



PLCOM

PL Series Software for Personal Computers Reference Manual

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1. Introduction

PLCOM allows a computer to communicate with the PL series solar power controllers.

PLCOM requires an IBM compatible computer running Win 95, 98 or NT and a mouse. A modem is required for communication over a telephone network.

PLCOM uses icons instead of text wherever possible. A text explanation of each main icon is displayed in the left section of the status bar, and in a bubble when the pointer is left still on an icon. When PLCOM is busy communicating, a timer will count down in the right section of the status bar.

2. Basic Functions

Exit - Allows PLCOM to be closed on Win95 computers, also displays the version number.

Language Selection - The language used can be changed by clicking Select Language and selecting the button of a flag. The font to be used can be changed at the bottom of this window.

Help - Opens this file.

Current State - Displays battery voltage, charge and load currents and amp hours and other information about the state which the controller is in now.

Historical Data - Displays the performance data logged each day by the PL (in graph form). Up to 4 selections can be displayed at once.

PL Settings - Displays and allows modification of the controller settings and calibrations.

Modem Setup - Used to set up the serial port for both direct and modem connection.

Dial Button - Used to dial up a remote location via the switched telephone network. When a call is in progress, the button changes color.

Save Data - Allows data to be saved or retrieved to a file. Can be used to mass program PL's.

Print Data - Allows the current data to be printed.

Periodic Save - Used to automatically poll a PL site and save the data retrieved.

Tools - Allows direct communication with the EEPROM and RAM in the PL. Do not use this unless you are really sure you know what you are doing.

LOG - Forces a periodic LOG to occur.

Status Bar - The Status Bar is the line of information

across the bottom of the main window. The panel at the left has a short description of the function of the control under the mouse arrow. The next panel has the date and time. The next two show the current serial port and baud rate. The panel on the right shows messages about the serial communication process.

3. Data Display Windows Current State, Historical Data & PL Settings

These are the heart of PLCOM. They display all of the information taken from the controller.

To re-read data from the PL, click again inside the desired data window.

Current State

This window shows the state of the controller at the present time. To reduce transfer times, the data is split into two sections. Clicking the diagram updates all the data in the diagram but not the green grid table. Clicking on the grid table will transfer the grid table information when required.

History Data

This window shows the past performance of the controller for the last 30 days in graphical form. Up to 4 different attributes can be shown at a time in different colours. Charge, Discharge, Voltage Max, Voltage Min, Float Time and State Of Charge (SOC%) are all transferred for each day. When new attributes are selected, the graph can be redrawn by pressing the 'Draw Graph' button. To turn off a colour, set the selection to 'Not Used'.

Day 1 is yesterday, and Day 30 is 30 days ago.

Settings

This window is used to display and adjust the values of the Control and Calibration Settings. The settings are grouped into 6 different pages depending on where they appear in the PL menu system. (Look at the back page of the PL reference manual, it is a very useful diagram.)

Clicking on one of the 6 buttons with text, will switch to a different page of settings. The two buttons on the right side are for sending changes to the PL. The window background goes red while data is being transferred.

SET :- Primary settings (Time, System Voltage, Program, Lockout, LOAD settings and current regulator state)

REG :- Regulator settings (bottom left of the PL Menu)

MODE :- Mode settings (bottom middle of the PL Menu)

EVNT:- Event settings (bottom right of the PL Menu)

GEN:- Generator settings (under CHRG in the PL Menu)

CAL:- Calibration settings (factory settings, leave these alone. Warranty void if these are changed.)

Changing a Setting

- 1) Click on the setting data to be changed. This will highlight the area.
- 2) Click again to remove the highlight, and edit the value as desired.
- 3) Press return. The single send button is now green, and the changed data is ready to send.
- 4) Click the green button to send the new setting to the controller. The button is red during send.
- 5) After the send, the user can click on the table to read back to the computer to check that the change has successfully occurred.

Only one most recent change will be sent by the single send button. The button in the far right corner allows PLCOM to program all the settings into the PL in one go. It's use is described in more detail in Saving and Programming PL Settings.

4. Saving Data to a File

The Save Data window has 4 checkboxes displaying the type of information to be stored, a filename edit-box and 3 buttons. A Save Data to File button, a Read Data from File button and a Save or Retrieve PL Settings button. The first two save data in a format to be read by humans, the third is for programming controllers and is explained in Saving and Programming PL Settings.

How to save a copy of the current data to a file.

- 1) Click on the Save Data icon.
- 2) Check the box of each data type that is to be saved. (If that data has not been read yet, then the check box is disabled)
- 3) Enter a filename (and path) in the space at the bottom of the window
- 4) Click the Save Data to File button.

The saved information has the date and time at the start of each record. When PLCOM saves, it adds the new data onto the end of the file if it exists already. To view the file, click the Read Data from File button or use a text editor such as word pad. The saved data can be printed from the view window.

