APPENDIX III: JAWS Scripts for LoggerPro 3.7.1

Excerpt from Penn State's *Independent Laboratory Access for the Blind* website,
http://ilab.psu.edu/JAWS_Scripts_for_Logger_Pro_3.7.doc
(Revised April, 2009)

This documents the scripts prepared by SSB BART Group for use with LoggerPro 3.7.1 and LoggerLite 1.4.1. These scripts were tested with JAWS 7.1 through 10.0 LoggerPro versions 3.5 through 3.7, and LoggerLite 1.4.1. They may work with JAWS versions as far back as 6.0, but this is not verified. These scripts may also work with later LoggerPro and LoggerLite versions but will not work well with older ones. Some features, such as complete announcement of tables and live sensor readings, will not work as well in LoggerPro versions older than 3.6.1.

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The JAWS Command Key System

How It Works

Most JAWS commands implemented for Logger consist of a prefix key followed by one or more separate keystrokes. This allows a large number of commands without conflicting with Logger's native commands. This multi-key system works very much like a set of standard Windows menus in that commands are grouped into logical sets. For example, commands that deal with sensors begin with the Command key followed by the letter S. In this document, such a sequence will be written as "Command S."

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The prefix key that starts JAWS commands, which will from now on be called the "Command" key, is the left square bracket ([). If it becomes necessary to type a left bracket into Logger itself, it can be done simply by pressing it twice in succession. Keys typed after the Command key will only be seen by JAWS, not by Logger, until the key sequence is exited.

Some key sequences exit when finished, like Windows menus also do. For convenience though, some do not. For example, the first sensor's current live reading can be announced via Command S 1. Typing digits right after the 1 will continue to announce other sensor readings. Pressing any key that is not part of a sequence will exit the sequence, though Esc is the preferred method for exiting a sequence that does not exit automatically when finished. JAWS will play a short door-closing sound whenever a command sequence exits, so the user will be ware that the sequence is completed and keys will again behave normally.
There are a few JAWS commands for Logger that use the more conventional single-keystroke approach. Also, most of the multi-key sequences have parallel conventional commands for those more accustomed to that approach. The single-key versions of commands, which tend to be Ctrl+Shift with letters and numbers, will be listed in the JAWS Command Reference section of this document.

Keyboard Help For Key Sequences

There is a help system for the key sequences just described. To explore key sequences, press the Command key and then use Tab to move through the list of keys you could type next. This is much like arrowing through a Windows menu. Shift+Tab will move backward through the available keystrokes, and JAWSKey+Tab (or Insert+Tab) will repeat the most recently described keystroke. This help system works at all levels of key sequences, so you could, for example, type Command S and then use Tab to hear about all the commands available that relate to sensors.

How To Use LoggerPro and LoggerLite With JAWS and the Scripts

This section is intended to help users get started quickly with LoggerPro or LoggerLite using these scripts. This section is organized by task. Tasks appear as level 3 HTML headings, so JAWS users can use H or the number 3 to move from task to task efficiently.

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Connecting and Testing Sensors

Command S S will give a quick list of sensors that Logger has noticed. Command S L will also list sensors but with full names and current values for those that provide live readings. Typing Command S Shift+L will bring up the sensor list in a JAWS virtual buffer for easy review. If you are working with a new data set, these commands will help you determine which sensors are connected and set up correctly.

If you are working with a pre-existing data set, the sensors listed by the above commands will be the sensors that were attached when the data set was created, not necessarily the sensors that are currently attached. To get a list of currently attached sensors, create a new data set (this requirement applies with or without JAWS).

One way to access a sensor's setup screen is to click on its toolbar item near the top of the screen. Command S Shift+S will activate the JAWS cursor and place it on the row of sensor readings, making it easier to find a particular sensor for setup. (This feature will only work if "Large Toolbar Buttons" is left unchecked in File > Preferences.)

