Logger *Pro* 3 Release Notes

Version 3.14

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System Requirements

Basic data collection or graphing, without video

- Windows 7, 1 GHz or better, 1 GB RAM (2 GB for 64-bit systems), available USB or serial port, Windows 8.1, or Windows 10 with 4 GB RAM (32 or 64 bit) with OS compatible hardware.
- macOS 10.10, 10.11, or 10.12 with available USB port.   We recommend that Mac users use 10.11 or better and upgrade their systems through Apple's software update on a regular basis for the optimal experience in using Logger *Pro*.
- Go Wireless Temperature (GW-TEMP) requires Windows 10 and a compatible Bluetooth 4.0 transceiver for the computer. Mac users of GW-TEMP requires 10.10 or 10.11 or newer; GW-TEMP is not supported on Mac prior to 10.10 nor on Windows prior to Windows 10.
- Logger *Pro* requires approximately 200/380 MB (Mac/Windows) disk storage. About 140/290 MB (Mac/Windows)additional temporary disk space is needed during the installation process; you should have at least 550/830 MB (Mac/Windows) free space prior to installation to allow the installation to complete successfully and retain some space for creating user files during normal use.
- Computer display resolution 1024x768 or higher is strongly recommended. Lower resolutions may result in important controls being hidden
- Data collection requires one or more of the following interfaces: LabQuest Stream, LabQuest Mini, LabQuest 2, LabQuest, LabPro, Go! Temp, Go! Link, Go! Motion, WDSS, GW-TEMP, Vernier Spectrometers including the Go Direct SpectroVis® Plus Spectrophotometer, Fluorescent Spectrometer, select Ocean Optics Spectrometers, Vernier GPS, Mini GC, Watts Up? Pro, OHAUS Scout Pro or Adventurer Pro balance.
- Previous releases of Logger *Pro* are available for special applications. Contact Vernier for more information.
    - Video resolutions less than 1024x768 are fully supported by Logger *Pro* 3.4.6 for non-video applications.

- Window 2000 is supported by Logger *Pro* 3.6.0.
- Windows 98 SE & Me are supported by Logger *Pro* 3.4.6.
- Mac OS 9 is supported by Logger *Pro* 3.4.2
- macOS 10.2 is supported by Logger *Pro* 3.4.5
- macOS 10.3 is supported by Logger *Pro* 3.6.1
- macOS 10.4 and 10.5 are supported by Logger *Pro* 3.8.5.1
- macOS 10.6 is supported by Logger Pro 3.8.7
- macOS 10.7 is supported by Logger Pro 3.9
- macOS 10.8 is supported by Logger Pro 3.11
- macOS 10.9 is supported by Logger Pro 3.12
- Windows XP and Vista are supported by Logger Pro 3.8.7
- Windows NT is supported by version 3.2.1 of Logger *Pro* 3. Windows NT does not support any USB devices.
- Windows 95 and Mac OS 8 are supported by Logger *Pro* 2.2.1.

Video Functions

- For video playback or extended data collection a faster processor and more memory are strongly suggested.
- Windows 7, Windows 8, Windows 8.1, or Windows 10 with DirectX 11 or newer and OS compatible drivers installed.
- Macintosh macOS 10.10 or better.
- User video files can be quite large and require substantially more disk storage space.
- For Windows: 2 GHz single-core processor or any multi-core processor and 4GB RAM, and at least 1.5 GB available hard disk space for temporary storage.
- For Mac: Intel processor and 2 GB RAM, and at least 1.5 GB available hard disk space for temporary storage.
- Routine video capture and storage will require additional disk space over time. High resolution movies will consume more disk storage very quickly.
- Screen resolution of at least 1024x768.
- Compatible camera with updated drivers for your target computer
- A minimal system may sometimes exhibit skipped, black, or duplicated frames in video. Faster systems will exhibit fewer such problems.
- Modern videos can be quite large and may exceed Logger Pro memory allocation. Reducing resolution and/or duration with conversion and editing tools suited to the purpose may be required for some video scenarios. Single movies lasting 15 seconds at 1080p should have no issues on modern systems; longer movies may need to be at a lower resolution for adequate performance. 4K resolution movies up to 30 seconds long have been shown to load and play on reasonably modern machines although the load time can take a few minutes

Go Wireless Temperature (GW-TEMP) (Bluetooth 4.0/BLE/Bluetooth Smart)

- For Macintosh, GW-TEMP requires macOS 10.10 or newer ; a Mac-compatible Bluetooth 4.0 radio (built-in or add-on).
- For Windows, GW-TEMP requires Windows 10 or newer; a Windows-compatible Bluetooth 4.0 radio (built-in or add-on)

Go Direct™

- Logger *Pro* currently supports the Go Direct SpectroVis® Plus via the USB interface only; Bluetooth connectivity is not supported.

- Logger *Pro* does not support any other Go Direct products; for Go Direct, please see http://www.vernier.com/products/software/graphical-analysis/

Wireless / Bluetooth with Vernier Wireless Dynamics Sensor System (WDSS)

- For Windows, WDSS requires Windows 7, Windows 8, Windows 8.1, or Windows 10 with the Microsoft Bluetooth Driver and a Bluetooth radio compatible with the installed driver (built-in or add-on radio). Certain "Widcomm" or "Broadcom" Bluetooth radios are supported. Vernier recommends using the Microsoft Bluetooth driver whenever possible for such radios; however, latest Broadcom drivers and radios have been shown to work with Logger *Pro*.
- For Macintosh, WDSS requires macOS 10.8.5 or newer ; a Mac-compatible Bluetooth radio (built-in or add-on).
- For recommended Bluetooth radios or other Bluetooth/WDSS related information, visit www.vernier.com/bthelp

Data Sharing

- For Windows, Data Sharing requires installation of Apple's Bonjour for networking support. Note that Bonjour Print Services may be inadequate for Data Sharing. You must install Bonjour as provided by the Logger *Pro* installer if you wish to use Data Sharing. The Windows installer does not install or enable Data Sharing by default; it must be selected during install from the Custom Setup. Data Sharing on Windows requires 1.2 Mb additional disk space.
- Enabling Data Sharing on Windows requires enabling the Windows firewall to allow the computer to communicate with the network through a designated communications port. When you first enable Data Sharing from within Logger *Pro* (via File>Data Sharing... pulldown menu in Logger *Pro*), the operating system will present a Windows firewall dialog that must be approved for Data Sharing to function on the Windows machine.
- Data Sharing users of Logger *Pro* should note the port number the server is using. This is particularly important for users attempting to communicate via the web application (via a URL in a web browser). You'll need to specify the port in the URL, e.g. http://myloggermachine.local:8080 where port 8080 is the port number specified in the Logger Pro Data Sharing dialog.
- For Macs, Bonjour is already installed on your machine. Data Sharing is installed by default but not enabled. Do NOT attempt to change the location of the Data Share installation. The above notes regarding enabling Data Sharing from within Logger *Pro* apply to the Mac as well; except that typically there is no need to configure the Mac firewall.

Install Notes

Vernier Data Sharing is installed on Macs by default but left disabled. Installation on Windows is optional through the installer's custom setup dialog. After installation on Windows, you must enable the function. The first time you enable Data Sharing on Windows you will be prompted by the operating system's firewall to allow the network port to be used for communications. If you specify a port differing from the default (8080), you should make note of it for all potential Data Sharing client users. If you change the computer's network, you may see the firewall prompt again.

Always first install Logger Pro before connecting any Vernier device via USB for the first time.

Logger *Pro* 2, Logger Lite, Graphical Analysis, LabQuest Emulator, and Logger *Pro* 3 will coexist on a single computer.

Logger *Pro* is supported in the following languages: Arabic, Czech, English, Finnish, German, Greek, Spanish, French, Italian, Dutch, Polish, Portuguese, Russian, Slovak, Swedish, Simplified and Traditional Chinese, Thai, Turkish, Ukrainian, and Korean.

There is an interaction between the Logger *Pro* installer and Texas Instruments TI Connect uninstaller. If TI Connect has been installed and subsequently removed, Logger *Pro* installer will refuse to run. To install Logger *Pro* 3 in this situation, first reinstall TI Connect 1.6 or newer. You can download an installer from http://education.ti.com.

Windows Network Installation/Remote Deployment

- An installer for Windows that does not prompt for user input is available by request. This is useful for remote or network managed installations of Logger *Pro*, as this silent installer (packaged as a .msi) can be caused to run on a remote computer via Group Policy or otherwise, and the installation will proceed. Installation on Vista and Windows 7 systems may require User Access Control (UAC) changes (temporarily) in order to complete the installation via the silent installer. Such UAC changes are ultimately the responsibility of the computer's administrator and/or network management tools. "Wininstall" and image based installers are not generally supported as device driver installations are necessary to work with Logger *Pro* and part of the install msi. Write to info@vernier.com for more information.
- Data Sharing functionality depends on Apple's Bonjour software. Apple's Bonjour software is not included in the silent installer for Windows. Windows machines needing to run Data Sharing MUST be installed using the full installer provided by CD or Web. Apple's Bonjour Print Services does NOT support Data Sharing.
- We do not recommend installing Logger *Pro* to a network location for shared access, because the necessary drivers will not be present on client machines.
- We do not recommend re-packaging a Logger *Pro* installation for remote deployment (as in Wininstall), because driver installation requires that a secondary installer execute at install time. Please use a Vernier supplied silent installer with your remote deployment tools to accomplish needed remote installation scenarios.

