Vernier LabPro™ Wins National Award!

LabPro has now been shipping for four months, and what a four months it has been at Vernier! Since the first LabPro units went out the door on May 15, we have shipped almost 10,000 units! Even though some early orders were delayed by a greater than expected demand, as well as a world-wide chip shortage (thanks to cell phones), we are now nearly caught up with orders. We anticipate being completely caught up in early September.

LabPro has been well received at many spring and summer workshops. At over 40 of our own workshops, as well as many other third-party summer workshops, teachers saw how easy it is to collect data using this versatile new product.

The best news of all came at the American Association of Physics Teachers Winter 2000 Meeting, where LabPro was selected as the winner of the Most Innovative New Product award!

In addition to this good news, we have also heard very favorable responses to the twenty new auto-ID sensors we started shipping concurrently with LabPro. When you start up our Logger *Pro* or DataMate programs with a Vernier auto-ID sensor connected to LabPro, a calibration, label, and unit is loaded, *and* a live reading is displayed!

In May, we released the new LabPro versions of our ten lab books. These manuals were rewritten for both computers and calculators (using our new DataMate program), and include the word processing files of each experiment on CD.

To our customers who had to wait to receive their initial LabPro orders, we offer our sincere thanks for your patience. We hope you will understand what a huge task it has been redesigning literally every major product at Vernier Software & Technology.

We've Moved!
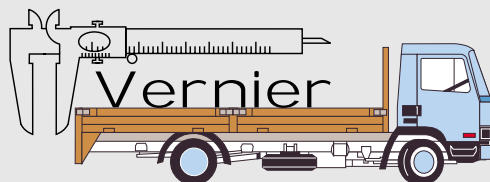
Vernier

Please note our new
address & phone numbers:

Vernier Software & Technology
13979 SW Millikan Way
Beaverton, OR 97005-2886
(503) 277-2299 • Fax (503) 277-2440

Please be sure your business office is aware
of our new address and fax number.

Workshops Using Vernier Products

Vernier Software & Technology has added many hands-on training opportunities in 2000—most of them at no cost to participants. We have implemented a Vernier "Traveling Workshop Kit" that will have traveled to 48 locations (77 workshops) throughout the United States by the end of the year. Here are some opportunities that are still available:

Vernier Hands-On Evaluation Workshops

These **free** workshops include four hours of hands-on training in the use of computers and calculators for data collection. Dinner is included! Visit our web site for up-to-date information and registration.

Dallas, TX (Sept. 14)	Minneapolis, MN (Oct. 16)
Chicago, IL (Sept. 21)	Virginia Beach, VA (Nov. 13)
Grand Rapids, MI (Sept. 25)	Wilmington, DE (Nov. 14)
Detroit, MI (Sept. 26)	San Diego, CA (Dec. 11)
Dayton, OH (Sept. 27)	Los Angeles, CA (Dec. 12)
Indianapolis, IN (Sept. 28)	Oakland, CA (Dec. 14)

Vernier Hands-On Training at National Conferences

This fall, we will offer hands-on training at several national and regional conventions. No pre-registration is required; simply consult your convention program for dates and times, or contact us for information.

■ NSTA Midwestern Area Convention, Milwaukee, WI (Oct 19-21, 3 high school and 2 middle school workshops)

■ National Association of Biology Teachers, Orlando, FL (Oct 25-28, 5 workshops)

■ NSTA Eastern Area Convention, Baltimore, MD (Nov 16-18, 3 high school and 2 middle school workshops)

■ NSTA Southwestern Area Convention, Phoenix, AZ (Dec 7-9, 3 high school and 2 middle school workshops)

2001 T³™ Vernier Affiliate Workshops

For the first time this summer, Vernier co-sponsored (along with T³, Teachers Teaching with Technology™) six hands-on workshops. It is not too soon to start thinking about hosting a two-day T³ Vernier Affiliate Workshop at your school in 2001. Completing a Mini-Grant Application could result in your school being chosen as a workshop site *and* receiving a T³ grant to partially fund the workshop. You can get information or apply by visiting the T³ web site at www.t3ww.org/t3/minigrant.htm. The deadline for completing this application is October 15, 2000.

