



Physics

Tempo

The Newsletter of The St. Louis Area Physics Teachers

January 1994 Vol. 4 No. 3

an affiliate organization of the American Association of Physics Teachers

Notes and News from The PTRA Dynamics Workshop December 1993

by Rex & Debbie Rice

The first of this year's Physics Teaching Resource Agents-Plus Workshops, *Teaching About Dynamics*, was presented at Gateway Institute of Technology by Missouri PTRAs Gene Fuchs, Debbie Rice, and Rex Rice on Saturday, December 4, 1993 from 8:00 a.m. - noon.

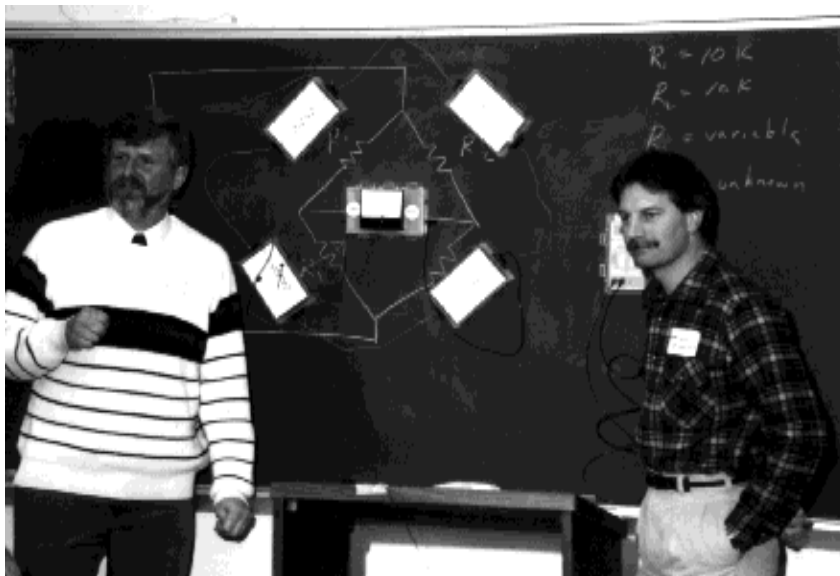
Twenty-one teachers participated in the workshop. Participants came from as far away as House Springs, MO and included teachers from middle school, high school, and college levels. The physics laboratory technician from St. Louis University was also a participant.

The workshop included activities designed to address student misconceptions in kinematics and dynamics. Participant's used Macintosh computers outfitted with Universal Lab Interfaces from Vernier Software. The probes used with the interface included ultrasonic motion detectors and force probes. The workshop gave most participants their first opportunity to use this type of equipment. An innovative fan cart attachment, designed by Robert Morse to attach to the new Pasco Scientific dynamics carts, was used for many of the activities. If you are thinking about upgrading your laboratory with new dynamics carts, seriously consider the new model from Pasco. It is truly low friction, rugged, and compared to what you pay for the "2 x 4 and rollerskate wheel" dynamics carts from most places, a relative bargain. From all indications, the workshop was a success.



Student hostesses, (Left) Kelly Lambing and (Right) Diane Discher, 8th grade students from St. Margaret Mary Alacoque School in south St. Louis County handled registration and refreshments for the January 1994 Meeting.

Look for more information on the PTRA program and PTRA -Plus Workshop on Page 2, and the enclosed flyer.



(Right) Dr. Robert Krchnavek, assistant professor of Electrical Engineering, Washington University, and (Left) Paul Discher, Lab Manager presenting demonstration using "on-the-board" magnetic demo fixtures originally designed at Washington University for EE280, an introductory course in electrical networks. Physics Teachers attending the January 1994 workshop built these demo fixtures for use in their own classrooms.

Notes and News from the January 1994 Meeting at Washington University

by Paul Discher

A regular meeting of the St. Louis Area Physics Teachers was held Saturday, January 8, 1994 at the campus of Washington University. Sixteen teachers attended this meeting which was hosted by the Electrical Engineering Department and Paul Discher. A business meeting preceded the make-and-take workshop; "Building and Using On-The-Blackboard-Electrical Demos For Teaching High School Physics".