Some sensors, when connected, cause Logger to add a corresponding digital meter object to the current page. You can use Ctrl+Tab to move through the available page objects, or Command O Ctrl+L to pick one from a JAWS list dialog. Leaving focus on a digital meter will cause JAWS to provide real-time announcements of the corresponding sensor's value as it changes. The right mouse button JAWS command, or the Menu key (sometimes also called the Applications or Context Menu key), provides another way to reach sensor setup dialogs if pressed while a sensor's meter is in focus.

Command S and then a number from the number row will read specific sensor names and values. Shifting the number will let you set up automatic continuous announcement of a sensor's live readings. For example, Command S 3 will read the third sensor's value, and Command S Shift+3 will bring up a dialog box allowing you to set up sensor 3 for automatic continuous announcement of readings. To disable automatic continuous announcement of a sensor's readings, just bring up the setup box again, then cancel it with Esc. Note that this method of automating sensor reading announcements will repeat the sensor's value at specified intervals whether it has changed or not, whereas the above digital meter method will say nothing until the sensor's value actually changes.

In the LabPro Setup dialog, Command S S will list all LabPro channels and announce what is attached to each. Command S Shift+S will present this information in a JAWS list box instead of just reading it aloud.

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Starting and Stopping Collection

Command S S will indicate whether data is currently being collected, in addition to listing sensors. JAWS will also announce automatically when collection starts and stops. The announcements may be slightly delayed if data collection significantly impacts the CPU.

Use JAWSKey+Tab before starting collection to make sure focus is not on a data table. If it is, use Ctrl+Tab to move focus to a different item on the current page. Collecting while in a data table may produce a lot of extra speech as the table continuously expands.

The Space bar usually turns data collection on or off but may not work in a data table and sometimes fails to stop collection even when focus is not in a table. Command S C, or Ctrl+Shift+C, will work everywhere and will better announce what is happening.

Managing Objects On a Page

Ctrl+Tab will move cyclically through the objects on the current page, announcing each object as it acquires focus. JAWSKey+Tab will repeat the currently focused object's information, and a double JAWSKey+Tab will bring details about this object into a JAWS virtual buffer for easy review.

Command F followed by a digit will read a specific field of information about the currently focused object. This is most useful with statistical objects as a way of quickly checking specific statistical values. For example, Command F 3 will read the third field of information about the currently focused object. If that object is a statistical object, the third field might be the minimum Y-axis value and where on the X axis it occurred.

When an object is in focus, there will be a corresponding option in the Options menu available that provides access to the object's properties. Use this to set up any special settings for the object, such as column names for tables, axis specifications for graphs, etc. The right mouse button command or the Menu key can be used to gain access to the object's properties as well, but it may first be necessary to bring the object to the front of the Z order so it is not covered by other objects. This can be done with Command O F. Using the Options menu should avoid this issue though, so the Options menu is the recommended approach.

Command O L will list the objects on the current page, such as tables, graphs, digital meters, etc. Logger adds objects automatically as sensors are connected, and users can add objects as well, such as thermometers, gauges, statistical objects, integrals, etc. Command O Shift+L will bring up the object list in the JAWS virtual buffer for easy review.

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Managing a Data Table

Note: Navigation may not begin on the first cell when you first try navigating in a particular table.

Use the four arrow keys to move among table cells. Use Ctrl+PgUp and Ctrl+PgDn to move up or down quickly 20 rows at a time. As you navigate up and down, you will hear the row number and the current cell's value. When navigating left and right, you will hear the column name and the cell value. Note that left and right arrows wrap to new lines when you try to arrow past the left or right edge. This is a Logger behavior.

Managing Pages In a Multi-Page Project

Use PageUp and PageDown to move among pages of a multipage data window. JAWS will announce the page number, page count, and page title (if any) when the page changes. The SayTitle command, JAWSKey+T, will also announce this information when focus is in the data window. The Page menu contains many useful page-related options, including a way to add pages and a way to jump directly to a specific page.