PHYSLab 2001

Applications for Project PHYSLab for next summer in Portland, Oregon are now being accepted. This is a three-week, NSF-sponsored workshop for high school physics teachers that is in its tenth year. The workshop will be held July 2–July 20. The registration deadline is Feb. 28, 2001. Contact Lowell Herr at lherr@uswest.net, http://physlab.catlin.edu.

Vernier workshop held for the Department of Defense Dependents Schools at H.H. Arnold High School in August, 2000, Wiesbaden, Germany.

RealTime Physics and Interactive Lecture Demonstrations: Activity-Based Learning in Lab and Lecture

Winter AAPT Meeting, January 7, 2001, San Diego, CA. David Sokoloff (University of Oregon), Priscilla Laws (Dickinson College) and Ronald Thornton (Tufts University). This hands-on workshop is designed for those interested in making learning in their introductory course more active using strategies based on the outcomes of physics education research and the use of computers for data collection and analysis. For more information contact David Sokoloff, sokoloff@oregon.uoregon.edu.

Chautauqua Short Course: Promoting Active Learning in Introductory Physics Courses

University of Oregon, June 7-9, 2001. David Sokoloff (University of Oregon), Priscilla Laws (Dickinson College) and Ronald Thornton (Tufts University). NSF-sponsored course is designed for those interested in making major changes in introductory physics courses or in other introductory science courses by promoting active student involvement in the learning process. Contact David Sokoloff, sokoloff@oregon.uoregon.edu, (541) 346-4755.

10 and 15 Years Ago in This Newsletter . . .

In our 1990 issues of this newsletter, we announced our first Macintosh lab Interface, the ULI. We also announced MS-DOS® simulation programs, our only Apple II® GS-specific program, and our Light Sensor and Magnetic Field Sensor. We included an article about the new Macintosh models aimed at schools—the Mac LC and the Mac Classic. ($1199 for black and white monitor, 2M of RAM and a 40M hard drive.)

Fifteen years ago, in our Fall 1985 issue, we announced our Voltage Plotter Apple II program. We also included an article on compatibility with the new Apple II hard disks that were just starting to appear.

NEW!

Middle School Science with Computers

Middle School Science with Calculators

We are pleased to announce our latest in a series of popular lab books, *Middle School Science with Computers* and *Middle School Science with Calculators*. Co-authored by Don Volz and Sandy Sapatka, two outstanding integrated science teachers, these experiments are written specifically for grade 6-8 science classes. Here are just a few of the features of these books:

■ Each book contains nearly 40 experiments, covering a variety of topics in earth science, life science, ecology, and physical science.

■ *Middle School Science with Computers* supports the new Vernier LabPro interface, as well as older Vernier interfaces (Serial Box Interface or ULI).

■ *Middle School Science with Calculators* supports the use of TI Graphing Calculators with either the new Vernier LabPro or the Texas Instruments CBL 2™ interface. Any of the following TI Graphing Calculators can be used: TI-73, TI-83, TI-83 Plus, TI-86, TI-89, TI-92, and TI-92 Plus.

■ A CD is included with each book, which contains the word-processing files for each of the student experiments in both books.

■ Here are just a few of the experiment titles found in each book:

Heating of Land and Water	The Greenhouse Effect
What Causes the Seasons?	Cooling Rates: Shaq vs. Susie
A Water Field Study	Schoolyard Study
Ocean Floor Mapping	Crash Dummies
Buoyancy	Water Hardness Study
Soil Study	Yeast Beasts in Action
Heart Rate and Exercise	Mapping a Magnetic Field
First Class Levers	Absorption of Radiant Energy

Visit the "News" section on our web site to find a complete listing of the experiments in each book. You can also view or download sample experiments.

Middle School Science with Computers .... MSC-LP $35.00
Middle School Science with Calculators .... MSCALC $35.00

Do You Have an Idea to Share?

Have you written your own experiments using Vernier products? Do you have an idea for a student research project that utilizes Vernier products? Or do you just want to benefit from people who do? We now have a place for you on our web site to read entries submitted by other educators and post your own. Go to www.vernier.com and click on "Vernier Idea Board."