Printing Data

Opening the Print Data window displays four checkboxes and a Print Data button. Click the desired boxes and press the Print Data button to send the data to the default Windows printer.

5. Saving and Programming PL Settings

All the current PL settings displayed in the settings window can be saved in a file. This file can then be read back, edited, and put into a new controller. The process is quick and easy.

Saving PL Settings

- 1) Successfully program the first PL.
- 2) With the programmed PL connected, click on PL Settings.
- 3) Click open the five Control Settings pages of PL Settings. The calibration data (CAL) is not needed and is not sent when programming.
- 4) Click the Save Data icon from the main window.
- 5) Click the Save or Retrieve PL Settings button. (looks like a Red arrow pointed at a PL).
- 6) The new window has 3 buttons, click to top one, Save PL Settings to a File.
- 7) A standard Save window is displayed, pick a location and a new name for your file.
- 8) Press the Save button.

Programming PL Settings from a file

- 1) Click the Save Data icon from the main window.
- 2) Click the Save or Retrieve PL Settings button. (looks like a Red arrow pointed at PL).
- 3) The new window has 3 buttons, click to middle one, Retrieve PL Settings from a File.
- 4) A standard Open window is displayed, pick the location and name for your saved file.
- 5) Connect a new PL.
- 6) Click PL Settings.
- 7) Check that correct data is shown. If Control Settings were already displayed, click a different page to update the display. Be careful not to load information from the new PL.
- 8) Click the Send all settings to the PL button. (It's the one on the right with a yellow arrow pointing at a PL)
- 9) A confirmation window is displayed, click the Send Now button.
- 10) The Send all settings to the PL button is now red. Wait for the timer in the status bar to count down, the Send all settings to the PL will go grey.
- 11) Disconnect programmed PL
- 12) Connect a new PL
- 13) Repeat from step 8)

6. Using Tools

The Tools window provides functions used in directly writing to the PL. PLCOM can read or write to any location in the PL ram or EEPROM. For example, reading PL ram location 48 will show the PL time.

The Loopback command enables the PLI (not the PL) to respond to a query from the computer. If the response to sending a loopback command is 128 then communication has been established as far as the PLI.

The Clear History command wipes all historical data from the PLs EEPROM.

The Test History command loads fake data into the history of the PLs EEPROM. This can be useful to test the Historical Data window.

7. Automatic Data Logging

PLCOM can automatically read data from the controller and save it into a file using the Periodic Save icon. The LOG icon at the right side of the main window can be used to force a LOG to occur.

- 1) Click Periodic Save
- 2) Check the Log Data Every box to enable the automatic data logging.
- 3) Use the up/down arrows to select the time between reads
- 4) Enter a file name for the data to be saved in. The number to the right of the filename is the number of hours remaining before the next read. Only the current state data is saved.
- 5) If the site must be dialled up via a modem, then check the dial up box and enter a telephone number to dial. Only one site can be set to automatically log.

8. Serial Communication Setup

To get a serial communication link to work, many parameters must be set up correctly. The PLI serial interface must be connected between the PL controller and the computer or modem. The PLI communicates at a fixed line speed with no hardware flow control. It does not include commands to handle modem setup. Hence, it is up to the computer end of the link to set up the communications.

8.1 Direct Communication

When the computer and the PL controller are close enough to allow communication without a modem, then the PL can be attached directly to a serial port on the computer. Use a standard serial cable such as

the type used to connect an external modem to a PC.

To communicate in this way, the serial port communication speed (baud rate) must be set to be the same as that on the PL. The data format is 8 bits, No parity and 1 stop bit. This is set automatically by the program. The PL does not use hardware flow control and so does not provide a drive for the RTS, CTS, DSR and DTR lines of a standard RS232 port. If the port will not operate without these lines being active, then tie CTS to RTS and DTR to DSR at the computer end to force them into an active state.

The port being used and the communication speed can be set up under the heading 'Direct' in the menu available under the modem button.

Select the fastest baud rate which will work. Slower baud rates may work better over longer distances.

8.2 Communication via a Modem

For longer distances, a modem is required to change the data into a form which is suitable for long distance transmission and to handle the dial up connection. One modem is required at the computer end and one at the PL end.

8.3 The PL End

The modem connected to the PLI must be configured to communicate with the PLI at the same baud rate as that set on the PLI. This is normally done by connecting the modem to a computer serial port and sending the modem AT commands to select the desired configuration. It MUST be done correctly otherwise it will not work.

By the way. There are two baud rates involved with any modem setup. The speed to communicate over the phone line with, and also the speed to communicate to the local device with. Here we are talking about the speed the modem uses to communicate with the local device (PLI).

Some modems do not have complete documentation on how to do this setup. The following information may help.