Miscellaneous Tasks and Features

JAWSKey+F1, when typed in a data window, will bring up a JAWS virtual buffer containing a lot of information about the current page. The following items are included:

- An indication of which page is currently showing, the page title if any, and the number of pages in the data window.
- A list of all objects shown on the current page, with all information available about each. For digital meters, this includes current readings at the time you typed JAWSKey+F1. For statistical and analysis objects, this includes the data shown by those objects, such as integrals, slope equations, quadratic coefficients, etc. This is more information for each object than shown by Command O L
- A list of all sensors associated with the current project (similar or identical to the information shown by Command S L).

Use a double JAWSKey+F1 to display the help document you are currently viewing in your default browser.

If you encounter a list or combo box that is hard to use because focus won't stay in it when you arrow among options, press F4 twice quickly and then select your choice from the JAWS list that pops up. (F4 was chosen because it naturally opens combo box dropdowns; pressing F4 once will do what it normally would have done without scripts running.)

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The left and right mouse button keys will, if pressed when the PC cursor is active, click on the currently focused object (table, graph, meter, etc.). The SayCharacter, SayWord, SayLine, RouteJAWSToPC, and RouteInvisibleToPC commands will also address the currently focused object.

User-Transparent Script Features

The scripts improve JAWS' ability to name correctly a number of fields scattered throughout Logger.

JAWS will automatically announce various error conditions, such as when trying to apply a Curve Fit to a graph without selecting enough points or when trying to communicate with a LabPro on a port with nothing attached.

If a digital meter includes an alarm condition and that condition is met, the screen text in the meter turns red. JAWS will begin saying "alarm!" before reading the meter's text in such a situation. "Alarm!" should also appear in Braille for the meter where applicable. This feature requires LoggerPro 3.6.1 or later and will not work in older LoggerPro versions.

During import operations, JAWS will announce context-sensitive instructions and changes in the status of the process.

Some LoggerPro list controls do not read correctly without help, so the scripts include code to make these boxes behave normally with JAWS.

The scripts make the JAWS automatic graphics labeler work in LoggerPro though it otherwise would not. It may be necessary to enable all graphics to be spoken before attempting this, though users should not have to do this themselves anyway. The scripts already include labels for the main tool bar at 16-bit and 32-bit color depths, and toolbar items can also be invoked from menus under the menu bar.

Several little tunings are included for the LoggerPro help system: `Alt+B` and `Alt+LeftArrow` go back to the previously shown help page, `Alt+RightArrow` does the opposite just as in Internet Explorer, and JAWS should not repeat highlighted search terms while navigating through help pages right after you search for key words.

JAWS will spell "T I" instead of saying "ti." Several other custom pronunciation fixes are also included.

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JAWS Command Reference

This section lists JAWS commands unique to Logger. Standard JAWS commands that are enhanced for Logger but which function in other applications are not included here. Examples of these include JAWSKey+Tab and JAWSKey+F1.

Category	Function	Command System Keystrokes	Conventional Keystroke
Command system help	Cycle through and announce possible keystrokes at the current command level	Tab or Shift+Tab at any level	N/A
	Repeat the last-spoken command possibility	JAWSKey+Tab	N/A
	Exit the command system without executing a command	Esc or any key that is not a command	N/A
Sensors	Summarize current screen (includes quick sensor list)	Command S S	Ctrl+Shift+S
	Move mouse to sensor list on screen, or show LabPro channel list in a JAWS virtual view	Command S Shift+S	Ctrl+Shift+S twice quickly
	List connected sensors in detail	Command S L	Ctrl+Shift+A
	Say a specific sensor reading	Command S digit	Ctrl+Shift+digit
	Set up automatic announcement of sensor readings	Command S Shift+digit	Ctrl+Shift+digit twice quickly
	Toggle collection on/off	Command S C	Ctrl+Shift+C
Objects	Move currently selected object to front	Command O F	Ctrl+Shift+F
	Say the list of objects on the current page	Command O L	Ctrl+Shift+O
	Virtualize the list of objects on the current page	Command O Shift+L	Ctrl+Shift+O twice quickly
	List objects on the current page in a JAWS listbox	Command O Ctrl+L	Ctrl+Shift+L
Object fields	Say the value of a specific field of information about the currently selected object	Command F digit or Command F Shift+digit	N/A
Miscellaneous	Skim down 20 rows in a data table	N/A	Ctrl+PgDn
	Skim up 20 rows in a data table	N/A	Ctrl+PgUp
	Open a combo box	N/A	F4