Vernier "Millennium" Sale!

Vernier Software & Technology didn't have a sale in the last millennium, so we thought we'd have a sale in this one! With the release of our new LabPro interface, we are reducing our inventory of some older products by offering you some special, one-time, low prices. This sale is open to educational institutions only.

Universal Lab Interface *(includes AC Adapter, ULI to computer cable, Voltage Probe)*

ULI-MAC .... $220 *(previously $299)*

ULI-IBM .... $220 *(previously $299)*

ULI Force Probe
FP-ULI .... $50 *(previously $130)*

MPLI Board and Box
MPP-IBM .... $220 *(previously $265)*

Vernier in the News

Vernier Software & Technology was recently named one of the "100 Best Places to Work in Oregon."

The Oregon Museum of Science and Industry (OMSI) recently changed the name of their computer center to Vernier Technology Lab.

We recently changed our company name to "Vernier Software & Technology" to better reflect all the things we do as a company. Software is still a big part of it, but now lab interfaces, sensors, books, technical support, and training are also very important.

New Calculator Programs

Our most popular calculator data-collection programs, CHEMBIO, PHYSICS, and PHYSCI have been updated so that they are compatible with our new interfaces, the CBL 2 and LabPro, along with the original CBL™. You can download these free programs from our web site at www.vernier.com.

Is Your Car Making You Sleepy?

by Robyn Johnson

Sitting in a traffic jam, your mind has time to wander. Always the scientific thinker, I began to wonder if increased CO_2 levels from the traffic were the cause of my incessant yawning on the way home from work. Would I be better off opening the windows and breathing the fumes of the cars around me or closing my vents and windows and breathing my own human exhaust? I was anxious to investigate.

I brought a Vernier CO_2 Gas Sensor and a LabPro interface in the car with me on my way home from work. I left the windows and vents open and proceeded to sit on the highway in stop-and-go traffic for 25 minutes. Surprisingly, to me at least, the CO_2 levels in the car stayed close to ambient at an average of 450 ppm (see Figure 1). The only slight rise came at minutes 20-22 when I was completely stopped with several big trucks around me.

Figure 1

Seeing so little change in CO_2 levels with the windows and vents open, I wondered what would happen if they were closed? I repeated my drive the next day with the windows and vents closed, and observed a rapid increase in CO_2 levels (see Figure 2). The concentration rose at an average rate of 80 ppm/min, then leveled off around 2700 ppm. The U.S. EPA states that CO_2 concentrations above 1000 ppm in buildings indicates a ventilation problem.[1] This is with only one person in the car. Imagine if the car was full of heavy breathers!
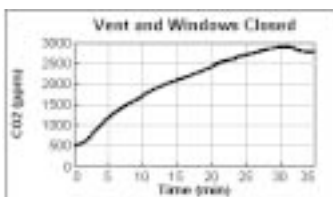

Figure 2

This led me to a third and final question: Does having the windows closed, but the vents open, provide enough fresh air to keep the CO_2 levels down? A third trip indicates the answer is yes (see Figure 3). The CO_2 concentration is constant at around 500 ppm. This is slightly above ambient, but is still in a healthy range.

Figure 3

What does all this mean? How does the size of the container affect concentration? What would happen if there were more people in the car? Is CO_2 the only exhaust product we should be concerned about? What are acceptable indoor CO_2 concentrations? What would happen to the O_2 concentration? This sounds like a great jumping off point for a student discussion and/or further research. As for me, I'm opening my vents and going home to get more sleep.

Reference
[1] *Building Air Quality,* EPA Publication No. 400/1-91/003

TI Interactive!™ NEW!

Texas Instruments has developed a new computer program called TI Interactive!, a useful tool in math and science instruction. This software gives students and teachers many of the features of a TI-83 Graphing Calculator on a computer, but the program is much more powerful than just a calculator. It also contains a word processor with integrated mathematics system, symbolic computer algebra, and a web browser. TI InterActive! will also work with a TI-GRAPH LINK™ cable to communicate with the TI-83, TI-83 Plus, CBL, or CBR™. Additional information about TI Interactive! can be found on the TI web site at http://www.ti.com/calc/docs/interactive/docs/intacthome.html

TI Interactive! can be purchased as a single copy or in a variety of site licenses, including an unlimited site license.