Welcome & Business

Donuts, coffee, and meeting registration commenced at 8:30am and was handled by special student hostesses Kelly Lambing and Diane Discher. Teachers were welcomed by Paul Discher and Dave Bross, as the meeting commenced at 8:55 a.m. The first order of business was to firm up the calendar of the St. Louis Area Physics Teachers for the balance of the 93-94 academic year. Dates for the March and May meetings were acknowledged and

some discussion prevailed regarding the "topic" for the April Meeting to be hosted by St. Louis University. Frank Cange was "elected" as our "volunteer" to coordinate the details of the April 1994 meeting. Recommendations for inviting a distinguished speaker were voiced as well as possible sources for funding if air transportation and lodging became necessary. Teachers having suggestions for a speaker, or if interested in making a presentation at this meeting, should contact either Frank Cange at 618-235-2700 (Belleville Area College) or Dave Bross at 314 391-4701 (Parkway West High School).



New Faces, (left) David Taylor, Rosati Kain H.S. (right) Roger Reeves, Hillsboro H.S. (Hillsboro ILL), (not shown) Jennifer Bolla, Hazelwood East H.S.

Announcements

Various announcements were made by attendees. Dave Bross discussed a number of issues which were distributed on a printed survey form to teachers. Dave requested that teachers complete the form and return it to him. A shortened version of this survey is enclosed in this newsletter. Dave Bross also reminded teachers of nominations needed for officers which will be voted in our March 1994 Meeting. Frank Cange announced results of an AP Physics Survey conducted last year. Rex Rice presented a number of concerns regarding the ongoing costs associated with the PTRAs workshops. Rex also made a brief plug for his upcoming February 1994 PTRA "Optical Communications Workshop". A discussion prevailed regarding possible sources for funding of workshops costs other than that of teacher's own pocketbook. Bill Brinkhorst and Val Michael made announcements regarding their upcoming High Speed Photography Workshop scheduled for March 1994.

Call for Nominations

Elections - March 1994

The St. Louis Area Physics Teachers is now accepting nominations for the following positions: Executive Officer(s), News Letter Editor, Secretary-Treasurer & Membership Coordinator. The two latter positions of News Letter Editor and Secretary-Treasurer & Membership Coordinator are new positions being developed from the present work Paul Discher has done in writing, editing, and producing the *Physics Tempo*. After developing *Physics Tempo* four years ago, Paul is stepping down. Look for a new editor, and mailing address for the *Physics Tempo* in the near future.

Report from the Newsletter Editor

Paul Discher presented Newsletter and treasury report to the teachers. The *Physics Tempo* is currently mailed to 238 teachers. The *Physics Tempo* treasury balance is \$567.49, and this year we have received a number for mailing subsidies that has helped to conserve our funds. This financial picture has allowed us to continue a September 1992 initiative of our membership, the St. Louis Area Physics Teachers - Directory. This directory now in its second printing, is

provided to paid members only. The directory lists officers, executive committee members, and membership, in bound 27 page booklet. Currently *Physics Tempo* has 63 - paid members. In January 1993 there were 53 paid members, and in January 1992, 33-paid members. Paul also announced that a copy of our annual report, as required by the AAPT Constitution Section VIII, was mailed to Mr. John W. Layman in November 1993. A copy of the cover letter was presented to teachers at-

tending this meeting. The annual report package consisted of this cover letter, a copy of the St. Louis Area Physics Teachers Directory, and 1-year's back issues of *Physics Tempo*. At the conclusion of this report the teachers took a short break and returned to commence with the Workshop.

The Workshop "Building and Using On-The-Blackboard Electrical Demos for Teaching High School Physics"

This workshop involves constructing enclosures for electrical components made from video tape storage boxes that can be attached magnetically to your blackboard for vertical presentation to your class. Teachers registering for this workshop were encouraged to test their blackboards to see that they were magnetic. The participants were also cautioned that they will need to have digital multimeters of their own in order to make good measurements without affecting the parameters of a circuit. In order to provide the teachers with current information on the types and costs of digital meters, Mr. Christopher Robertson, instrumentation sales representative from Olive-RS Electronics was present to demonstrate meters and answer questions. In addition, Mr. Robertson, Olive-RS Electronics and John Fluke Mfg. Company donated a model 77 Fluke digital multimeter which was raffled off before we started the workshop. The winner of the meter was Gary Shepek (Belleville West High School).

Dr. Robert Krchnavek, assistant professor of Electrical Engineering at Washington University gave a short talk on his experiences teaching and using "on the board" as well as other demo devices in his classroom. He also described the events that lead up to the development of the "on-the-board" devices by Paul Discher. These devices were originally designed and constructed to meet the needs of an Engineering networks class EE280.