Almost all modems used now are 'Hayes compatible', which means that they recognise a standard set of commands preceded by the letters AT. This is complicated by the fact that different manufacturers of modems do not implement exactly the same subset of AT commands. General guidance is given here which applies to the chipsets commonly used in low cost 56K modems. This can mostly be applied to other modems, but sometimes a function is achieved by use of a different AT command. Read the manual supplied with the modem.

To set the correct modem configuration, connect the

modem to a computer serial port and use a terminal program to send commands to it. If you don't have a terminal program, use the simple one available from our website (called Terminal.exe). Set the port speed to be the same as the PLI RS232 interface will be set to. Send the command AT&V and the modem will send back its current configuration. When you send a command the modem will usually send back an OK if it is acceptable.

The required settings are:

1. Set the modem to autoanswer. This is done by setting register s0 to a non zero value. The value in s0 sets the number of rings before answering. To set 2 rings, send the command AT&S0=2. You can check the value in the s0 register by sending the command AT&S0=?.
2. Disable handshaking. This is done by sending the command string AT&K0
3. Select Asynchronous mode. Send AT&M0
4. Select Asynchronous direct mode. Send AT&Q0 (3 & 4 generally both do the same thing)
5. Disable DTR input. Send AT&D0 This is important - the modem may hang up on answer otherwise.
6. Set CTS on all the time. Send AT&R1
7. Set DSR always on. Send AT&S0
8. Stop the modem sending result codes to the PLI. This may cause the PLI to send error codes back to the modem which confuses the modem. Put it in the 'quiet' mode by sending ATQ1
9. Fix the modem line speed to the same as the PLI. This can be done by setting register s37. (Some manufacturers provide specific commands for this). The normal value of s37 is 0 which allows the modem to work out the line speed itself. This is not always reliable. It is better to fix the speed.

The settings are: s37=	3	for	300	baud
	4	for	1200	baud
	6	for	2400	baud
	9	for	9600	baud

For example, send AT&S37=6 to set the line speed to 2400 baud. This is important. If the line speeds don't match, the communication will be scrambled.

10. You can also disable command echo by sending AT&E0. This will stop the modem echoing back the commands you send to the modem.
11. Finally, save the configuration. This is done by sending AT&W0. (This loads the configuration into location 0. This is normally the configuration which will be loaded when the modem powers up. Many modems have two configuration stores. If the default configuration has been changed to 1,

then it can be changed back to 0 by sending AT&Y0)

When this is complete, test the system with the modem plugged into a PLI and connected to the phone line. Dial up the modem using PLCOM from the computer via another modem and check that the modem answers, goes online and that communication with the PLI and PL can be established. The loopback command in the tools window can be helpful in this debugging - see Using Tools)

8.4 The Computer End

In 32 bit versions of windows, modem control is best done using the TAPI services that are a part of windows. The user does not have to know anything about setting up the modem. In the modem setup window, the user can select TAPI mode by checking the box next to the TAPI label. If there is no TAPI device shown in the selected device window, then use the TAPI select button to open the 'Device Selection' box. (The name of the modem device may be in English) It is not necessary to select the modem port in TAPI mode.

On 16 bit versions without TAPI services, modems can be configured by sending the modem a setup string of AT commands. To not use TAPI, uncheck the TAPI box. When the TAPI box is unchecked, the modem setup string will be sent to the port number selected in the Modem Port box. The status panel will show a message if the setup is OK or not. The setup string sent to the computer end modem can be edited in the box at the bottom of the window. The modem commands available can be found in the manual for the modem. The string &K0&Q0&D0 works well on most modems. If the modem setup fails, it can be tried again by checking and then unchecking the TAPI mode check box. Do not enter the AT at the start of the command because this is added automatically by the program.

The communication speed (baud rate) selected by the computer must match the speed set on the modem unless it has an autobaud rate facility enabled. Here we are talking about the local comms speed between the computer and the modem, not the telephone line speed.

9) Dial Up Procedures

To dial a remote site via a modem using TAPI, follow these steps.

- 1) Ensure that the TAPI mode box is checked in the modem setup window.
- 2) Press the dial button to open the dial up window.
- 3) Select the phone number to dial from the phone number list or enter a number in the phone number box.

- 4) Press the dial up button to start the call.
- 5) When the call has been connected, the status display will show 'connected' and the dial button will change color.
- 6) Now press cancel to close the dial window and use the rest of the program as for a direct connection.
- 7) To finish the call, open the dial window and press the 'Hang Up' button. There is a short delay while the modem disconnects. When the call is disconnected, the message TAPI closed is displayed and the dial button returns to its normal color.

Up to 16 phone numbers can be stored in the phone list. Each phone number has space on the left for a name.

For a non TAPI call, uncheck the TAPI box and proceed as above.

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