TI Interactive Teacher Edition (Single License)
Order Code TI-INT-TE $63.50

TI Interactive (10 User License)
Order Code TI-INT-10 .... $293.50

See our web site for additional site license combinations.

Science Humor

Q: Why did the chicken cross the Mobius strip?

A: To get to the same side.
(credit: Tom Gregg)

Q: Why is it that anteaters never get sick?
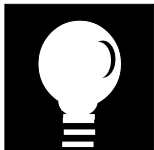
A: Because their stomachs are full of antibodies.

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info@vernier.com • www.vernier.com

Innovative Uses

Joel Langlois, a student of John Childs (Grenville Christian College, Brockville, Ontario) walked away with "First Place —Best of Fair— Overall", and went on to the Canada Wide Science Fair in London, Ontario. Joel used one of our heart rate monitors to study the variability of heart rate among people.

The March 2000 issue of *Canadian Chemical News* included an article entitled *A Computer-Interfaced Physical Chemistry Laboratory: Some Personal Experiences,* in which the Chemistry Department of Sir Wilfred Grenfell College presents a first-hand account of their success implementing Vernier equipment into their Introductory Physical Chemistry course.

There have been several articles in *The Physics Teacher* in which teachers use our computer software (usually Logger *Pro*) or calculator software to do experiments and demonstrations. You might want to check out the details in *The Physics Teacher.*

- Vol 37, Nov 1999, p. 496, *The Energetics of a Bouncing Ball,* by Warren A. Turner and Glenn W. Ellis (Brunswick School, Greenwich, CT). This is a great lab exercise where students graph kinetic, potential, and total energy as a ball bounces.

- Vol 37, Dec 1999, p. 551, *Heating Water: Rate Correction Due to Newtonian Cooling,* by James O'Connell (Frederick Community College, Frederick, MD). Students use Newton's Law of Cooling to explain the non-linear rise in temperature as a container of water is heated.

- Vol 38, Jan 2000, p. 6, *Decoding the TV Remote Control,* by James O'Connell (Frederick Community College, Frederick, MD). Students use Logger *Pro*, a ULI, and a solar cell to study the pattern of infrared pulses from remote controls.

- Vol 38, March 2000, p. 176, *Computer-Based Experiments to Measure RC,* by Francis X. Hart (University of the South, Sewanee, TN). Students use our interfaces and our Instrumentation Amplifiers to study the charging and discharging of capacitors.

- Vol 38, Sept 2000, p. 354, *Variations of a Circular-Motion Lab,* by John L. Makous (Providence Day School, Charlotte, NC). A variation of the circular motion/centripetal force lab that uses a Dual-Range Force Sensor to monitor the force and provide a way of measuring the period.

- Vol 38, Sept 2000, p. 367, *Improving Precision and Accuracy in the g Lab,* Parker Moreland (Danbury, CT). This is a very nice study of the details involved in improving the measurement of g by using either picket fences or a pendulum. Included is a nice chart for estimating your local g from your latitude and elevation.

Vernier Lab Manuals Correlated to State and National Science Standards

All Vernier curricular materials are now correlated to the National Science Standards and the science standards of states shown below in dark gray. States shown in light gray are coming soon. These correlations are available free of charge in PDF format on our web site. You can download them and print them as you need them. You can also search for curricula that meets specific state and national standards at the ExplorAsource web site, www.explorasource.com.

The correlations were created by MediaSeek, the national leader in resource correlation. Having an independent agency such as MediaSeek correlate our curricular materials assures an unbiased view of how they match up with state and national science standards. We hope you take advantage of this new free service!

More About Adapters

"What adapter do I use to connect my old Vernier sensors to LabPro?"

"What adapter do I use to connect my new Vernier sensors to a ULI or a Serial Box Interface?"

These are two of our most common tech support questions. Here are the answers:

- If you are buying new Vernier sensors for use with LabPro or CBL 2, you do not need to purchase adapters! The new sensors use a BT (**B**ritish **T**elecom) connectors.