What's Changed in Logger *Pro* 3.14

New Hardware (Devices or Sensors) Support

- Fluorescent Spectrometer VSP-FUV

OS Support

Windows

W10, W8.1, & W7

Mac

10.12, 10.11, & 10.10

Significant Defect Resolutions

Fixed: Windows Update Installers disabled Go Wireless Temperature menu pick

Language Support

Ukrainian

Dropped OS Support

Dropped Hardware Support

none.

Logger *Pro* 3.14 Known Issues

LQ Stream Bluetooth Discovery and Pairing Consistency

Bluetooth discovery, pairing, and connection to the LQ Stream via BT is different on macOS and Windows.

LabPro Windows Driver Limitation

LabPro connectivity on Windows changed due to a driver change. As a result, Logger Lite and Logger Pro MUST be of the same "generation"; otherwise LabPro will fail to connect. Logger Pro 3.13 and Logger Lite 1.9.1 may be used together on the same machine. Logger Lite 1.9 and earlier are NOT compatible with Logger Pro 3.13. Likewise Logger Lite 1.9.1 is not compatible with any Logger Pro prior to 3.13.

Video Limitations

Large video files take a long time to load after a movie is inserted in a Logger Pro experiment. For example a 30 second 4k resolution (3840x2160) video is about 93 MB in size and takes about 4 minutes to load after the insert. Only the machine OS itself offers feedback that something is happening during this time. After the movie loads, playback is normal. Some machines may not play such movies smoothly

Ohaus Tare Operation Timeouts

Logger *Pro* reliably connects to select Ohaus balances; however, when using the "Zero" or "Tare" button on the balance itself, it is possible to inadvertently disconnect the device. This is particularly true if you are using a more sensitive Ohaus model and/or if the balance's environment is unstable (excessive vibration and/or noise). The issue is that the balance temporarily stops communicating while it stabilizes after the button depress; if this interval is sufficiently long (the balance has some difficulty stabilizing) Logger *Pro* believes the balance has been disconnected. If this occurs you may address the issue by reducing the vibration and noise in the environment

before depressing the balance's zero button, use Logger *Pro*'s toolbar zero button (which alerts Logger *Pro* prior to telling the balance to tare), or increase the timeout setting in UserSettings.txt (contact Vernier for more detail).

Disabling Auto Behavior

Logger *Pro* 3 can be configured to not automatically setup for collection based on the sensor connected in support of certain curricula; however, many devices do not yet allow "manual" setups. Examples include Spectrometers, Ohaus balances, Go!Temp, and Go!Motion. Only sensors which use the LabPro, LabQuest, LabQuest Mini, or Go!Link may be used in the manual setups.

LabQuest file Compatibility

Logger *Pro* 3.7 or newer can open most LabQuest files correctly. Data columns will be translated correctly. However, in some cases there will be errors in calculated column translation, breaking the data import. In most cases you can manually recreate the calculated columns in Logger *Pro* to recover the information or use fully supported equation forms in files meant for interchange between Logger *Pro* and LabQuest.

Similarly, LabQuest App can open many Logger *Pro* files when transferred to the LabQuest using the LabQuest Browser in Logger *Pro*. Elements not supported on LabQuest will be ignored, such as text annotations or movies. While LabQuest App does support calculated columns, the possible calculations are much more limited than in Logger *Pro*. As a result, some calculated columns will not be translated for use in LabQuest App.

LabQuest Device Compatibility

Logger *Pro* 3.12 can be used with LabQuest 1.0,1.1, 1.1.1, 1.2, 1.3, 1.4, 1.5, 1.5.1, 1,6, 1.7, 1.7.1, 2.0, 2.0.1, 2.0.2, 2.1, 2.2, 2.3.3,2.4, 2.5, 2.6, 2.6.1, 2.6.2, 2.6.3, 2.7, and 2.7.1 software. If a LabQuest with 1.0 software is detected, a warning will be displayed advising that the LabQuest unit be upgraded. This message will be displayed every time the LabQuest is detected, but the LabQuest can still be used for most applications. If a Logger *Pro* feature requiring newer LabQuest software is used, unexpected results such as freezing, crashing, or data loss may occur. Power Amp and Function Generator functionality is only available on version 1.3 of LabQuest or newer. We strongly recommend updating LabQuest to 1.7.2 or newer. LabQuest 2 hardware ships with LabQuest 2.4 or newer software. See www.vernier.com/labquest/updates/ for information on updates.

Windows 7

The behavior of USB devices after a computer sleep/wake cycle on Windows 7 may differ from prior Windows operating systems. For example an interface connected to Logger *Pro* (not actively collecting data) may lose the connection to the interface when the computer wakes from a sleep state.

Typically the computer enters a sleep state as the result of the computer's energy settings. When Logger *Pro* is actively collecting data the program prevents the computer from sleeping; however, if the interface is merely connected but not collecting, Logger *Pro* will allow the sleep cycle to start.

If your Windows 7 installation was installed fresh (not an upgrade from Vista) then you will likely see the interface fail to reconnect upon computer wake. Upgrades from Vista retain the Vista behavior and the interface will reconnect automatically upon computer wake. If you encounter problems with USB connected interfaces in Windows 7 upon a computer waking from sleep, it is recommended that you disallow sleep, disconnect interfaces

when done with active collection, or set the time to commence sleep well beyond the anticipated use of Logger *Pro* on that computer.

In the event an interface fails to reconnect, shut down Logger *Pro*, disconnect the interface, reconnect, and invoke Logger *Pro* again. The interface should then connect without a problem.

Logitech 4000 cameras are not supported; use Logitech 5000 model instead.

Uninstalling 3.8.4 from the control panel will complain about an unknown publisher. This does not affect upgrades from prior versions. To workaround the issue, simply ignore the unknown publisher warning and allow the uninstaller to remove Logger *Pro* 3.8.4 as desired.

Installing 3.8.6 on systems not connected to the internet AND not updated since October 10, 2010 by Microsoft update will complain about an unidentified publisher. The installer is signed; however, UAC will complain as the root certificate from VeriSign is outdated.

Mac

Proscope HR is recommended for Macs.

ProScope HR "B" model requires the latest ProScope HR driver from the vendor website (www.bodelin.com). Both Mac and Windows users should download and install the latest appropriate driver. Use of the ProScope HR in Logger *Pro* with outdated drivers will exhibit video "breakup" or "tearing".

Mac "forced sleep" will interfere with connectivity via USB to interfaces. Active collections with Logger Pro are not generally affected; however, if you are running Logger Pro on a laptop and close the lid, this will force the sleep and your data collection will be interrupted. If you intend a long duration collection, particularly with a long interval between samples, or you intend a long duration monitoring of sensor values without collection, we recommend you turn off sleep in the energy portion of the System Preferences.

Spectrometers

Although multiple spectrometers may be connected at the same time and used with Logger *Pro*, such use is not supported by Vernier. We recommend that only one spectrometer be connected at a time.

If you experience connection issues with the USB2000 or other Ocean Optics spectrometers after installing the latest Logger *Pro* and rebooting the machine (particularly on Vista), please run Windows Update to ensure that Vista is fully updated with all Microsoft's updates for the operating system and try connecting after updates are complete. Vista 32 bit systems that are not up to date with Microsoft's updates may exhibit connection problems particularly with the USB2000 unit.

Some computers may not supply enough current for Spectrometer lamps via the USB port connection. If you experience problems calibrating and suspect this may be the cause, contact Vernier for more information and reference TIL #2408. Eliminating USB extensions or unpowered hubs can eliminate some connection issues.

SpectroVis Plus can hang Logger Pro on Macintosh if the spectrometer is left connected as the machine boots. It is recommended that the SpectroVis Plus is physically disconnected from machines that will be shut down.

Logger Pro will report too generically, "Could not collect from Device", if the spectrometer lamp is weak or burns out. Please check that the spectrometer lamp is brightly lit while it is connected to Logger Pro if this message is seen.

GPS

At this time only Garmin devices are supported with the Garmin data transfer protocol. NMEA data protocols are not supported in 3.8.4. Only select Garmin units and the Vernier GPS devices are supported at this time; please see www.vernier.com/gps for supported models.

COM interfaces are shown for connected VGPS devices. Attempting to re-connect to a Vernier GPS (VGPS) manually via a COM port (after disconnection for whatever reason) will not yield a usable connection and may lock up or crash Logger *Pro*. If there is a need to reconnect to the VGPS it is currently required for you to use the Vernier GPS port designation in the Experiment>Connect Interface>GPS> menu.

VGPS connection to Mac 10.6 (Snow Leopard) mistakenly will display a networking dialog. Users of VGPS on Snow Leopard may simply cancel from that dialog and use the device normally in Logger *Pro*. VGPS is not supported on Yosemite 10.10.

Adventurer Pro

Pressing the "Unit" button on the Ohaus scale may lead to incorrect values being reported by Logger *Pro*. Use the Calibrate dialog in Logger *Pro* to set the units.

Watts Up? Pro

Although the device contains on-board memory and internally logs data values, Logger *Pro* does not support retrieving that stored data (remote data retrieval). To use the "Watts Up? Pro" device with Logger *Pro* you must collect data with the device connected.

Mac OS 10.8 & 10.9

Users of "Mountain Lion" or "Mavericks must use Logger Pro 3.8.6.2 or newer. Earlier versions of Logger Pro will not run on these newer versions of Mac OS.

