

## SECTION 1: DATA ACQUISITION SYSTEMS

### 1.1 Inputs

*Q: How many channels of data can the PowerLab collect?*

A: PowerLabs are available in 2, 4, 8 and 16 channel models. The LabChart software can collect up to 16 channels of data. If a 2, 4 or 8 channel PowerLab is used, then the remaining channels may be software derived (i.e arithmetic calculations).

*Q: Does the PowerLab provide hardware or software control of amplification/gain?*

A: There are no knobs or dials on the hardware. The software provides control over system gain and filters.

*Q: What is the range of input voltages that can be directly connected to the PowerLab?*

A: Input voltages may vary from +/- 10 Volts

*Q: Does the PowerLab have bipolar inputs, unipolar inputs or both?*

A: BOTH

### 1.2 Filtering

*Q: Is the PowerLab designed to work with frequencies from DC to 100 Hz?*

A: YES

*Q: Does the PowerLab permit band-pass filtering, e.g., 1 to 40 Hz?*

A: YES

*Q: Does the PowerLab have a specific 50/60 Hz main filter?*

A: PowerLab have adaptive mains filter to remove mains frequency noise.

*Q: Does the PowerLab filter signals with analog or digital filters? If digital, is the filtering done during collection or subsequently?*

A: There are analog filters within the hardware devices; however, they are controlled by the LabChart software. Digital filtering is also available using the LabChart software and may be done online (while recording) or post data acquisition.

### 1.3 Sampling Rates

*Q: Does the PowerLab have sampling rates that can be varied by the user?*

A: YES

**Q: What sampling rates are provided?**

A: 1 sample per: 2, 5, 10, 15 or 30 sec  
1, 2, 5 or 10 min  
1, 2, 4, 10, 20, 40, 100, 200, 400 Hz  
1, 2, 4, 10, 20, 40, 100, 200 kHz

**Q: Are the sampling rates varied specifically by channel?**

A: YES for both Macintosh and Windows

**Q: What is the highest sampling rate possible?**

A: 200 kHz on a single channel using High-Speed USB PowerLabs

**Q: What is the highest sampling rate possible with all channels collecting simultaneously?**

A: 400 kHz (aggregate) with High-Speed USB PowerLabs

## 1.4 Display

**Q: What is the resolution of the PowerLab A/D converter?**

A: 16 bit

**Q: During collection, does the PowerLab display digitized data (signals) on a monitor?**

A: YES. Up to 32 channels can be displayed concurrently.

**Q: Can event marks be displayed either in a separate channel or superimposed on a data channel?**

A: YES. They are also stored in a separate window that enables comments/events to be searched, deleted or edited.

**Q: Can the display show (either during collection or subsequently) the data prior to and after filtering?**

A: YES. The signal may be recorded with or without digital filtering options. The software may also be used to adjust digital filters before recording (ie select appropriate filters etc); however, in this mode the preliminary the preliminary data will not be saved.

Raw data may be copied to another channel and then the digital filtering applied on this second channel to avoid deleting the raw data.

**Q: Is the PowerLab designed to readily record event marks and use them as a trigger?**

A: YES

## 1.5 Equipment Interfacing

**Q: Does the PowerLab include, if desired, any special purpose transducers, e.g. blood pressure devices, special electrode arrays?**

A: YES. A wide variety of transducers, signal conditioners, electrodes and other accessories are available for teaching or research applications in:

- Psychophysiology
- Cardiovascular Physiology
- Respiratory Physiology
- Pharmacology (Isolated Tissue/Organ Experiments)
- Exercise Physiology
- Neurophysiology
- Sleep Physiology
- Electrophysiology & Cell Biology
- Biology/Biochemistry

**Q: Does the PowerLab interface with readily available PCs or Macintosh systems?**

A: YES. A PowerLab may be used with either a PC or Macintosh with both platforms having independent versions of LabChart software. PowerLabs are designed to connect to computers via standard connections i.e. High-Speed USB.

**Q: Does the PowerLab only work with a specific set of hardware amplifiers?**

A: NO. While ADInstruments provide a comprehensive range of amplifiers that may be controlled by LabChart software, third-party amplifiers may also be used. If third-party amplifiers are used then the analog output from these devices (+/-10V) may be connected to the input channels of the PowerLab.

