



USER'S MANUAL
PDL3200

Portable Data Acquisition made easy!

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INTRODUCTION

The PDL3200 Portable Data Acquisition system allows the user to acquire data from a variety of sensors and devices. The system may be operated in conjunction with or independent from the PC.

The PDL3200 system consists of a Main Unit, Input Configuration Card(s), Windows™ Software and Accessories.

CONVENTIONS

This User's Manual uses the following conventions to help insure the effective and safe operation of the PDL3200:

Notes: Provide information that is important to understanding the operation of the PDL3200 and its software.

Cautions: Alert the user to conditions that could cause damage to the hardware being tested or the PDL3200.

Words that are *Italic* indicate software controls or specific terms defined within this manual.

SAFETY

Be sure to read the entire manual before using the PDL3200. This product is intended for use only by personell who have a thorough understanding of electrical principles.

CUSTOMER SUPPORT

Design Technology Services provides full support for the PDL3200 through our web site and via email.

www.portabledaq.com

GETTING STARTED

This section covers the steps needed to install the software and setup the PDL3200.

INSTALLING SOFTWARE

- 1) Save any data and close all applications.
- 2) Insert the CD into the CD-ROM drive.
- 3) If the SETUP program begins automatically, skip to step 6.
- 4) Click START on the taskbar and select RUN.
- 5) Browse to Setup.exe on the CD-ROM drive. Select OK.
- 6) The SETUP program will prompt the user as needed to complete the installation.

QUICK START TUTORIAL

- 1) Activate the Portable Data Acquisition program.
- 2) Select Help | Contents from the menu bar.
- 3) Select Quick Start from the contents menu.
- 4) Read the instructions and follow the steps in each frame.
- 5) Click the Previous & Next links to navigate the tutorial.

Now that you have completed the Quick Start Tutorial - read the next section Software.

SOFTWARE

This section expands upon the Quick Start Tutorial to cover fundamental operations of the PDL3200 software. It is recommended that you complete the Quick Start Tutorial before reading this section.

CREATE A PROGRAM

The key characteristics of **any** data acquisition program are:

Which inputs to sample.

When to take the first sample.

When to take the second..third..fourth sample(s)

And

How many samples to record.

The Program Editor TABs allow the user to answer the above questions. The answers are then used to automatically create an acquisition program.

Note: The Program Editor will not allow the user to set conditions which are invalid. Learning by clicking is recommended.

General TAB

Program Name-

Assign an arbitrary name to the program.

Card Type-

Select which card is being used.

Card Option-

Select from the available options for the selected card.

Last Modified-

Shows when the program was last modified.

Analog TAB

User Name-

Assign an arbitrary name to each input (up to 16 chars).

Type-

Select from the available types for each input.

CREATE A PROGRAM (CONTINUED)

Digital TAB

User Name-

Assign an arbitrary name to each input (up to 16 chars).

On/Off-

Select an input as being used or not used.

Trigger TAB

Immediate-

After initialization tasks are complete, the first sample is taken immediately.

Delay-

After initialization tasks, the specified delay will occur before the first sample is taken.

Clock In -

After initialization, a pulse on the Clock In input must occur before the first sample is taken.

Note: The initialization tasks typical require less than 50ms from when the *Run* mode is entered (see modes).

Samples TAB

Sample Interval-

This frame selects when the second sample and each subsequent sample will be taken.

Time Interval-

For sample periods \geq 1.0 seconds up to 8 hours.

Frequency -

For sample periods from 0.5 Hz (2 sec) to Max Frequency.

Clock In -

A pulse on the Clock In pin will cause a sample to be taken. Pulses at a rate above Max Frequency may not be processed by the unit.

CREATE A PROGRAM (CONTINUED)

Memory Management -

The PDL3200 has ~32,000 bytes of memory for storing data. Some data acquisition tasks may need only a small portion of the memory. By dividing the memory, the user may perform multiple acquisitions before returning to the PC to upload the data.

Divide -

Partitions the internal memory to allow multiple acquisitions. Security is automatically enabled when set for more than 1 acquisition.

Samples -

Select the required number of samples per acquisition.

Max -

Sets the samples per acquisition to the maximum based upon the inputs to be recorded and the *Divide* setting.

Run Time -

Shows the amount of time to complete the number of samples for an acquisition. This does not include any *Trigger* delay times.

Record Time-

When the *Sample Interval* is set to Clock In, this option is available. By selecting this option, the time between Clock In pulses is recorded along with the requested data..

Security-

By selecting this option, data can only be erased from the PDL3200 via the PC. See Operating Modes for further details.