Mac OS 10.9 & 10.10

10.9 energy management is more assertive. Mac Energy Saver preferences may interfere with Logger Pro's connections to interfaces or data collection. Logger *Pro* 3.9 and newer adjusts its energy demands on the Mac according to needs of the interfaces and/or data collection. With typical data collection rates for most devices and sensors, Logger *Pro* 3.9 and newer should not encounter any issue. Problems such as disconnected interfaces or interrupted long duration data collection may be avoided by either adjusting the energy saver preferences to avoid the computer suspending. If desired or necessary one may change the "App Nap" setting on the Logger Pro application file itself. For more information please see http://www.vernier.com/til/3190

General Issues and Suggestions for Logger Pro 3.13

- Currently you cannot insert the same movie in an experiment file (cmbl) more than once and have them share the same video analysis data set. Duplicate movies will have independent data sets.
- Calculated columns' equations based on two or more data columns measuring the same physical quantity (such as temperature) from sensor data collected using the LabQuest interface will not be preserved if saved as QMBL format and read by Logger *Pro*. For example, if you measure two temperatures with the LabQuest (standalone) and save a QMBL formatted file set with a calculated column which depends on those two temperatures, save, and reopen that QMBL formatted file in Logger *Pro*, the calculated column will not work as expected. The workaround is to re-create the calculated column in Logger *Pro*.
- Do not connect the USB cable to LabPro until it is powered and has given its start-up beeps.
- Computer sleep and energy settings may interfere with Logger Pro operation – particularly on newer operating systems and/or hardware that are more aggressive in energy conservation measures to preserve battery life. If you encounter interface disconnects and/or problems with data collection (particularly with slow or overnight collections, you may wish to experiment with different energy settings.Microsoft's Windows Update can cause overnight collections to be terminated due to rebooting. Suspend Windows Update temporarily when running overnight collections. Don't forget to turn Windows Update back on when you are finished with such long-term collections.
- Meters monitoring Drop Counter sensors will display the last point taken.
- System response time may increase when collecting a large number of data points.
- When using a Stainless Steel Temperature Probe remotely, the default calibration will be used. A custom calibration can be performed, but will be used only when the collection is done while attached to a computer.
- When updating the LabPro OS on multiple LabPros, do not disconnect a LabPro until after you click OK on the dialog box announcing a successful update. (LabPro OS updates from Logger Pro were removed as of Logger Pro 3.11 and newer.)
- User parameters cannot start with z.
- On Macintosh only, picture analysis may not work if the inserted image is a .pct file. To avoid the problem, convert to .jpg in an image editing program.
- OS 10.10 and later systems with a primary language set to something other than English impacts font selection dialogs. The default font is not selected or highlighted. Users may select other fonts without issue however.

File Compatibility

Logger *Pro* 3.14 can open files created in Logger *Pro* 3.0, 3.1, 3.2, 3.2.1, 3.3, 3.4, 3.4.1, 3.4.2, 3.4.5, 3.4.6, 3.5.0, 3.6.0, 3.6.1,3.7, 3.8, 3.8.2, 3.8.3, 3.8.4, 3.8.4.2, 3.8.5, 3.8.5.1, 3.8.6, 3.8.6.1, 3.8.6.2, 3.8.7, 3.9,3.10.1, 3.10.2, 3.11, 3.12, and 3.13. Logger *Pro* 3.14 can also open files created in Logger Lite (any version) and Graphical Analysis 3.0, 3.1, 3.2, 3.4, and 3.8.4.

Files created by Logger *Pro* 3.14 in general can be opened in version 3.3 through 3.13 , but if newer features are used in the file compared to the earlier version, it will not be fully functional. For specific limitations, see Specific File Issues below.

Files with movies in .mov (QuickTime containers) may not load properly in 3.12 and newer.. If the underlying codec is mp4 then movies may playback fine in 3.12 and newer on Windows. It may be necessary to convert movies in .mov format to use the .mp4 codec to ensure playback on Windows in 3.12 and beyond as QuickTime is no longer used by Logger Pro on Windows since Apple no longer supports QT on Windows.

Files created by Logger *Pro* 3.14 cannot be opened in Logger *Pro* 3.0, 3.1 or 3.2.1. Graphical Analysis cannot open any Logger *Pro* files.

Specific File Issues

- Files created in Logger *Pro* 3.14 containing calculated columns with the degree symbol or Greek micro (μ) in the column name will not open correctly in Logger *Pro* 3.3. To avoid the problem, remove the degree symbol or Greek micro character while in version 3.14 Or, in version 3.3, find the Â° or Âμ you see in the column name and remove the Â.
- Files created in Logger *Pro* 3.3 or earlier containing column names that use the pipe character (|) will not open correctly in Logger *Pro* 3.14. To resolve this problem, remove the pipe character from the column names while using Logger *Pro* 3.3 or earlier.
- Files created in 3.14 that include calculated columns referring to a specific data set will not open properly in Logger *Pro* 3.3.
- Logger *Pro* 3.14 continues to support auto-save files as a safeguard against unexpected interruption of data collection. Increasingly, experiment files can contain large numbers of samples that take a long time to save to disk. To remedy this in 3.6.0 or later, auto-save files are now saved in a new internal format allowing, for example, files that formerly took 40 seconds to save, take only one second to auto-save.
- Files containing cosine squared, Gaussian, or normalized Gaussian fits or models created in versions newer than 3.8.4.2 will not open or will not display such fits or models correctly in prior versions (3.8.4.2 or earlier). Files with such data should always be open in 3.8.5 or newer.

Logger *Pro* 3 Change History

Logger *Pro* 3.13

New Interface Support

LQ-STREAM Bluetooth Connectivity Support

New Hardware (Devices or Sensors) Support

Go Direct SpectroVis Plus Spectrophotometer (GDX-SVISPL)
Fluorescent Spectrometer VSP-FUV
OHAUS Scout® (newest hardware): OHS-222, OHS-123, OHS-422
LabPro driver on Windows updated to use WinUSB (see below)

OS Support

Windows
W10, W8.1, & W7

Mac
10.12, 10.11, & 10.10

Significant Defect Resolutions

Slovak experiments and support files translated / improved

Tab key clears your data in the table on Mac

Experiment File Changes

Physical Science with Vernier updates

35c Graphing Your Motion.cmbl

Middle School Science with Vernier updates

09 A Good Sock.cmbl
11 Solar Homes.cmbl
27 Magnetic Field.cmbl
33a Graphing Motion.cmbl
33b Graphing Motion.cmbl
33c Graphing Motion.cmbl
33d Graphing Motion.cmbl
33e Graphing Motion.cmbl
33f Graphing Motion.cmbl
34 Speeding Up.cmbl

Dropped OS Support

macOS 10.9 is no longer supported; Windows 10 or 8.1 is recommended for current Windows 8 users.

Dropped Hardware Support

None in this release; however, LabPro drivers have changed on Windows

Logger *Pro* 3.12

Video playback restored on Windows (without relying on deprecated QuickTime)

Separate Windows Updater / Installer

There are now two separate Windows Logger *Pro* installation files available. The installer does not prompt for a password, and is obtained from the user account section of vernier.com. The updater will only update an existing Logger *Pro* installation. The updater can be downloaded without login from vernier.com.

Experiment File Changes

- Experiments containing movies were changed to ensure they use .mp4 or other usable containing formats and codecs to allow Windows playback via Windows Media Foundation calls rather than QuickTime which was removed from Logger *Pro* in 3.11.

- Added "Physics with Video Analysis" to the published set of experiments in Logger *Pro*.

- Added "3 and 4-Point Testing" to the "Structures & Materials Tester" in "Probes & Sensors"

New Language Support

Slovak is now a supported language in Logger Pro.

Logger *Pro* 3.11

Sensor and Device Support

Go Wireless Temperature (GW-TEMP) (Only supported on Mac 10.10 or newer or on Windows 10 or newer)

LabQuest Stream Interface support added

GPS Support on Mac has been removed

Palm Pilot support has been removed

LabPro OS (firmware) update removed.

QuickTime installer for Windows has been removed from the installer

Experiment File Changes

- Added Solar Energy Experiment Files

- Updated Spanish Translated Experiments

Logger *Pro* 3.10.2

Significant Defects & Issues Resolved

LabQuest Mini connectivity to Logger Pro for Mac users of El Capitan (10.11) restored. El Capitan introduced some timing related issues that made the USB connectivity to the LabQuest Mini interface problematic for most, if not all users of El Capitan. Vernier recommends all Mac users install 3.10.2. Windows installations are unaffected and installations from the CD for Windows will continue to install 3.10.1.

Platform Support

Mac OS 10.11 (El Capitan) Support

Logger *Pro* 3.10.1

New Features

Weighted Curve Fits

Curve fits have been reimplemented, offering greater speed, more consistent results, and optional point weighting. Repeated parameters in custom curve fits are now allowed. Fits have been tested successfully against NIST standard curve fits. You can now optionally specify a weighting column for use in any curve fit. Weighting is direct, meaning that a point with a weight of two is counted twice in fit calculations.

Correlation Values for All Curve Fits

Correlations are calculated for all curve fits and displayed in the curve fit helper annotation for the fit. In the past this was only available on linear fits.

Export to plot.ly

Logger Pro data can now be exported to the Plotly online graphing service. An account is not required, but is recommended. An internet connection is required. See plot.ly for more information about the service.

Save to LabArchives

Logger Pro files can be saved directly to LabArchives. An account with labarchives.com is required. An internet connection is required. Logger Pro files stored on LabArchives can be retrieved. At this time accessory files, such as videos or images, are not automatically saved to LabArchive servers.

Significant Defects & Issues Resolved

Export CSV with maximum precision

Copy text from curve fit helpers

A number of crashes and asserts fixed.

Experiment File Changes

VSMT files in Probes & Sensors/Structures & Materials updated.