## 1.6 Software Programming and Interfacing

**Q: Does LabChart use a proprietary data output format? If so, do you provide the data output format to the purchaser of your system?**

A: LabChart software operates using a proprietary data format that is not available to users. However, the data may be exported in various formats for use with other software programs. Data may be exported in the required formats for the following programs:

- Axon
- MatLab
- Igor
- QuickTime
- WAV
- PVAN

Data may also be exported as binary, EDF (European Data Format) or text files.

The programming code for LabChart is proprietary and not available to users. It is NOT open source code.

**Q: Can output from LabChart be readily imported into standard spreadsheet and/ or statistical programs? If so, which ones?**

A: In addition to the programs listed above, exporting data as text makes our program compatible with common statistical programs such as SPSS for Windows. Data may also be exported in Microsoft Excel (.xls) format.

**Q: Can the purchaser efficiently add special purpose routines or modify the functions of your programming code?**

A: NO. The program is not intended to require manipulation of the code. ADInstruments provide a range of software extensions and Modules to meet the analysis requirements of most life science applications. Our system is designed to be a complete and ready-to-use system suitable for use by researchers, teachers and students with minimal knowledge of computers.

## Section 2: Data Scoring/Reduction

**Q: Which of the following can be analyzed using LabChart & Scope?**

A:

EEG	YES
ERP	YES
Heart rate	YES
EKG	YES
Skin conductance	YES
Heart rate variability	YES
Blink Response	YES
EMG	YES

Other signals commonly measured with our system are:

- EOG
- Blood Pressure (MAP, Systolic, Diastolic, Ventricular)
- Cardiac Output (Small Animals)
- Non-Invasive Blood Pressure
- Force
- Displacement
- SpO2
- O2, CO2
- Respiratory Parameters (VT, f, VE, VI, PIF, PEF, FEV, RER, VO2, VCO2)
- Temperature
- Reflex and Reaction Times

**Q: Are the data displayed as they are scored?**

A: YES.

**Q: Is the scoring indicated on the screen graphically, numerically, or both?**

A: BOTH.

**Q: Can the timeframe for analysis be varied?**

A: YES.

***Q: Can the timeframe for analysis be time-locked or event-locked?***

A: YES

***Q: Can signals be further amplified after collection?***

A: A zoom function is available to enhance sections of data but further amplification is not available unless arithmetically derived.

***Q: Is the analysis displayed as a single channel?***

A: Depends on the application. While additional channels may be computed from raw data in other channels, specific plots i.e. Poincaré Plots, Cardiac Output curves, Metabolic Charts may be shown using different windows. Various software extensions and Modules provide additional windows and data display functions specific for an application.

***Q: Can the space a channel occupies on the monitor be adjusted?***

A: YES. Channels may be expanded both vertically and horizontally.

***Q: Does your system score latency from an event?***

A: YES

***Q: Does your system score signal maxima and minima?***

A: YES

***Q: Does your system record slopes of defined segments?***

A: YES

***Q: Please list other signal features that can be analyzed with your system.***

- A:
- Selection details (start time, number of samples, end time etc)
  - Statistics (mean, SD, SE, minimum, maximum, time at max/min, RMS etc)
  - Comments/Annotations
  - Slope (time at slope, maximum slope, minimum slope etc)
  - Integral
  - Differential
  - Frequency, Rate, Period, Average Max/Min etc

Further signal features can be analyzed with specific application Modules including:

- Blood Pressure
- Dose Response
- Peak Analysis
- Cardiac Output
- Metabolic
- HRV
- Spike Histogram (Neurophysiology)
- Video Capture (Records movies in synchronized time)
- ECG Analysis
- DMT Normalization (for wire myography studies)
- Circadian Analysis

***Q: Is a record of data editing retained?***

A: YES (with specialized Modules enabled)

***Q: Are data manipulation routines available, e.g. cumulating across trials, reorienting a matrix, etc?***

A: NO.

***Q: Are data transforms (e.g., log values, etc) available?***

A: YES.

***Q: Is there a graphical capability to identify outliers?***

A: YES (specific to application module)

***Q: Can scored data be readily imported to standard spreadsheet/statistical programs?***

A: YES

***Q: Does LabChart accept data in standard data formats, e.g. ASCII?***

A: YES