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Known Issues For Vernier's Attention

The following issues would need to be addressed by Vernier in a future version of Logger. They can not be addressed, or at least not as safely or easily, via JAWS scripting.

- There are a few fields that are skipped by the Tab and Shift+Tab keys
- Some sets of radio buttons in LoggerPro do not allow arrow keys to select a choice. For these, use of the JAWS cursor to click the desired option is required
- There is no known way to jump to the top or bottom of a table with keyboard commands
- Arrows can move focus to cells way below the bottom of existing data. (This may be intentional and not a problem but is worth mentioning because it is unusual for table controls)
- Shift+Tab moves forward, not backward, through table cells. Arrows work as expected though
- Ctrl+Shift+Tab does not move through objects in the reverse order of Ctrl+Tab
- Left and right arrows, when pressed at the left and right edge of a row, respectively, wrap to the next row in the corresponding direction instead of stopping as is the case in many other applications. This may be preferred by some users but is unusual enough to deserve mention.

APPENDIX IV: Using LabPro Remotely

Having a computer or calculator attached to LabPro during data collection is preferable, because it provides much more flexibility in your data collection and provides a screen for immediate feedback of your results. There are times, however, when disconnecting LabPro from the computer or calculator to collect data is useful. For example, remote data collection is perfect for gathering acceleration data on a roller coaster. The following describes remote data collection with LoggerPro 3 on a computer.

There are 3 buttons on the LabPro interface: Transfer (left), Quick Setup (centre), and Start/Stop (right). When the unit is battery powered and unplugged from the LoggerPro software, if you press the Quick Setup button, it will collect 99 points of data, about 5 seconds worth. If you require a different amount of time or require the data points to be spread further apart, follow the following instructions for time-based.

Set Up for Time-Based Method

Using the Set Up for Time Based Method, you connect the LabPro to a computer to set it up, detach it for a real time data collection, and then re-attach it to the computer to retrieve the data. This gives you more flexibility than the Quick Setup method. With this method, you can (a) use any sensors (not just auto-ID), (b) control the time between samples, and (c) control the number of data points collected (up to about 12,000).

1. Set up LabPro for remote data collection:
   a. Put fresh batteries in the LabPro.
   b. Set up the sensors, LabPro, and LoggerPro just as you normally would to collect data in Time Based mode. Use Ctrl-d to change the information in the data collection pop-up menu.
   c. Before detaching the LabPro, go to the Experiment menu, select Remote, then Setup. A summary of your setup will be displayed.
   d. Tab to Ok and press enter to prepare the LabPro.
   e. When LoggerPro prompts you, disconnect the LabPro from the computer.
   f. If it has not already been saved, save the experiment file so it can be used to later retrieve the data from LabPro.

2. Collect data:
   a. When you are ready to collect data, press the START/STOP button (at the right). Do not press the Quick Setup button (centre) or it will change the settings that were changed on the computer.
   b. When data is collecting, a green light will flash; when the data collection is complete, the yellow LED will flash briefly. You can also stop data collection early by pressing the START/STOP button before data collection is finished.

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3. Retrieve the data:
   a. Start LoggerPro if it is not already running. If the "Continue Without Interface" dialog appears, tab to Ok and press enter.
   b. Open the experiment file used to set up LabPro.
   c. Attach the LabPro to the computer.
   d. If a Remote Data Available window appears, tab to the YES button and press enter. Another dialog will appear clarifying how the data is to be transferred; select the radial button of your choice and tab to Ok and press enter. If a window does not appear when the interface is reconnected, go to the Experiment menu, select Remote, then Retrieve Remote Data and follow the on-screen instructions.
   e. The data will be retrieved.

