTWIN software. See the section on “Using the Console Only”.

For detailed instructions on PCT programming please refer to the *PCT Programming Guide*.

The PCT module needs to have a program (bp3 file) loaded into it for it to function as required. This program file instructs the PCT module in all aspects of operation. Therefore you must have the correct file loaded for the required operation.

When you receive your PCT you should have received:

- PCT module
- External power supply (except models with internal power supply)
- 9 Pin RS232 data cable to connect PCT module to PC
- Software CD with PCTWIN program
- This PCTWIN user guide
- PCT Programming guide
- External Temperature Probe (if ordered as an option)

PCTWIN is also used to display operational information of a connected PCT module while it is operating. This is useful for testing and debugging your bp3 program file.

## **Installing the PCTWIN Software Program**

Using the PCTWIN installation CD locate the directory that contains the PCTWIN program. Run the setup.exe file in order to begin the installation on your computer. Installation will proceed and you can then open the program using the desktop icon. Alternatively you can locate the program file at *C:\Program Files\PCTWIN* after the installation is complete.

## **Connecting the PCT to the computer**

In order to connect to your computer you will require a computer with a RS232 serial COM port. This is a 9 pin male connector. If your computer does not have a RS232 COM port you can use an optional USB to RS232 converter cable. You can usually find one at your local computer supply store. This converter cable once installed will actually appear to your computer as an installed RS232 COM port. If you cannot locate a USB to RS232 converter cable you can contact LaMantia Products to purchase.

The PCT has two 9 pin data ports on the rear of the unit. The female port labeled IN/PC is used to connect to the computer. Connect one end of the data cable to IN/PC on the rear of the PCT module. Connect the other end to the RS232 serial COM port on your computer.

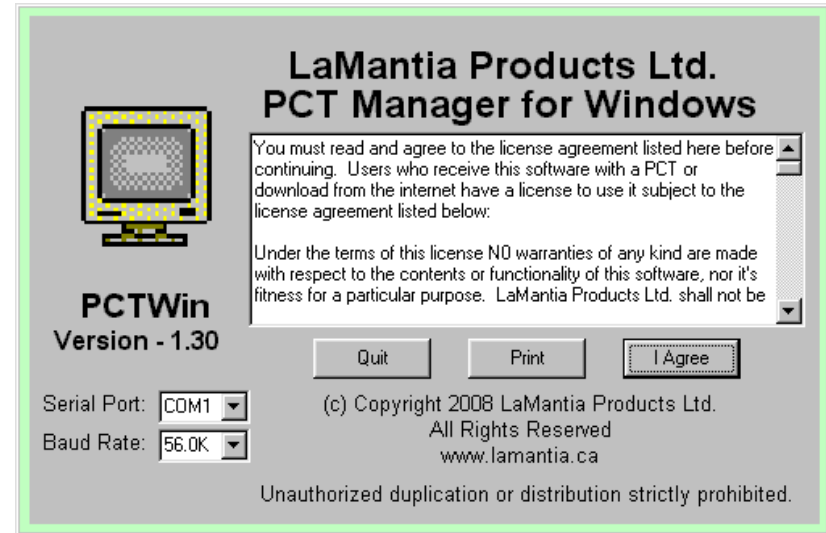
The other 9 pin data port on the rear of the PCT is used to connect to another PCT module. In this way you can communicate with multiple PCT modules.

## **Power up the PCT and establish communications with PCTWIN**

The PCT module is supplied with either an internal power supply or external power supply. In both cases this is a universal 120/240 volt supply. After the data cable is connected you can power on the PCT and start the PCTWIN program.

## **Starting the PCTWIN software program**

When you first start the PCTWIN program you will see the introductory screen



Select the *Serial Port* number that your computer is using for the RS232 port. This is a number from 1 to 4. Your PCT is supplied preset to a baud rate of 56K so there is no need to change this.

You must read and agree to the terms listed. If you agree then select “I Agree” in order to proceed to the main PCT program window.