EKG files (Biology w/ Vernier, Human Physiology w/ Vernier, and others) updated to use filters.

Platform Support

Windows 10 Support

Provisional Mac OS 10.11 (El Capitan) Support

Sensor and Device Support

Sound Level Sensor (SLS-BTA)

Platinum-Cell Conductivity Probe (CONPT-BTA)

High Performance Gas Pressure Sensor (PS400-BTA)

Logger *Pro* 3.9

Platform Support

Macs running Yosemite (OS 10.10) are fully supported; as always, we recommend that machines be updated to the latest version of any supported version. OS 10.10.1 is current as of this writing

XP & Vista are no longer supported; see notes above for the final versions of Logger Pro for systems no longer supported.

Mac OS 10.6 is no longer supported; see notes above for the final versions of Logger Pro for systems no longer supported.

Significant Defects & Issues Resolved

Macs running Logger *Pro* on Yosemite (OS 10.10) with a non-English primary language will no longer crash due to an inability to find the system font.

Better support for Mac's "App Nap" feature enables a better user experience when connected to a Vernier interface via USB and when performing "long and slow" data collection. App Nap appeared first in Mac OS 10.9.

Logger *Pro* Data Sharing server reconfigured to support Chrome App clients. Chrome App clients (hosted on Chrome books or in Chrome browsers) could not properly communicate with Logger *Pro* Data Sharing sources due to a security setting in the web server embedded in Logger *Pro* prior to 3.9.

Sensor and Device Support

Support for the Vernier Structures and Materials Tester (VSMT)

Logger *Pro* 3.8.7

New Sensor Support

Vernier Energy Sensor (VES-BTA) including six new automatic setups for sensor combinations for temperature sensors, light sensors, and the anemometer..

Feature Changes

Support added for "raised dot" printers for Braille output

VES automatic detection with sensor combinations.

Uncertainty Boxes may be enabled from graph options.

Comma Separated Value (CSV) Import/Export handling of localized values using a comma as a radix separator

Significant Defects & Issues Resolved

Data Sharing component for existing installations now correctly updated by installation.

Data Sharing Web App updated to version 1.4 supporting IE 11 browsers.

Data Sharing display of scientific notation corrected.

An assert for a missing accessibility string corrected / avoided.

"Display larger text" for helper object text now provides a larger font.

Motion Encoder Cart can now be used with motion detector experiments.

Logger *Pro* 3.8.6.2

Operating System Support

Windows 8.1 is supported.

Mac OS 10.9 (Mavericks) is supported.

New Sensor Support

PAR-BTA, PAR Sensor

VSP-EM, Vernier Emissions Spectrometer

VSP-UV Vernier UV-VIS Spectrometer

VDS-EC Vernier Motion Encoder System

Feature Changes

Upgrades Data Sharing Web Application to version 1.3 now supporting use with Internet Explorer 10.

Updates to published Physics with Vernier experiment files.

Significant Defects & Issues Resolved

Greek Blood Pressure files fully translated.

Consistent CSV export / import localization support.

Data set order presentation from Data Sharing more consistent.

Better toolbar appearance in localized versions.

Logger *Pro* 3.8.6.1

Operating System Support

Windows 8 is supported.

New Sensor Support

ODO-BTA (Optical Dissolved Oxygen) is supported.

Feature Changes

Google Maps Export now uses version 3 of the Google Maps API. Large data set export has better capacity and rendering performance support.

Additional sensor supporting experiment files included for Goniometer (GNM-BTA), Vernier Projectile Launcher (VPL), and Instrumentation Amplifier (INA-BTA) in the sensor folder of experiments. The files support use of the

Goniometer in EMG experiments, the INA with high and low pass signal filtering, and the Time of Flight experiment with the VPL.

Significant Defects & Issues Resolved

Most often used dialogs with numeric fields now validate user input immediately rather than after the dialog is closed preventing invalid inputs and more timely feedback.

DCU dialog now may be entered without connected sensors for improved usability and user experimentation.

Improved Data Sharing performance for some scenarios.

Numerous Video Capture defects resolved.

Better defaults for wavelength range and other spectrometer settings for SpectroVis line of spectrometers.

Zeroing two or more sensors no longer causes sensor re-initialization.

Over 150 other issues resolved.

Logger *Pro* 3.8.6

Operating System Support

Windows 8 is provisionally supported. Logger *Pro* 3.8.6 has been tested with pre-release versions of Windows 8 and no significant issues have been found.

Mac OS 10.8 (Mountain Lion) is supported. Logger *Pro* 3.8.6 has been tested the released 10.8. Full Screen mode is supported. Gatekeeper will identify the installer package and executable as authored by Vernier Software & Technology.

New Features

Enhanced DCU control to support STEM activities.

Digital Filtering (reduce noise in sensor data)

Optional Support for Vernier Data Sharing (as part of Vernier's Connected Science System®)

New Sensor Support

Ethanol Sensor – allows experiments in anaerobic respiration.

Pyranometer – supports measuring solar radiation in Watts / Meter Squared

Danish, Finnish, and Turkish are now available for Logger *Pro*.

Logger *Pro* 3.8.5.1

Significant Defects & Issues Resolved

Logger *Pro* 3.8.5.1 corrects regressions in behavior introduced by 3.8.5 for LabPro users doing repeated collection runs with some sensors, or in some instances simply stopping the collection using the LabPro.

. In 3.8.5, repeated collections with digital sensors (Radiation Monitor or Drop Counter) plugged into the LabPro would drop the connection to the sensor or sometimes the LabPro at the end of a collect. This defect also would cause a minor live readout glitch with the LabPro and the Dual Range Force sensor where spurious readings were visible after the collection ended. And lastly, some Motion Detector configurations and usage patterns could cause problems with the live audio feedback clicks from the Motion Detector. All of these issues stemmed from a single defect in 3.8.5 and are corrected in 3.8.5.1.

Logger *Pro* 3.8.5

New/Changed Device/Interface/Sensor Support

- LabQuest 2 is first supported.
- LabQuest Mini Firmware Upgrade to 1.85 for better support of Chemical Polarimeter, Diffraction Apparatus, and Projectile Launcher released after the initial release of the LabQuest Mini.
- Diffraction Apparatus

New Language Support

In addition to the prior 13 languages, 2 additional languages are now supported:
- Swedish
- Greek

Logger *Pro* 3.8.4.2

New Device/Interface/Sensor Support

- Supports new Chemical Polarimeter (CHEM-POL)
- Supports Constant Current System (CCS-BTA)
- Supports new Projectile Launcher (VPL)

- New cosine squared curve fit

Significant Defects & Issues Resolved

- Ohaus balance connectivity made more reliable and deterministic.

New Computer Operating System Support

- Mac OSX 10.7 (Lion) Supported

Logger *Pro* 3.8.4

New Device/Interface/Sensor Support

- Improved WDSS Bluetooth Support – newer Broadcom (Widcomm) Bluetooth radios support.
- Supports new Anemometer
- Supports new Melt Station
- Supports new 30-V Voltage Probe

New Features

Data Marks / Tags

Data Marks enable annotations of data events during a time-based data collection. Data Marks are associated with the actual data cell(s) taken at the user selected time during the collection. Such markers might for instance be associated with a change of phase during a melting session with the new Melt Station or any other sensor where you may wish to note an event during the collection. Press the <d> key during a data collection places a Data Mark and displays an associated helper box for further use. Double-clicking the associated helper box allows you to enter text associated with that mark.

Data Tagging enables annotations of a specific sample or ranges of samples after a collection or for collections utilizing non-time-based modes. Similar to Data Marks, Data Tagging can associate additional information with specific samples. To tag a sample or range of samples, select the sample or range from the graphed data and then press the <d> key. You may also select a data sample range from the data table if you wish.

Note that Data Markers and Tags are distinct from text annotations in that the Mark or Tag is associated with a distinct sample in the data table and not just a location on a graph as is the case for text annotations. Use Data Marks as part of a time-based collection during the collection. Use Data Tags after a collection. Data Marks may be distinguished by a small black triangle rendered at the top right of the "helper" box.

Data Marker/Tag text may be entered by double-clicking on the marker "helper" box and entering desired text in the provided field.

Video Analysis Enhancements

More video analysis options are available. Video frames may be skipped while adding points. The first point marked may set time zero. Center of mass studies can be done with video analysis.

Other Changes

The Logger *Pro* Windows installer has been rewritten to better support international or second language installations, enable better Windows support of Broadcom based Bluetooth radios, enable better installer behavior when the same or newer version of QuickTime is already installed, rectify some driver issues that plague some XP installations, and provide MSI based "silent installation" for improved remote/network managed deployment usage.

Czech, Dutch, and Polish were added as supported languages.

Logger *Pro* 3.8.3

New Device/Interface/Sensor Support

- Latest VGPS devices (MTK) Support
- Ocean Optics Spectrometers supported on Windows 7 and Vista 64-bit operating systems.
- Drop Counter Automatic Configuration Feature Added

Other Changes

For the first time both English and international versions of Logger Pro 3 are concurrently released. English users in most cases will not notice any difference. However, if an English user wishes to enable one or more available alternate languages such as Spanish or French along with English it is relatively simple to do so by creating additional desktop shortcuts that specify a "/Lang" parameter to the Logger Pro 3 executable. For example, Spanish Logger Pro 3 on an English system may be enabled via a copy of the regular desktop shortcut and adding " /Lang=es" to the Target line in the shortcut. – contact Vernier for more information.