Clock In /Out

Clock Out-

Enable the Clock Out output pin, select the active state (hi or low) and when the pulse is to occur.

Clock In-

Select the active edge for the Clock In input pin.

See the Synchronization section for more information.

COMMUNICATION

The PDL3200 communicates over the serial port. Some of the common functions are: send program, retrieve program, upload data, clear data, start an acquisition and stop an acquisition.

PROGRAMMING

After a program is created (or opened), click the “send program” button to load the PDL3200. The program does not need to be saved to disk first. The PDL3200 will internally store all aspects of a program.

To retrieve a program, click the “retrieve program” button. The program will be retrieved and automatically displayed.

Note: Sending a program to the PDL3200 will clear any data stored in the unit

ACQUIRING DATA

The PDL3200 can be started and stopped from the Main Unit controls or remotely from the PC (when connected).

To start a program remotely from the PC, click the “start acquire” button.

If the PDL3200 is running a program, a “busy” message will be displayed when trying to communicate.

To stop a program, click the “stop acquire” button.

Note: Starting, Running and Busy indicate that the stored program is being executed. However, this does **not** indicate if data has been or is currently being recorded (this is determined solely by the program).

HANDLING DATA

Data acquired by the PDL3200 can be uploaded to a File, to the Clipboard, or to the Quick Viewer.

File-

Select the “data to file” button. The user will be prompted for a file name for saving the data.

Clipboard-

Select the “data to clipboard” button. The data is automatically uploaded and placed onto the system clipboard. Next, click on the desired application and “paste” the data.

Quick Viewer-

Select the “data to quickview” button. The data is automatically uploaded and displayed. The Quick Viewer can display the “raw” data using a spreadsheet, digital data in a logic analyzer view, and analog data on a X-Y chart. The Quick Viewer "raw" data can also be “copied” onto the system clipboard and shared with other applications.

Note: The status of the PDL3200 and any warnings associated with the data can be retrieved by clicking the “status” button.

MULTI-METER

The PDL3200 can display all of the channels in real time when connected to the PC. Click the “Multi-Meter” button and the unit will automatically be configured. The Multi-Meter form shows the values for each of the channels and can be set for manual or automatic updates.

PC RECORDER

The PDL3200 can send data directly to PC for display and recording. The sample rate is slower, but the amount of data can be much larger than 32,000 bytes. Click the “PC Recorder” button to set the configuration options. Once configured, the *Quick Viewer* will be displayed with start, stop and erase controls.

HARDWARE

The PDL3200 system consists of the following hardware: Main Unit, Input Configuration Card(s) and Accessories.

MAIN UNIT

Analog Port-

This port has eight analog / digital inputs, three ground pins and +15 Vout pin.

Digital Port-

This port has eight digital inputs, one ground pin, a clock in pin, a clock out pin and +5V DC pin.

LED Indicator-

Indicates the current Mode (see Modes).

On / Off Switch-

Applies power to the unit.

Mode Button-

Provides the status and / or start a program (see Modes).

RS232 Connector-

Connects the unit to the PC via the RJ11 cord.

Battery Compartment-

Stores the 9V battery.

9V DC Jack-

Accepts power from the AC wall adapter.

INPUT CONFIGURATION CARDS

The Input Configuration Card (ICC) allows the Analog Port to be directly connected to a variety of sensors and signals. Typically, the first step in acquiring data will be to determine which Input Configuration Card to use.

Caution: Be sure to read the specifications and adhere to the limitations for each card prior to using.

ACCESSORIES

The PDL3200 standard accessories: AC Adapter, DB9 to RJ11 adapter, 4 ft. RJ11 Cord and a Terminal Block Insertion Tool.

MODES

The PDL3200 has four basic modes: *Ready*, *Run*, *Secure* and *Low Power*. The default mode, *Low Power*, is never indicated by the LED.

When the Mode button is pressed, the unit checks to see that all conditions needed to execute the program are valid. If so, the mode is changed to *Ready*. If the unit is incapable of executing the program the mode is set to *Secure*.

Once the *Ready* mode is entered, the user has 5 seconds to start the unit (*Run* mode) by pressing the Mode button a second time. If the button is not pressed within 5 seconds the unit returns to *Low Power* mode.

When the *Run* mode is entered the *Starting* indication is given. Then initialization tasks are completed and the acquisition program is executed.

The *Secure* mode is indicated (from *Low Power*) when the unit memory has data, the installed card is incorrect or the programming was incomplete.

If *Security* was not enabled during programming, data can be dumped from the unit by cycling power off then on and re-entering the *Run* mode.