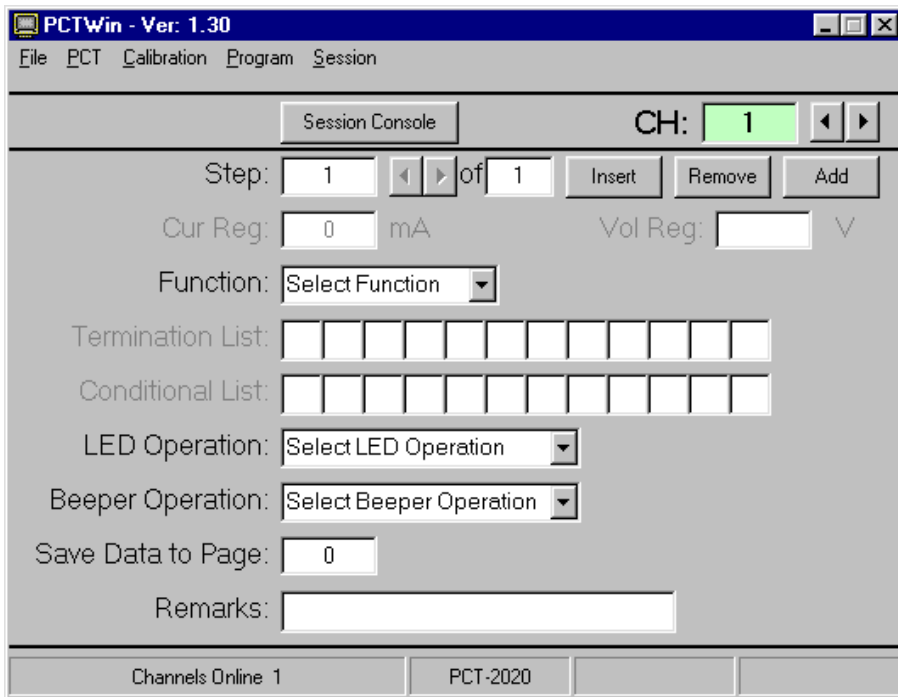
## **Main PCT window**

When this main window opens your PCT should automatically establish communications with PCTWIN. You will see this happening with a progress bar window as the initial communications proceeds. Once the initial communications is complete the PCT will then be *Online* and you can begin to work with the PCT. Note that when your PCT successfully goes *Online* you will hear a single beep from your computer and in the bottom left corner of the Main window you should see “Channels Online 1”.

If you see “Channels Online 0” then you are NOT connected yet. If this is the first time that you have tried to connect with the PCT then you probably have a problem

with your RS232 serial port at the PC. You need to ensure that your RS232 serial port is installed correctly on your computer. Check your Windows Control Panel – System for details on your serial port status. Ensure that you are using the correct COM port number.

You will be unable to communicate with the PC until you see “Channels Online 1”. Continue to investigate why your serial communications is not working until your are successful in getting Online.



This main screen displays the information for a single step of the PCT program. A PCT program will have many steps and you can scroll through the steps with the left < and right > arrow buttons. When the program first starts you will not have any program information open so the fields will be blank.

Buttons are provide for you to add, insert or delete steps as you proceed to build or edit your bp3 program file.

The following explains the various other items found on this screen:

**Step:** This is the step number current displayed. There can be anywhere from 1 to a maximum of 240 steps in a PCT program.

The PCT operates by moving from step to step as required. The routing is controlled by the program statements so that, as the PCT session proceeds, the PCT can be operating on any step at a particular time. There is not necessarily a linear progression. The program statements can cause the PCT to route to any defined step. So the PCT may move to a forward or backward step. It all depends on how the program statements are defined. You can loop back and repeat steps or jump forward. It all depends on how your bp3 program is structured. This is similar to any computer program. In fact the PCT acts like a computer running an operating system and you are programming the operation by setting the step parameters.

**Cur Reg:** This is the current that will be used for the selected charge or discharge function. If the Function is Discharge then the Cur Reg will be the actual discharge current. If the Function is Charge then the Cur Reg will be the actual charge current as long as the actual battery voltage is below the specified Vol Reg value.

**Vol Reg:** This is a voltage limit during a Charge step. If the battery voltage has reached this value during charge then the PCT begins to regulate on voltage rather than current. The actual current will be reduced as the battery demands. Normally SLA, Lilon & LiPO type batteries are charged at constant voltage with an initial current limit. In this case use:

Cur Reg= desired initial current limit

Vol Reg = desired voltage regulation value

For NiCd and NiMH batteries you normally want a constant current charge. In this case set Cur Reg to the desired current and Vreg to a value greater than the expected battery voltage. Usually you would just set Vreg to the maximum. Note that even if you do not want to limit voltage, you still need to set this value otherwise you will not get any charge current to flow. Remember the PCT is a FULLY programmable device. This means you have to set everything. The PCT does not know what battery type you are using so it cannot make any decisions for you. You must specify everything and ensure it is working as you expect.