Current international users will enjoy more timely and seamless support of their native language on their choice of Windows operating systems (International Logger *Pro* 3 is not supported on macOS) International users wishing to also access the English version (or other installed languages) of Logger *Pro* 3 on their native systems may do so by creating an additional shortcut(s) as above (e.g. "/Lang=en" for English). Logger *Pro* 3.8.3 replaces all prior versions of Logger *Pro* International.

Graphing optimized for user entered data when no interface is connected; no connecting lines are drawn and the scale is set to 0 to 10.

Logger *Pro* 3.8.2

New Device/Interface/Sensor Support

- Vernier LabQuest Mini (see the Vernier website for more information: http://www.vernier.com/lqmini)
- SpectroVis Plus

- Windows 7 64-bit operating systems support.
- Mac macOS 10.6 (Snow Leopard) support.

Other Changes

The location for Experiment templates and examples is changed for 3.8.2 to mesh with operating systems providing a "Common Application Data" location and avoid problematic automatic Windows behavior like "Shadow Copies" resulting from Logger Pro writing to "Program Files" routinely outside of the installation process. As a result, first time opens will default to the Common Application Data location (which varies by Operating System) for access to the provided Experiments. New users of Logger Pro will not notice this change; however, long time users of Logger Pro will no longer find the "Experiments" folder in the "Program Files" or "Applications" folders. The new locations are:

- /Library/Application Support/Logger *Pro* for macOS
- [Startup Drive Letter]:\Documents and Settings\All Users\Application Data\Vernier\Logger Pro 3\{language code} for Windows XP
- [Startup Drive Letter]:\ProgramData\Vernier\Logger Pro 3\{language code} for Vista & Windows 7 systems

For the convenience of long time users of Logger *Pro* 3, an alias or shortcut that points to the "Experiments" folder may still be found in the "Program Files" or "Applications" folder.

Logger *Pro* 3.8

New Device/Interface/Sensor Support

- Vernier Mini GC (see the Vernier website http://www.vernier.com/probes/gc-mini.html for more information)
- LabQuest Function Generator (with LabQuest 1.3)
- LabQuest Power Amplifier (with LabQuest 1.3)
- Vernier VGPS-PL
- Watts Up? Pro

Windows 7 & Mac macOS 10.6 OS Provisional Support

Logger Pro is now provisionally supported on Windows 7 32-bit and 64-bit OS and macOS 10.6 (Snow Leopard) Note that 10.6 is only available on Intel architecture Macs. Logger Pro 3.8 was tested on pre-release versions of both Windows 7 and macOS 10.6 and found to be compatible. It is possible however that final released versions of these operating systems from Microsoft and Apple could introduce changes from the pre-released versions tested during Logger Pro 3.8 development and evaluation that could be detrimental to Logger Pro 3.8's operation. Windows 7 and macOS 10.6 users are cautioned to perform their own evaluation of Logger Pro 3.8 on the released versions of these operating systems prior to committing to any large scale deployments of Logger Pro 3.8 on these new operating systems.

New Features

- Peak Area Measurement (Peak Integration) When you choose Peak Integration from the Analyze menu, a dialog will be displayed. Use the graph in the Peak Integration dialog to select the left and right boundaries

of the peak you want to integrate. You can auto-scale, zoom in, and zoom out using the buttons. This feature primarily supports the analysis of chromatographs from the Vernier Mini Gas Chromatograph (GC)
- Function Generation with connected 1.3 LabQuest. To set up the Function Generator, open the LabQuest sensor dialog by clicking the LabQuest icon in the toolbar or choosing Set Up Sensors > LabQuest from the Experiment menu.
- Power Amplification with connected 1.3 LabQuest and Vernier's PAMP. To set up the Power Amplifier, connect PAMP to LabQuest and then open the LabQuest sensor dialog by clicking the LabQuest icon in the toolbar or choosing Set Up Sensors > LabQuest from the Experiment menu.

Significant Defects & Issues Resolved

In prior releases, unplugging devices would not remove them from the Live Readout bar under some conditions. This could confuse some users that did not always carefully disconnect and connect devices at the beginning and end of Logger Pro sessions. Device signatures from the low level API were corrected to match what Logger Pro expected in these cases so that the confusing behavior no longer occurs.

In 3.7, VGPS users of Logger Pro in the eastern hemisphere could encounter longitudes that were incorrectly signed. Such users would have to introduce calculated columns to correct the sign prior to using such data. Logger Pro 3.8 corrects this error.

Using a heat pulser (HP-BTD) with the 1.2 LabQuest interface attached to Logger Pro 3.7 did not work. Using a 1.3 LabQuest interface with Logger Pro 3.8 corrects issues with the heat pulser via the LabQuest interface. LabPro users are unaffected.

LabPro users attempting to upgrade LabPro firmware with Logger *Pro* 3.7 "over the wire" firmware updates would fail with an assert. The issue is corrected in Logger *Pro* 3.8. Note that upgrades are enforced for LabPro firmware older than 6.26. (LabPro firmware updates were removed from Logger Pro 3.11 and newer.)

Logger *Pro* 3.7

New Device/Interface/Sensor Support

- LabQuest 1.2 devices are fully supported including sensor support for wide range temperature, heat pulser, and DCU
- Vernier GPS Device

64 bit Vista OS Support

Qualified and signed 64 bit Device drivers for LabQuest and LabPro interfaces are now available. The Logger *Pro* installer automatically installs these new drivers enabling full support of Logger *Pro* functionality on this 64 bit operating system.

Better Date & Time Display

Date and Time display on graphs is improved, providing better user feedback and the ability to plot time-based data in much more meaningful and useful ways.

Improved GPS Functionality

- Signal strength indication for VGPS devices in Live Readouts.
- Ability to select coordinate units (decimal degrees, degrees + minutes, UTM)
- Better automatic data columns based on collection mode / sensor configuration.

Changes in Auto Behavior

- An entry in the usersettings.txt file, "IDSX_MANUAL_SENSOR_CONFIG" may be used to specify if automatic setup of sensors should be turned off to support curricula that have students perform setup for data collection, etc.
- The usersettings.txt is found in the Vernier installation folder; you may find this in typical installations under your Local Disk C: > Program Files > Vernier Software > Logger Pro 3 > en-US > Support > Usersettings.txt.
- In the Usersettings.txt file find the IDSX_MANUAL_SENSOR_CONFIG entry and change the value to "1" to enable the manual mode.

Installer Packaging Improvements

The Windows installer has been migrated to use a MSI package which supports easier deployment by IT personnel to multiple computers by scripting. Contact Vernier for more information.

Significant Defects & Issues Resolved

- Fixed: Multiplication in LabQuest calculated column fails to transfer to LP
- Fixed: Leaving LabQuest Interface window displayed in Logger *Pro* will cause interface disconnects.
- Fixed: cannot correctly zero a motion detector when using LabPro

Other Issues Resolved in 3.7

- Fuller set of calculated column equations supported in Logger *Pro* / LabQuest data exchanges.
- Improved LabQuest remote setup.

Logger *Pro* 3.6.1

New Device/Interface/Sensor Support

- LabQuest 1.1 devices fully supported including sensor support for radiation and rotary motion
- Support for LabQuest 1.1 internal microphone

New Icon

Logger *Pro* 3.6.1 features new icons for the application and documents. The new icons are related to new icons used in Logger Lite 1.4.

Significant Defects & Issues Resolved

- Crashes with WDSS when used with WIDCOMM Bluetooth driver

Other Issues Resolved in 3.6.1

- Clarified wording in Remote Data Retrieval dialogs

Logger *Pro* 3.6.0

New Device/Interface Support

- LabQuest devices supported (Note: International users (3.6.0i) may encounter specific file interchange issues , see LabQuest 1.2 or 1.3 notes at the end of this document.)
- New SpectroVis Spectrometer supported
- Global Positioning System (GPS) devices supported on Mac.

New Program Features

- Auto-saving during collecting is significantly faster.

Significant Defects & Issues Resolved

- Improved reliability during sensor confirmation and LabPro firmware updates.
- "Rough and slow graphing" on Macs displaying pixel ratio resolutions other than 1:1.

Other Issues Resolved in 3.6.0

- On Windows, the installers now install a version (7.2) of QuickTime supporting Vista computers.

Logger *Pro* 3.5.0

New Computer Operating System Support

- Windows Vista is supported on Vista compatible hardware. LabPro drivers are signed for Vista.

New Device/Interface Support

- Logitech 5000 camera for video capture.
- Garmin GPS receiver models GPSmap 60CS and GPSmap 76S.
- New Vernier CO_2 sensors with selectable range.
- Vernier and Ocean Optics Spectrometers are now supported on Intel Macs.

New Program Features

- Improved axis based zoom in/out on graphs; uses and extends the "stretchy axis" concept.
- Mac allows customization of the toolbar to suit user preferences.
- Mac User Interface conforms much more closely to Apple Human Interface Guidelines and thus should be more similar to other Mac applications. Mac Logger *Pro* text handling now has access to more of Mac native text handling and features.
- Numerous spectrometer connection and functional improvements. Connection/disconnection is faster and connection does not require a separate scan operation. Peak resolutions are generally cleaner and noise is diminished. Calibrations may reliably take advantage of averaging.
- Automatic graph match exercise creation feature. Access in Settings for (file-name) in the File menu.
- Empty Latest data sets are now hidden on remote data retrieval.
- Movies can now be swapped without altering video analysis environment.
- Global, as opposed to per-user, preferences.
- Sensor confirmation dialog now allows connection of WDSS.
- Additional picture and movie file types available in Mac insert picture/movie object open dialogs.