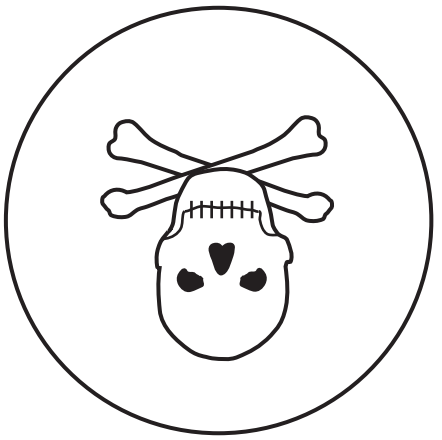
APPENDIX V: Braille Chart for Rainin AutoRep M

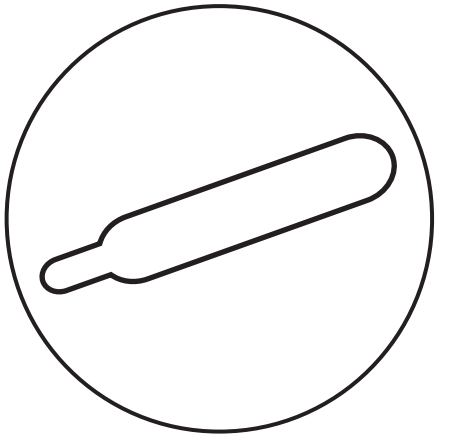
Included in the documentation for this manual-repeating pipette is a reference chart in print – as well as a micro-print version on the backside of the pipette. This chart assists the user in selecting which tip to dispense a specific amount of solution, and which stepped setting (1-5) to choose.

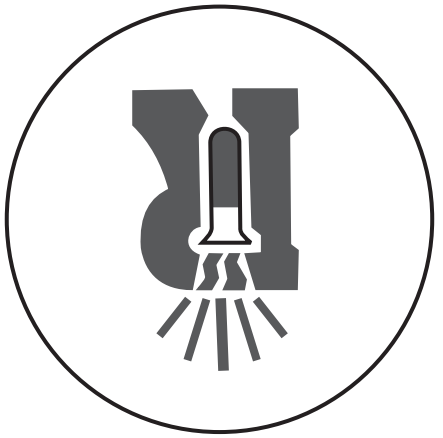
The following page is the braille equivalent of this same chart, with all measures converted from micro-litres (µL) to milli-litres (mL). It can be printed onto microcapsule paper and processed through a heat-device (e.g. a PIAF, or Pictures-in-a-Flash – see above); the braille dots will 'swell' up to form a tactile braille reference page for the student to use. At the time of this resource's publication, the PIAF is available for loan through the Learning Resources Centre (LRC).

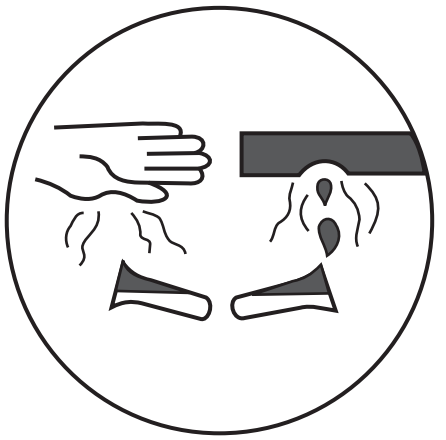
APPENDIX VI: WHMIS Symbols in Braille

Similar to the previous appendix which included a reproducible braille reference page, the following two pages are common WHMIS symbols students may encounter during laboratory experiments; these can be reproduced in tactile braille when printed or photocopied onto microcapsule paper and used with the PIAF.









APPENDIX VII: Excerpts, Manufacturer User Manuals

The following pages have been borrowed (with permission) from the manufacturer websites to assist with the various equipment listed in Sections 3-6 of this resource.

Thank you for using this resource!