The Vreg value is only required when the Function = Charge. It is not required if the Function = Discharge, Pause, Stop or IR test.

#### **Termination List:**

This is where you list which program statements you want to use as termination statements. Enter number from 1 to 32. These correspond to the program statements shown in the menu item *Program - Program Statements* . You assign one or more program statements to monitor the PCT during the step and cause a termination if the statement is true at any time during the step. Once the termination is generated the termination statement that cause the termination will define the routing and other details as defined in the program statement. If you hold your mouse over the statement number a help box will appear to show you the contents of the statement. You may need to move between steps to generate the message.

### Conditional List:

This is similar to the termination list in that you assign numbers corresponding to the same list of program statements that you have created in the menu item *Program - Program Statements*. However the difference here is that the program statements listed as conditional will not cause a step termination. The statements identified in the conditional list are only tested once a termination statement has caused a termination. These conditional statements provide for alternate routing of the program to different steps in the event that a conditional statement is also true when the termination is generated.

For example you may have 3 program statements defined:

- (1) If Voltage < 10 then Go To step 4
- (2) If mAH < 1000 then Go To step 8
- (3) If mAH >= 100 then Go To Step 12

You could list program statement 1 as a termination statement to stop the discharge when the voltage drops below 10V. Steps 2 and 3 could be listed as conditional statements to be tested once the termination occurs. In this case since either (2) or (3) must be true the program will route to either Step 8 or 12 and not Step 4.

**LED Operation:** This is used to define the operation of the LED's. There are many different possibilities here and they can be used to indicate what the PCT is doing at any time. You can have the Green or Yellow LED be: On, Off, Flash X number of times, alternate or blink at various rates. Through creative programming you can indicate any number of situations to a user. You will probably want to have some steps in your program specifically designed provide way of signaling to the user.

For example if the capacity is greater than 1000mAH you could route to Step 14 where the Green LED will be a solid ON. This might for example, indicate to the user that the battery measured greater than 80% of capacity. Other steps could have a flashing yellow LED to indicate a failure or some other fault situation.

Since there are so many combinations of LED usage it is possible to create a whole menu of different meanings. This will allow the user to be advised at any time about the progress of the session.

**Beeper Operation:** This is used to control the beeper. The beeper sounds a tone to signal the user that some condition has occurred. Again this can be: On, Off, Intermittent or sound X number of times. This is useful in the event that the operator is waiting for the session to complete. The user will be advised by an audible sound and avoid having to keep checking on the progress. This can greatly improve productivity.

**Save Data to Page:** Use this field to instruct the PCT where to save the operational information collected during the step. If you want to use the virtual console to display operational information, then you will need to program the console as part of your bp3 file. When the console is operating it will need to know

what data to retrieve for display purposes. The PCT saves step data in this designated memory page every time the step terminates. Then, in order to retrieve this information for display in the console, the computer software program will retrieve the data for the desired step.

If you plan on displaying saved results data on the console then you will want to avoid using loops in your program. Looping back will cause the new results data to overwrite the old results data. If this is your situation then just use a few more steps rather than looping.

If you do not require results data for the console then set the Save Data to memory page = 0. This means "Do not save step results" and will avoid using any memory. This is good practice. Do not save any more data than required. Please refer to the *PCT Programming Guide* for information on how the PCT memory is organized.

**Remarks:** Use this field to enter in a description of the step or for what purpose it is used. This remark will print out on the program listing when you print your bp3 file. This is very useful in helping you design, test and debug your bp3 file.

**CH:** If you have multiple PCT modules you can use these buttons to select which channel you want to use as the default module. There are several situations when you will need to switch the default to a different module. For example when loading a bp3 file into a PCT it will load into the default channel. When viewing the onscreen monitor or console the default PCT will be displayed.