Significant Defects & Issues Resolved

- Macintosh long-term data collection spanning more than 3 days is more reliable.
- Curve fits no longer require sorting data.
- Numerous graphics and print issues.
- Spectrometer calibration more robust.
- Improved stability during drop counter calibration.
- Improved reliability during sensor confirmation and LabPro firmware updates.

Other Issues Resolved in 3.5.0

- Radiation monitor and events with entry or selected events again works.
- Removed some limitations on columns choice for horizontal axis.
- Allow simultaneous heart rate monitor and blood pressure measurement.
- Restored robust movie file location search feature on Macs.
- User parameter units no longer lost.
- Data Pro Hot-sync from Palm on Mac again automatically retrieves data into Logger *Pro*.

Logger *Pro* 3.4.6

New Computer Hardware Support

- Intel Architecture Macintosh computers are supported natively for the first time in Logger *Pro* 3.4.6 through the new Apple Universal Binary.

New Device/Interface Support

- IR Temperature Probe
- Garmin GPS USB interface initially supporting GPS Garmin Models Vista Cx and GPSmap 76S

- WDSS WIDCOMM interface (alternate Bluetooth driver) for increased Bluetooth configuration options on Windows. Note: Vernier strongly recommends using Microsoft's Bluetooth drivers on Windows XP SP2 whenever possible.

New Program Features

- Time Offset option for curve fit
- Import Logger *Pro* experiment files; combine several students' results in one Logger *Pro* file.

Significant Defects & Issues Resolved

- Keyboard Triggers now work properly
- WDSS repeat remote setup no longer loses trigger setting
- GO!Motion dialog for keeping remote data on device is no longer missing
- Eliminated assert on video analysis WUtils.cpp when user deletes the time column
- Improved tracking of multiple objects in video analysis

Logger *Pro* 3.4.5

New Device Support

- Spectrometers powered by Ocean Optics (XP, Windows 2000, macOS 10.3.9 or newer)
- Wireless Dynamics Sensor System (WDSS) (XP SP 2, macOS 10.3.9 or newer)
- Global Positioning Satellite (GPS) Receivers by Garmin (Windows only)
- Adventurer *Pro*
- Soil Moisture Sensor
- Digital Video compatible cameras and devices.

New Program Features

- Log Graphs (Single and Double Y Axis)
- Point and Click video / data synchronization
- Full spectrum mode, and visible spectrum graphing with Spectrometers
- Data synchronization with multiple WDSS devices (facilitates dynamics experiments that were problematic in the past)
- Export Latitude / Longitude with other data annotations as a Google Map
- Electrophoresis Gel Analysis
- Interpolation Calculator
- Photo Distance Object
- Auto resizing text annotations

Significant Defects & Issues Resolved

On Windows systems, Logger *Pro* files on read-only media (CDs etc) would fail to open due to a low level Microsoft defect. This has been corrected and Logger *Pro* now opens these files successfully.

Data synchronization with multiple sources is much improved and more consistent.

Logger *Pro* 3.4.2

International

Logger *Pro* 3.4.2 provides an upgrade path for 3.2.1 international users. International users should examine release note entries below for versions since 3.2.1 to gain an understanding of what has changed from 3.2.1 to 3.4.2.

Silent Installation

Logger *Pro* 3.4.2 provides and allows a silent install option for system maintainers of a large collection of machines for English only. For more information on the silent install option, please contact Vernier Software & Technology.

Issues Resolved

Over 80 issues were addressed by 3.4.2. The following list reflects some of the more notable issues resolved.

- Curve fits no longer fail when columns have single Greek character short column names.
- The correct curve fit now loads on opening all files saved with curve fits in versions before 3.4. This only affected saved curve fits after the polynomial fit in the curve fit menu.
- Removed a program failure that would occur if the user deleted the base column of a graph and stored the latest run.
- Changed the slope calculation to correctly account for blank cells.
- Text import now works correctly for utf8 text encoding (special characters).
- LabPro OS update no longer causes an intermittent failure.
- Curve fits with single-character x-axis labels now correctly use that label.
- Fixed program failure on keyboard entry when automatic linear fit helper object is the only object selected.
- Graph Options dialog now respects manual scale settings.
- Better LabPro driver install on Windows 2000.
- Fixed a LabPro power saving feature defect that prevented the unit from powering down in all situations.
- Fixed a Mac OS Logger *Pro* crash when a default folder name was left empty in the start-up file.
- Fixed an issue with FFT where removal of one input column accidentally removed the source.
- Fixed text edit issues in text boxes where some characters were turned into Greek characters.
- Fixed text select and replace cursor placement issues that made certain text manipulations difficult.
- Data Delete Column should now ONLY show columns that can be deleted.
- Corrected a situation that froze Logger *Pro* 3.4.1 using an analog sensor and a photogate sensor.
- Opening Digital Meter Options dialog no longer intermittently shows "invalid parameter" message.
- Fixed intermittent and rare file corruption problems.
- Fixed TI Graph Link silver cable problem when upgrading from Logger *Pro* 3.1.
- Non-numeric entries in numeric columns are no longer lost.

Logger *Pro* 3.4.1

Serial LabPro Communications

Fixed issue with slow (<0.2 Hz) data collection when using serial connection to LabPro.

Logger *Pro* 3.4

Supported Operating Systems

Support added for macOS 10.4.1 and newer.

Signed Driver

LabPro USB driver for Windows XP is now signed by Microsoft. A signed driver can be installed without displaying a hardware wizard or requiring an administrator login. Initial Logger *Pro* installation still requires administrative rights, but connecting a LabPro to a new USB port will no longer require such rights.

Support for New Devices

- Support added for Go! Motion.
- Support added for TI-84 and TI-89 Titanium USB direct cables.
- Support for new sensors: Blood Pressure, Charge, Spirometer, and Hand Dynamometer.

User Parameters

User parameters allow control of values used in calculations, triggering, and analog output functions.

Control objects for user parameters have been added to the Insert menu. Parameter controls are page objects, much like a digital meter, that allow adjustment of parameter values using mouse or cursor keys.

Curve Fits and Modeling

Function Plotting. Modeling no longer requires the presence of data to draw a function on a graph, so a function may be plotted alone.

Modeling is improved. Manual curve fits may be modified after the fit is drawn on the main graph.

Curve fits now optionally stored as a calculated column of user parameters. Curve fits as parameters allows the fit to be manually adjusted after the fit.

Video Features

- Video capture from many USB camera devices, with automatic insertion of movies in Logger *Pro* pages, has been added to the Insert menu.
- When an experiment file containing inserted videos or pictures is created or saved, the referenced video or picture file is copied to the same file location.
- Video capture done with data collection will be inserted and already synchronized, ready for replay.
- Video analysis of a still photo.
- Rotated coordinate systems for video analysis allows one-dimensional analysis of motion that is neither vertical nor horizontal.
- Display of current frame time and frame number in videos.

Graph Features

Double Y graphs allow plotting of values with different magnitudes on a single graph, such as pH and temperature vs. time.

Adaptive point protectors for clearer printing of graphs with multiple traces. Point protectors are placed sparsely on runs as markers.

Better use of color for distinguishing runs. Optionally Logger *Pro* will use a single color in each run.

Time of day and Date in Time column and graphs has been added.

Optionally, horizontal axis labels may be rotated for graphs

There is a new option to make all rows major tics on graphs. For example, a data table listing twelve month names can be set to display all months on the horizontal axis.

Additional control of number displays added in data tables and graph labels. User can force scientific notation.

Styled Text

You can customize the style of the text (including adding Greek characters) as it appears in text boxes, annotations, and graph labels.

Data Collection

Automatic saving of backup data files in case of power loss or crash enabled.

Space bar toggles data collection on and off if the selected page object does not have space as a valid character. For example, if a graph is selected, pressing the space bar will start and stop collection, just like the Collect button. However, if a text object is selected pressing space will enter a space character. The space bar is a convenient way to start data collection.

New unit-changing paradigm allows changing units after data collection. Units are no longer tied to a particular calibration.

New Calculated Column Functions

- Event counting with photogates
- Modulo
- Boolean functions
- Collapse indirect for better display of photogate data
- Blood pressure calculations

Improvements

It is now possible to collect data more slowly than one point every 4.4 hours when LabPro is connected to the computer. Remote data collection continues to have the 4.4-hour upper limit to the time between points.

Improved speed for all Mac OS versions, especially OS 9. In particular, opening files with many calculated columns, or storing runs with many calculated columns, is much faster.

Improved flexibility in displaying photogate data without blank cells. The data table can hide rows based on any single column.

Improved examine mode for video analysis. Video now snaps to frame when a marked point is selected.

Additionally:

- Support added for QuickTime 7.
- Clarified sensor calibration dialog box.
- Improved printing of fine graph lines by setting gray grid lines to black.
- Sounds in videos are now enabled on all platforms.
- Improved tolerance of videos with uneven time steps, making more videos usable for analysis.
- The aspect ratio of an inserted video is preserved at file open.

Logger *Pro* 3.3

Support for Multiple Devices

Logger *Pro* 3.3 supports LabPro, Go!Temp, Go! Link, and Ohaus Scout Pro balances. Up to four devices may be used simultaneously, with no more than two LabPros. On Windows, only one Ohaus scale can be connected by USB. Note: USB devices connect automatically if detected. Serial LabPro (and Ohaus on Windows) require manual connection using Connect Interface from the Experiment menu.

Icons for On-Line Devices

The second row in the toolbar now holds icons for each on-line device, followed by any live readouts. These icons are buttons to summon the sensor setup dialogs for each device. Offline devices do not appear in the toolbar, but are available in the Experiment menu.