- In general, most questions about adapters for analog sensors are answered by one of these two scenarios:

  Old analog sensors. Older Vernier "-DIN" (analog) sensors can be adapted to the new LabPro or CBL 2 interfaces using a DIN-to-BTA adapter (DIN-BTA, $5).

  New analog sensors. Newer Vernier "-BTA" (analog) sensors can be adapted to the older ULI or Serial Box Interface with a BTA-to-DIN adapter (BTA-DIN, $5).

- Adapting a Vernier digital sensor is a little more complicated. If you have a Motion Detector, Photogate, Radiation Monitor, or Rotary Motion Sensor, visit our web site for more information: www.vernier.com/probes/adapters.html.

Make Me Pure

by Scott Holman

While attending the T³ (Teachers Teaching with Technology) Environmental Institute pilot held in Jackson, Michigan this summer, I saw this interesting lab activity presented by Rick Piercy (Yucaipa HS, CA). In this inquiry-based activity, students design a filtration system from common materials, such as sand, charcoal, filter paper, and cotton. Students then take a sample of water contaminated with grass clippings, vinegar, coffee grounds, and table salt, and test it for turbidity, total dissolved solids, pH, and clarity. After their initial test, the sample is poured through the filter system. The filtrate is collected in a 400-mL beaker and tested once again to determine how effective the system is at filtering out the contaminants.

The turbidity of the solution is measured using the Vernier Turbidity Sensor. Total dissolved solids (TDS) can be measured with the Conductivity Probe and the solution's pH can be checked with the pH Sensor. To build a filtration device, you will need the following: a 1-liter plastic bottle, charcoal, cotton balls, filter paper, sand, and baking soda (sodium bicarbonate). To prepare the test water, mix the following together in a 1-gallon container: water, grass clippings, potting soil or dirt, 10–100 mL of vinegar, 1–5 g table salt, and coffee grounds.

Students find that their pH has changed from an acidic value of 4–5 (due to vinegar) to a neutral or slightly basic value of 7.5–8.0. The turbidity values will significantly decrease after the first filtering, then slightly drop following the second. The filter mechanism is unable to remove ions, so expect to see no change in TDS, or an increase due to the addition of sodium bicarbonate to the filter.

	Turbidity (NTU)	pH	Total dissolved solids (mg/L)
Initial reading	135	5.3	1240
First filtering	64	7.9	4450
Second filtering	50	8.1	4690

This activity is a great way to use sensors in an inquiry-based setting. Once your students have tested their filtration device, have them use each of the filter materials separately to determine how each material affects the water sample.

Warm-Up Time for Dissolved Oxygen Probes

After extensive testing of our Dissolved Oxygen Probes, we have found that the 30-minute warm-up period can actually be reduced to 10 minutes. This shorter time really helps to simplify probe setup. With this shorter period, the probe can be warmed up once you get to your sampling location.

A New Version of Logger *Pro*™

Logger *Pro* version 2.1 for Mac and Windows will be released in September, 2000. If you have already purchased Logger *Pro* and want to get a free upgrade, check the "Downloads" section of our web site or contact our office. Here is a list of some of the new and improved features of Logger *Pro* 2.1:

- **Floating Cursor.** The coordinates of the cursor are now displayed in the status bar.
- **Delta Function.** When the cursor is used to click and drag between two points on a graph, the horizontal and vertical distances between those two points are displayed.
- **Strip Chart Mode**
- **Strike-Through Feature.** With this new feature, you can "remove" unwanted data points in the data table (e.g., ~~120.5~~). These points no longer show on the graph and are not used in any analysis calculations. You have the option of bringing them back if you wish.
- **Rename Data Run**
- **Large Fonts and Thick Lines Option**
- **New Formulas for New Columns**
- **Windows USB Support.** LabPro was the first educational lab interface with USB capabilities. Macintosh USB support was available in version 2.0. Now Windows '98 USB support has arrived.
- **Improved Radiation Support**
- **Improved Remote Data Collection**
- **Improved Printing**, including Print Screen.
- **Active X Support** to allow you to run another software program within a Logger *Pro* window, such as Netscape®, Excel®, or Vector Visualizer.
- **Improved Error Checking and Robustness**

Logger *Pro* comes with a free a site license (order code LP, $65). With this site license, you can install Logger *Pro* on all the computers in your school or college department, or on your students' computers.