### Menu: File - Open

Use this to open a bp3 file that you have stored on your computer. You may have a collection of bp3 files that you use at different times for different applications. When you need to use your PCT for a different task simply open the file and load it into the PCT. Look on our web site for a library of files that can be used with your PCT. Just remember to always verify that the PCT is operating as expected after loading in a new PCT. This is especially true, if it is the first time that you have used a particular bp3 file. See the safety message at the beginning of this guide. You will also need to open a bp3 file for modification, viewing and printing.

### Menu: File - Save

After you have created or modified a file you will want to save it for future use. Use this to save a bp3 file that is presently open using the same name and directory location.

### Menu: File Save As

Use this to save a new bp3 file that you are creating that has never been saved previously. You will need to specify the file name and location. You can also use this to save different versions of a bp3 file. You can open a file, make some modifications and then save the file with a new name without affecting the original.

### Menu: File - Clear Steps

This will clear the step data only and leave the other details intact. Sometimes it is useful to leave the program statements intact and just start to build a new bp3 file.

**Menu: File - Clear All**

This will clear the Step Data, Program, Statements, Battery Details & Memo

**Menu: File - Print**

This will print a bp3 file listing. It is sometimes convenient to have a hard copy of the file information. When you are analyzing the operation of the program and debugging this will prove invaluable. The printer used is the windows default printer in effect when the PCTWIN program was opened. You cannot change the printer after the program has been opened.

**Menu: File - Exit**

Use this to shut down the program. All file information that has not been saved will be lost.

**Menu: PCT – Read This First**

This is a safety message to users.

**Menu: PCT – Load Program**

Use this to load an open bp3 file into the PCT for use. As soon as the file is loaded successfully into the PCT the PCT will begin running the program starting with step 1. Note that the PCT must be connected and successfully online before you can perform a load operation.

**Menu: PCT – Restart**

This can be used to force the PCT to restart back at step 1. This is sometimes useful when writing testing & debugging your program.

**Menu: PCT – Vector**

This can be used to force the PCT to a particular step.

**Menu: PCT – Details**

This displays the Model No, Serial Number and Firmware Version of the default PCT. The PCT must be online to view this information.

**Menu: Calibration – Current Calibration**

The PCT is calibrated when shipped. However if at any time you want to re-calibrate the module this software tool will guide you through the procedure. To perform any calibration it is best to load a blank bp3 file first to avoid any complication from a running PCT program. Just load blank.bp3 to get started.

The wizard will guide you through the current calibration process required to calibrate the current measurements. To complete this calibration procedure you will need to connect a battery with a current meter in series. This will allow you to measure the current in and out of the battery. There are 4 input entries required. You should use a battery capable of being charged and discharged at full range current. Since there is no voltage regulation during current calibration you should use a NiCd or NiMH battery to run this calibration routine. A Lilon, LiPo or SLA battery could be damaged due to excessive voltage.

Validate that the current calibration has worked properly after loading a bp3 program by measuring the actual charge and discharge current with your current meter.

**Menu: Calibration – Voltage Calibration**

Again just load the blank.bp3 file and follow the onscreen instructions.

To complete the voltage calibration procedure you will need to disconnect the battery and connect a volt meter across the + and - terminals of the PCT. This will allow you to measure the output voltage of the PCT. There are 2 input entries required. A battery is not used for the voltage calibration procedure.

Validate that the voltage calibration has worked properly after loading a bp3 program by measuring the actual voltage with your voltmeter. This is especially important when charging Lilon, LiPO and SLA batteries at constant voltage. You do not want an over voltage situation..

After performing a new calibration you need to reload your PCT program. This is required for the new values to take effect. If you need to calibrate the PCT module to a particular standard or reference then these calibration software tools allow you to do this to your own quality standards.

**Menu: Program – Statements**

These are the program statements that control the flow of the program routine. You can list up to 32 however you do not need to use them all. They can be setup but still unused. The program statements are not used until they are assigned as either a termination statement or conditional statement in a particular step.

Please refer to the *PCT Programming Guide* for more information on how to use the programming statement.

**Menu: Program – Console**

Use this to program the virtual console. The console is a way to view operational information from the PCT as the program proceeds. Since each pb3 program is unique you will also need to program the console to display the information pertinent to your application. This is also a valuable feature because it adds to your ability to build your own customized battery testing system. The console is an 8 x 8 grid that can display up to 64 different fields of information.