Keyboard triggering

Keyboard triggering is a new option that allows you to start data collection with minimal delay by pressing the space-bar or return key on the keyboard. Enable keyboard triggering on the Data Collection dialog, Triggering tab. When keyboard triggering is active, clicking the Collect button merely prepares the system for data collection; collection begins at the next point when the space-bar is pressed.

Automatic Detection of Sensor Configuration

Logger *Pro* now detects the connection and removal of auto-ID sensors whenever live readouts are on and data collection is not active. When a sensor is added, a column is added to the Data Table. When a sensor is removed, its column is removed if the column is empty. To disable this behavior, turn off live readouts in the Experiment menu.

Automatic Updating of Page Objects

Logger *Pro* now automatically adds graphs or connects columns to existing graphs when sensors are added. This behavior simplifies setup, but it can also disrupt existing page layouts. As a result there are two new options to control automatic updates of page objects. You can separately enable or disable update page objects on File→New (the default is on) and after File → Open (the default is off).

Single-Point Calibration

Standard calibrations require two external references, but some sensors can be calibrated by setting an offset only, such as correcting a barometer for altitude. Logger *Pro* now allows single-point calibrations for any sensor that can be calibrated using two points.

Identify Column Data Source

Now that Logger *Pro* collects data from multiple devices it can be confusing as to where a given column is getting its values. You can now determine the source by device and channel number (e.g., LabPro 2, CH 3) by inspecting the Column Options dialog for a given column. In addition, the interface dialogs (Experiments→Set Up Sensors → Show all Interfaces show the column name where the data from each channel is stored, in each sensor's Sensor Info display.

Finer Control of Live Readouts

All live readouts can still be disabled through the experiment menu but individual columns can be controlled through the column options. This can be very helpful to reduce the number of live readouts displayed on the tool bar. You can now turn on live readouts for the Motion Detector, although then the detector will click at all times.

Export to GIS Format

Logger *Pro* can export data in a form recognized by GIS software such as ArcView by ESRI.

New Page Objects

There are three new page objects. The Thermometer resembles a glass thermometer and can be used to display sensor readings. The Analog Gauge is a dial readout for sensor readings. The Animated Display is used to represent the motion of objects, usually from a Motion Detector column.

New Global Preferences

New preferences have been added. Optionally you can turn on a list of recently used files to be displayed in the File menu. This feature lets you quickly return to recent work, but some users may want to turn off the feature so that students cannot easily find other student work. The default is off. You can turn on large toolbar buttons so that Logger *Pro* will look nearly like Logger Lite. The default is set for standard Logger *Pro* buttons.

Supports New Sensors

The new Thermocouple (version shipping after May 2004) is now supported

Sensor Confirmation Dialog

The Sensor Confirmation dialog opens when you open an experiment file and Logger *Pro* does not detect all the necessary sensors. In version 3.2.1 and earlier we assumed that some non-auto ID sensors were present. Now we prompt, unless the Sensor Confirmation flag is cleared in the setting for that experiment file.

The Sensor Confirmation Dialog will disappear when you connect the requested auto ID sensors.

You can also indicate where any non-auto ID sensors are connected and manually close the dialog.

Logger Pro File Compatibility

Logger *Pro* saves files in the .cmbl file format. Logger *Pro* opens .xmbl, .gmbl, and .cmbl files as saved by Logger *Pro* version 3.0, 3.1, 3.2 and 3.2.1, and Logger Lite. Logger *Pro* will also open files saved in any version of Graphical Analysis 3 (.ga3 extension).

Other Changes

- Grouped graph behavior links axes and doesn't group the objects themselves.
- Page objects now click to the front like windows in Finder and Explorer.
- Sensor polling for new auto ID sensors is now on whenever live readouts are on.
- Option to hide helper objects added.
- Predictions now take on the units of the graph.
- If no interface is connected when Logger *Pro* is launched, there is no longer a prompt to connect an interface, since Logger *Pro* is often used for manually entered data.

Experiment Files

- Experiment files have been updated.
- Experiment files have been added for Workshop Physics and CPU (Constructing Physics Understanding).
- Experiment files for Workshop Physics, CPU, Interactive Lecture Demonstrations, Real Time Physics, and Tools for Scientific Thinking have been moved to a folder titled *Additional Physics*.

Logger *Pro* 3.2.1

Supported Operating Systems

Mac OSX 10.3 is now supported.

Enhancements

- Several printing issues corrected.
- Fixed problem with serial connection to LabPro and Events with Entry data collection.
- Two-Photogate timing mode corrected.
- Remote data collection for 12000 points and four sensors now works correctly.

Experiment Files

Experiment files have been updated.

International

Logger *Pro* 3.2.1 is more compatible with international options.

Logger Pro File Compatibility

- Logger *Pro* files created in version 3.2 and 3.2.1 cannot be opened in older versions of Logger *Pro*.
- Logger *Pro* files created in version 3.0 and 3.1 may be opened in Logger *Pro* 3.2 and 3.2.1.

Logger *Pro* 3.2

Video Analysis

Quantitative position information can be obtained from inserted videos. User can set scale, define an origin, and track the positions of up to three objects. Video analysis data may be synchronized with sensor data.

Strip Charts

A new strip chart graph type has been added. If the width of a strip chart is less than the data collection time, then the strip chart will scroll right to left as data collection or replay proceeds.

Rate Functions

The rate functions used for heart rate and respiration rate calculations has been improved to use a moving window, allowing more frequent updates to the reported values.

TI Connect Compatibility

Logger *Pro* 3.2 is compatible with TI Connect versions 1.1, 1.2 and 1.3, and will use the installed USB Graph Link driver for calculator data import, if one is present.

Optional LabPro OS update

You have the option to update the LabPro Operating System (OS) from 6.26 to 6.27 to obtain improved Photogate and remote data collection behavior. If your LabPro has an OS older than 6.26, Logger *Pro* 3.2 will require an update to 6.27.

Other changes

- New and better sensor select dialog, with groupings of sensors.
- Handles 60 samples a minute or hour and other unusual values with better display of time values.
- Comma decimal separator now supported in addition to North American standard period decimal separator.
- Additional Tool Tips added.
- Extra smart sensors are ignored when opening a file.
- Stainless Steel Temperature probe calibration now supported using three reference temperatures.
- Removed extra Motion Detector calibrations because you are able to remove automatically generated calculated columns now and they will not come back.
- Data can now start before the movie and still be synced.
- Improved Motion Detector calibrating.
- Large number support increased to 10^{50}.

Logger *Pro* 3.1

A major development in Logger *Pro* 3 is the addition of all the features of the Graphical Analysis 3 Program. Below is an overview of these features.

New Feature: Import From TI Device

You can use Logger *Pro* 3 to transfer the data from a Texas Instruments graphing calculator to your computer for analysis or printing. Supported calculators are the TI-73, TI-73 Explorer, TI-82, TI-83, TI-83 Plus, TI-83 Plus Silver Edition, TI-84 Plus, TI-84 Plus Silver Edition, TI-85, TI-86, TI-89, TI-92, TI-92 Plus, and Voyage 200. To do this, you need a TI-GRAPH LINK cable, which is part of the TI-GRAPH LINK package and is sold by Vernier Software & Technology and other Texas Instruments dealers. This cable connects the TI graphing calculator to the serial or USB port of your computer.

New Feature: Import From Data Pro

You can import data from a Palm hand-held running DataPro into Logger *Pro* 3 for analysis or printing by selecting Import from…DataPro from the File menu. The Palm Hot-sync feature will also send data to Logger *Pro*. You will need the DataPro package, which is sold by Vernier Software & Technology.

New Feature: Movies

You can synchronize data collection and a movie of the experiment so that as you replay the movie, the data are replayed on the graph. Supported movie formats are Video clip (.avi) and all file formats supported by the QuickTime player. For a complete list of supported formats, visit: apple.com/quicktime/products/qt/specifications.html

New Feature: Draw Prediction

Added to Logger *Pro* 3 is the ability to predict what might happen in a given scenario. In certain lab experiments, you might want students to predict what is going to happen before they collect data. When you draw a prediction in Logger *Pro* 3 on the graphs, the prediction will be saved in the data table for comparisons.

New Feature: Control Devices

Using Logger *Pro* 3, you can power devices with an output signal from the function generator built into LabPro. You can also power and control devices using the Digital Control Unit.

New Feature: Pages

Logger *Pro* 3 now has pages. This allows you to have different layouts of data in a single file. One page might contain a graph and table with five different data collections. Then on different pages you might perform comparisons between different collections or just go into each collection in more detail. Each page can almost act as a different file while still sharing data with all the other pages.

New Feature: Insert Additional Objects

Added to Logger *Pro* 3 is the ability to add different objects besides the normal table and graph. These include rectangles and ovals. You can also add pictures to your experiment. Visual aids are especially useful for annotation, documentation, or instruction for a particular experiment.

New Feature: Data Browser

The Data Browser is a container for all the data in a Logger *Pro* file. In contrast, a given data table will not necessarily show all data columns.

For basic use of Logger *Pro*, you will not need to use the Data Browser. By default, all new data columns are added to all data tables. However, for more complex Logger *Pro* sessions, you may find it useful to display only a subset

of the possible columns in a particular data table, or you may find it useful to not display a data table at all. In these cases, you will use the Data Browser to manipulate data columns and data sets.

What Changed from Logger *Pro* 2 to Logger *Pro* 3

Below are questions you may ask if you are already familiar with older versions of Logger *Pro.* Also provided is a list of improvements and new features of Logger *Pro* 3.