Security is automatically enabled when the memory is divided into multiple partitions. The unit will provide a *Ready* indication until all partitions are filled. The unit will then enter *Secure* mode until cleared via the PC.

Note: Pressing the Mode button will never cause the unit to stop acquiring data. To prematurely stop a program, shut the power off or click the “stop acquire” button (when connected to the PC).

SECURING DATA

Even if *Security* was not enabled during programming, data can be “field secured”. After all data has been acquired, power the unit off and remove the card. The unit will not be able to overwrite the stored data when power is applied (an invalid card keeps the unit out of *Run* mode).

SYNCHRONIZATION

The main unit may be synchronized to multiple devices (including other PDL3200's) by use of the Clock In and Clock Out pins.

The Clock In pin allows other devices to direct the PDL3200 to perform an action, such as the following:

- 1) To start taking data (Trigger set to Clock In)
- 2) To take another sample (Samples set to Clock In)

The Clock Out pin may be used to signal other devices the following:

- 1) The first sample is about to be taken (Trigger Event)
- 2) Another sample is about to be taken (Each Sample)
- 3) The last sample has been taken (Acquisition Complete)

Caution: Never connect the Clock Out pin to an output pin of the main unit or any other device.

POWER

The PDL3200 can be powered via a 9V battery or through the DC Jack. A typical “alkaline” battery will provide approximately 32 hours of “Run” time for the unit (with no load on supply pins). A low battery indication is provided through software when approximately 5 hours of battery life remain.

The PDL3200 can provide power to other devices through two supply pins. The +5V DC pin comes from the main unit supply, current should be limited to 100ma. The +15 Vout supply is intended for use by current transducers, total current should be limited to 160ma.

The typical 9V battery will quickly degrade if loads are applied to the supply pins. Always use the AC adapter when supplying power to other devices through the supply pins.

POWER SEQUENCING

The input pins of the Analog and Digital Ports are passive. Once connected to other devices, the PDL3200 should be powered up first (before the device under test) and powered down last to avoid damaging the inputs.

DO'S AND DONT'S

DO

- * Use common sense. **STOP**, if you suspect that a certain setup or connection may damaged the equipment.
- * Always use an isolated power supply. The battery and AC wall adapter are isolated.
- * Clean the unit with a dry cloth and mild glass cleaner.
- * Check our website for the latest updates.

DO NOT

- * Connect the ground pins to different potentials (voltage sources). This can cause a high amount current to flow through the main unit.
- * Exceed the voltage rating for an Analog or Digital input pins.
- * Expose the unit to voltages above 28 volts.
- * Expose the unit to rain, high levels of moisture or excessive temperature (hot or cold).
- * Exceed 100 millamps of current on the +5V DC pin.
- * Exceed 160 milliamps of current on the +15 Vout pin.

WARNING MESSAGES

Each time data is acquired, the user must determine if that data is valid. Unexpected errors can occur and cause the data to be invalid. To assist the user in validating the data, the PDL3200 checks for certain conditions and issues warnings.

Note: A warning message does not necessarily invalidate the data.

Low Battery

Will occur when the battery has less than 5 hours of life remaining. The actual amount of time remaining will depend upon the type of battery, supply loads and the time from detection to reporting (typically the last *Run*).

Power Failure During One or More Acquisitions

Can be caused by the battery failing, the AC wall adapter losing power, disconnecting the AC wall adapter or turning the power switch off while the unit was in the *Run* mode.

Data Dumped From One or More Acquisitions

When security is not enabled the PDL3200 is allowed to overwrite data at the users request. A single or multiple overwrites causes this message occur.

Invalid Card ID Detected

Occurs any time the PDL3200 has power and the card inserted does not match the card specified by the Program. Also occurs if no card is inserted.

One or More Acquisitions Stopped via serial port

Occurs if the “stop acquire” button is pressed while the unit was in *Run* mode.

Invalid Program

Occurs if the transfer of a program is interrupted. Can be caused by a battery failure, DC adapter failure, turning the power off or disconnecting the serial cable before the transfer is completed.

Invalid Mode Detected

If an unhandled internal error occurs while operating this message will occur. Remove the unit from service and contact Design Technology Services technical support.

TERMS AND DEFINITIONS

Acquisition

The recording of one or more samples.

Analog

Signals that have an infinite number of distinct levels.

Digital

Signals that have only two distinct levels (hi & lo).

Input

The point for connecting a sensor or probe to the unit.

Running

The process of executing **any** portion of the program code.

Sample

A single recording of the selected inputs.

Starting

To begin execution of the program code. Does not always correspond to the taking of the first sample (see trigger).

Trigger

The conditions that are required prior to the first sample being recorded.