When an online PCT has been programmed with console data you will be able to view the console. Use: *Menu: Session – Console* to open the console during PCT operation.

The console also provides the opportunity to print so that if you require a printed report of the PCT session then you will want to use the console. Since the printed report is an image of the various cells within the console you can design your print - out by programming the console as required.

Programming of the console is fairly straight forward & self explanatory. It will take you some time however to run, edit, debug and modify things until you get them just the way you want. There are a few things to consider as you set it up and once you get started you will want to adjust things. You can display: Titles, Real time Data, Saved Data as well as calculations that will print various messages to the user.

The console program details are saved as part of the bp3 file & loaded into the PCT when the program is loaded. This means that you can move the PCT around between computers and the console can be viewed on any computer. This will allow your other co-workers, service staff or customers to view the console if they require more display information than the LED/Beeper combinations provide.

If you want other personnel to be able to view the console but not have access to the full PCT program, you can open a *Console Only* version of the program by using a special command line input when starting the program. Create a desktop icon and then edit the properties to add the suffix **con** so that the target format looks something like: "C:\Program Files\pctwin.exe" con

### **Menu: Program – Details**

This is used to input additional details about the battery. These details will be saved in the bp3 file and downloaded to the PCT when the PCT is loaded:

*Battery Type – Rated Capacity – Rated Voltage – No of Cells – Program Author*  
This data is important because it is displayed on the console and printed in the console print out. The *Rated Capacity* is also required in order for the console to calculate and display the % of *Rated Capacity* .

Remember you need to label the PCT to advise users what battery type can be connected. This is important so that you and other users are always aware of what type of battery to connect. Since the PCT is programmable it can have different programs at any point in time. Connecting an incorrect battery can result in a dangerous situation since improper charge and discharge levels can result. Please review the safety message at the beginning of this guide.

### **Menu: Program – Options**

This is where you specify the Reset Step No and Vector Step No.

The Reset Step No is the step that will clear all results data from a previous session. The default is Step 1. When the Reset Step No is first encountered by the PCT it will clear all of the results data from the previous session. Things like Total time, Counters & Step results are all cleared.

The Vector Step No is the step that the PCT will route to when the rear push button is pressed. By specifying here, which step to move to, you can create some very clever programs that can, in effect, have the PCT perform two different functions. The user can then, at any point, direct the PCT to perform a specific task.

See the *PCT Programming Guide* for more information on using the Reset and Vector settings.

### **Menu: Program – Memo**

This allows you to enter text information that will actually be part of the bp3 file and downloaded into the PCT. This is useful information for yourself and other users about what type of program is currently loaded. This will also print on the bp3 file print so that you can add documentation to your program listing. See the *PCT Programming Guide* for more information on the allowable size and memory considerations for the memo.

### **Menu: Session – Console**

This will activate the virtual console in order to display the operational information about the currently running PCT session. This will only be available when the PCT is online and you are running a session using a bp3 file that contains console programmed data.

### **Menu: Session – Details**

Session information is only available when a PCT is online. Session details displays the battery details for the currently loaded program in the PCT.

### **Menu: Session – Memo**

Session information is only available when a PCT is online. Session memo displays the memo for the currently loaded program in the PCT.

### **Menu: Session – Monitor**

This will display real-time data about the currently running session. This is very useful when designing and debugging bp3 files. Since there is quite a bit of information displayed, you can get a good picture of what the PCT is doing at any time.

### **Menu: About**

This displays copyright details about the PCTWIN software application

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### Using a *Console Only* Version of the Software

If you are not going to be programming the PCT, but just want to view the console you can open a Console Only version of the software. You will still need to install the PCTWIN software on your computer.

You can then open a *Console Only* version of the program by using a special command line input when starting the program. Create a desktop icon and then edit the properties to add the suffix **con** so that the target format looks something like: "C:\Program Files\pctwin.exe" con

This is also good if you want other personnel to be able to view the console but not have access to the full PCT program.

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### Using the Optional Temperature Probe

If you are using the optional temperature probe you just need to plug it into the rear of the PCT module. You can attached the probe to a battery with tape. With the temperature probe you will have another termination and routing option. However for safety do not rely solely on temperature for termination. You should also plan to terminate charge on other parameters as well such as time, charge input etc.

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