Interfaces

Logger *Pro* 3 supports the Vernier LabPro interface, the Vernier Go! Temp, the Vernier Go! Link, and the Ohaus Scout Pro balance. You can import data from text files, Excel files, different TI Graphing Calculators using a TI-GRAPH LINK cable, a Palm OS hand held using Data *Pro* and the LabPro. Logger *Pro* 3 will not work with the ULI, Serial Box Interface, or the MPLI.

LabPro and Collect buttons

The "Collect" button will no longer disappear when an interface is not connected. Instead there is constant feedback in the upper left-hand corner of the tool bar that tells the user whether or not the LabPro is connected. The Collect button will be faded if LabPro is not connected or recognized.

Windows

Logger *Pro* 3 now uses objects instead of windows. Every table, graph, meter, floating box and other window previously available in Logger *Pro* 2 are now separate objects in Logger *Pro* 3. Each object can still be sized and moved. Using the Page menu items, objects can be aligned, layered, grouped, un-grouped, and locked on a page. To insert most objects, just select the object you wish to add from the Insert menu. Floating boxes, now called helper objects, can still be found in the Analyze menu. Objects also have options, which can be opened by either double clicking on an object or selecting the desired object and choosing it from the Options menu.

Data Runs

Runs from Logger *Pro* 2 are now called Data Sets in Logger *Pro* 3.

Calculated columns

Formula Columns are now called Calculated Columns in Logger *Pro* 3. Other than the name change, calculated columns act the same way as Formula Columns in Logger *Pro* 2, with some additional features like error bar calculations.

Supported File Formats

Logger *Pro* 3 can open files in Logger *Pro* 3 (.cmbl or .xmbl), Logger Lite (.gmbl) or Graphical Analysis 3 (.ga3) formats.

The Import Text feature, available from the File menu, can import data saved with the Export Text menu item or files created and saved from several other formats (e.g. Excel). The file must be in the tab-delimited text format used by Export Text (a .txt, .TEXT, .dat or .csv extension). Data are imported only into the latest data columns. You can also use this feature to import data prepared or collected in another program into Logger Pro.

Sensor Setup

The Setup menu has been removed. The Sensors Properties dialog has changed to the Sensor dialog, which can be accessed through the Experiment menu by choosing Set Up Sensors → Show All Interfaces from the Experiment menu. Each interface (LabPro, Go!Temp, Go! Link, or Ohaus balance) will have its own Sensor dialog.

If you are using an auto-ID sensor (such as a Stainless Steel Temperature Sensor or a Motion Detector), Logger *Pro* will identify your sensor at launch and load a default data collection mode. If your sensor does not auto-ID, choose an experiment file from the appropriate sensor folder or open the Sensor Setup dialog to manually configure Logger *Pro* for you sensor.

Mode and Sampling

In Logger *Pro* 3 these two separate pages have been combined into the Data Collection dialog from the Experiment menu. As you change the mode for the collection, you will notice the options available will also change according to your choice. These options are similar to those in Logger *Pro* 2.

Repeat mode

In Logger *Pro* 2 there was a separate Repeat mode for doing a Real Time Collection with repeats. In Logger *Pro* 3, Repeat is a checkbox option on the Time Based collection mode page of the Data Collection dialog.

Photogate Timing modes

Photogate Timing modes are not available in the Data Collection menu. Click on the Photogate Channel Box in the Sensor Setup window to change or select timing modes.

Logger *Pro* 3 also contains improved, more flexible functions (available in the New Calculated Column dialog from the Data Menu) to create calculated columns based on Photogate data.

Radiation Monitor setup

Once the Radiation Monitor is set up in the Sensor Setup window, the sensor status will be shown. The reading will be in Counts. The status of the Radiation Monitor is also displayed under the Toolbar. Click on the Radiation Monitor Channel Box in the Sensor Setup window to change or select timing intervals.

FFT graph and table

To insert an FFT graph, just select it from the Insert menu under Additional Graphs. In Logger *Pro* 3 there is no longer a separate FFT Table; instead FFT data are placed in the regular data table. The FFT Graph Options dialog is similar to the FFT Options dialog found in Logger *Pro* 2 except the two pages, Graph Features and FFT, have been combined into one page for easier access. FFTs have also been updated to allow more than one column to be plotted on a single FFT graph.

Histogram graph and table

To insert a Histogram graph, select Histogram from the Insert menu under Additional Graphs. In Logger *Pro* 3 there is no longer a separate Histogram Table; instead histogram data are placed in the regular data table. The Histogram Graph Options dialog is similar to the Histogram Options dialog found in Logger *Pro* 2, but the Graph Features page has been renamed to Graph Options and the Axis Options page is now the Bin & Count Options page. Histograms have also been updated to allow more than one column to be plotted on a single Histogram graph.

Automatic/Manual Curve Fit

Both types of curve fits have been merged into a single dialog in Logger *Pro* 3. Logger *Pro* 3 includes all Logger *Pro* 2 curve fit options and many new features. For automatic curve fits, you are now able to define your own function for a curve fit. The preview window now acts like a normal graph with the ability to zoom and auto scale. To switch between a manual and automatic curve fit, just click the appropriate radio button located in the upper right of the dialog under Fit Type. After performing an automatic curve fit, you can switch to a manual curve fit to get an even better fit if you desire. Sometimes it also helps to click the Try Fit button more than once to improve an automatic curve fit.

Auto scale axes

The functionality is now in the Axes Options tab of the Graph Options dialog, which can be called up by selecting Graph Options from the Options menu or by double clicking on the graph. Clicking on the axis labels on the graph may also change the axes. The scaling options for each axis are now independent of each other.

Printing

There is no longer an option to Print Screen. Instead, you can select Print from the File menu.

Remote data retrieval

Remote data retrieval from the LabPro is now in the Experiment menu. The functionality remains the same except that when you setup the LabPro for remote data, you can now print out your collection settings. Retrieval of data from the LabPro remains the same.

Calibration Folder

The calibration for sensors has been updated and is now stored in a database, so it's no longer necessary to supply a calibration folder.

Experiment Folder

The experiment folder is now located within the default folder, which can be defined in the Preferences dialog.

Over Range Auto-scale option

The Over Range Auto-scale option in the Graph behavior preferences page in the Preferences dialog has been removed. In Logger *Pro* 3 you can get the same effect by going to the Axes Options, which can be accessed either through the Graph Options (from the Options menu or double clicking on the graph). There are scaling options for each axis, so the auto-scaling can be independent of each other.

Default Interface

Logger *Pro* 3 allows the creation of offline interfaces, replacing the single default interface of Logger *Pro* 2.

Options menu

The Options item found in the Experiment menu in Logger *Pro* 2 has moved to the File menu and renamed *Settings for "this file."* You will find all of the experiment options in this dialog except the Enable automatic Curve Fit check-box, which has been moved to the Preferences dialog. This new Settings dialog will save your options for the entire file, even after closing the file.

Store Latest Run

To store a set of data, choose Store Latest from the Experiment Menu.

Information about a file

The *About "this file"* item in the Help menu has been removed. In Logger *Pro* 3 you can place information about a page in the Page Options item in the Page menu. You can set the Page Information text in the Page Options dialog for page 1. You can also choose for it to be displayed when the page is first viewed, or when the file is opened.

Undo function

In Logger *Pro* 2 there was an undo command in the Edit menu. Logger *Pro* 3 expands on this command and allows you to undo almost any action that you perform. Collecting data, deleting or inserting an object, or changing the

scale of the graph, for example can all be undone. If you perform too many undo operations, you now have the option to perform a redo that essentially undoes an undo.

Text Annotation

Text Annotation in Logger *Pro* 3 has been updated with many new features. For one, each text annotation can be connected to a point, thus describing information about what is happening to the graph at a particular point in time. As the graph is moved, the text annotation will stay with its point. You can also have more than one text annotation for a single point.

Stretchy Axes

Just outside the X or Y-axis line, you can use the cursor to manually rescale or stretch the axis.

LabPro Operating System Changes

Logger *Pro* 3 requires at least LabPro operating system 6.26. If a LabPro is connected with an earlier version, a dialog box will open offering to update the LabPro. You must update the LabPro to use it with Logger *Pro* 3. Beginning in version 3.2.1, Logger *Pro* will update the LabPro OS to version 6.27. This update is optional, and be applied by connecting a LabPro, clicking the LabPro icon in the toolbar, and clicking the Update LabPro OS button in the Sensors dialog for that LabPro.

Note that LabPro OS updates are no longer supported in Logger Pro release 3.11 and newer.

In version 6.26 sensors were allowed to warm up after pressing the START/STOP button. In 6.27 the sensors are warmed up at setup time. After any warmup period has elapsed, data collection begins immediately on pressing START/STOP.

Version 6.27 updates and fixes:

- The build has DataMate 6.15 that includes the TI-73 Application.
- Fixed problem where communications were ignored during sensor warm up period.
- Fixed problem of photogate timebase and analog timebase being out of sync.
- Fixed problem of a first point of monitored (not collected) data being max value when using high speed data collection (DataMate),
- Fixed problem of corrupted data if photogate state transitions during start of pendulum experiment
- Fixed problem of using two Radiation monitors at the same time (Logger *Pro*)

LabQuest Operating System Changes

LabQuest 2 OS release notes may be found at https://www.vernier.com/til/ and searching for "LabQuest Release Notes". LabQuest 1 release notes are summarized at http://www.vernier.com/support/updates/labquest/labq/