The New Turbidity Sensor is Shipping!

Our new Turbidity Sensor is extremely useful in water quality studies and other experiments where the clarity of a solution is to be measured. Its small, sleek design, and simple setup make it easy to use at a water quality study site or back in the classroom. Chemistry and biology teachers can use this sensor to monitor precipitates formation or algae and yeast populations. The Turbidity Sensor measures turbidity in NTU (the standard unit used by most water collection agencies and organizations). Calibration can be done very quickly and easily using the high quality Hach StablCal® 100-NTU standard (included). Also included is a high-grade glass cuvette for the water sample to be measured. (Order Code TRB-BTA, $99)

Renew Today and Win a Prize!

Now it is easier than ever to stay up to date on the latest news from Vernier! You may renew your *Caliper* subscription on our web site at www.vernier.com/mailing_list.html or fill out the form below, fold it, tape it, and send it back to us. On November 1, we will draw 20 names from the renewals. Those 20 people will win a Vernier T-shirt. (You are eligible to win even if you ask to be removed from our mailing list!)

As an added service, you may also sign up to receive e-mail announcements from Vernier (no more than 6 messages per year). We do not sell or share our mailing lists. Fill in the information on this form or on our web site to keep abreast of new products, share information, and other fun Vernier stuff!

Would you like to stay on our mailing list?

☐ Yes   ☐ No

☐ **Please send me your latest catalog.**

Would you like to receive e-mail updates from Vernier?

☐ Yes   ☐ No

T-Shirt Size: ☐ S   ☐ M   ☐ L   ☐ XL   ☐ XXL

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If there is no mailing label, please fill the information below.

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13979 SW Millikan Way
Beaverton, OR 97005-2886

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City/State/Zip _____

Course Focus:

☐ Biology   ☐ Chemistry   ☐ Physics   ☐ Math   ☐ Middle School Science   ☐ Other _____

Your comments, questions, and jokes are always welcome! _____

_____

_____

What do you use for data collection?

☐ Computers

☐ Calculators

☐ Both

VERNIER SOFTWARE & TECHNOLOGY

Upcoming Events
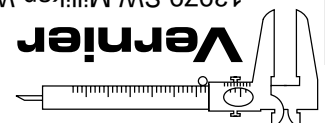
We will be exhibiting at all of the following conferences. For an updated list, visit the "Workshops" section of our web site.

Conference	Location	Date
NSTA Northwestern Area Convention	Boise, ID	October 5-7
New Jersey Science Teachers Association	Somerset, NJ	October 11-12
Texas Science Teachers Association (CAST)	College Station, TX	October 12-14
California Science Teachers Association	Sacramento, CA	October 12-15
Oregon Science Teachers Association	Newport, OR	October 13
Florida Association of Science Teachers (FAST)	Miami, FL	October 13-15
NSTA Midwestern Area Convention	Milwaukee, WI	October 19-21
National Association of Biology Teachers (NABT)	Orlando, FL	October 25-28
Technology & Learning	Denver, CO	October 25-28
Iowa Science Teachers Association	Des Moines, IA	October 26
Nebraska Association of Teachers of Science (NATS)	Fremont, NE	October 26-28
Illinois Science Teachers Association	Chicago, IL	October 26-28
South Carolina Science Council	Myrtle Beach, SC	November 1-3
Science Teachers Association of Ontario (STAO)	Toronto, Ontario, Canada	November 2-4
Kentucky Science Teachers Association	Lexington, KY	November 2-4
Science Teachers Association of New York (STANYS)	Ellenville, NY	November 5-7
Virginia Association of Science Teachers (VAST)	Roanoke, VA	November 9-11
Computer Using Educators (CUE)	Sacramento, CA	November 9-11
North Carolina Science Teachers Association	Greensboro, NC	November 15-17
NSTA Eastern Area Convention	Baltimore, MD	November 16-18
NSTA Southwestern Area Convention	Phoenix, AZ	December 7-9
AAPT National Convention	San Diego, CA	January 6-11

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