After the talk, Dr. Krchnavek and Paul Discher jointly presented two network demonstrations using a set of completed "on-the-board" fixtures. The first network was a simple series and parallel resistor combination. A circuit diagram was sketched on the blackboard using schematic symbols. Thereafter the chalk symbols were replaced with magnetic boxes containing the components. Once the individual components were cabled together, ohms law formulas were applied to determine the voltages and currents through the circuit.

The second network constructed 'on-the-board' was a

Wheatstone bridge. Configured as a balanced bridge, this circuit arrangement made it simple to calculate the value of an unknown resistor by reduction of the second term in the equation. Therefore, the unknown resistor was simply equal to the value of the adjustable resistor in one leg of the wheatstone bridge. By using an analog meter at this point to "null" the bridge it was shown how the internal resistances of such meters can affect the overall function of a network. The artifact of this meter produced an error in the "unknown" resistor value by 300 ohms. The analog meter was substituted with a high impedance digital meter and the bridge circuit was "nulled" again. This time the predicted resistance approached the unknown within 30 ohms (< 3%). Following this demonstration there was a short refreshment break. Teachers rejoining the workshop after the break continued with the fabrication of their fixtures. Other teachers were invited to tour the Electrical Engineering laboratories.

Special Event: PTRA Workshop "Teaching about Lightwave Communications"

Date: Saturday February 12, 1994
Time: 8:30am - 2:30pm
Place: Clayton High School
Host: PTRA's Debbie Rice, Rex Rice, Gene Fuchs
Contact: Debbie or Rex Rice
314-862-2845

The second PTRA-Plus physics workshop will be held at Clayton High School on Saturday, February 12, from 8:30 a.m. to 2:30 p.m. The topic of this workshop is *Teaching about Lightwave Communications*. This workshop hosted by Missouri PTRA's Gene Fuchs, Rex Rice, and Debbie Rice. The fee for this workshop is \$85.00, \$55.00 of which covers materials which will be taken home by participants. The firm deadline for registration for this workshop is Monday, January 24. Please see the flyer in this issue of *Tempo* for further information and the registration form for this workshop.

News on the Third PTRA-Plus Training Session *by Rex Rice*

The third PTRA-Plus training session will be held this summer in South Bend, Indiana, on the campus of Notre Dame University. At that time PTRAs will be trained to present at least two more workshops on new topics. Watch the *Tempo* for details on future PTRA-Plus physics workshops.

If you have any further questions about the PTRA program or workshops, please contact Debbie or Rex Rice at (314) 862-2845. We are willing to travel to other sites in Missouri and Illinois for groups as small as 10 participants. Current workshops which are available through the PTRA-Plus program include:

The Role of Laboratory Activities in Introductory Physics Teaching, The Role of Demonstrations in Introductory Physics Teaching, Teaching About Kinematics, Teaching About Electrostatics, Teaching About Electric Circuits, Teaching About Dynamics, Teaching About Astronomy, Teaching About Magnetism, Teaching about Waves and Sound, Teaching about Lightwave Communications. More workshops are being developed.

Next Meeting —March 1994 "High Speed - Sound Activated Photography workshop"

Date: Saturday March 12, 1994
Time: 8:30 a.m.
Place: Parkway Central High School
Host: Val Michael & Bill Brinkhorst

The next regular meeting of the St. Louis Area Physics Teachers will be held on the campus of Parkway Central High School, 369 North Woods Mill Road, Saturday March 12th, 8:30am. This meeting will be hosted by Val Michael & Bill Brinkhorst (John Burroughs School), and the topic will be "Sound Activated High Speed Photography". An important business meeting will precede the workshop. We will be taking nominations and electing new officers for the upcoming new academic year 94-95 and, nominating and electing a News letter Editor and Membership Chairperson / Secretary Treasurer.

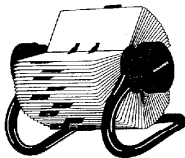
At this workshop teachers will be able to test the 'sound trigger' devices based on the Physics Teacher articles by Loren Winters. Copies of the articles will be available at the meeting. Teachers will be taking pictures with their own camera, and the sound triggered flashes will be provided by Val and Bill. Additional sound trigger kits will be available for purchase at the meeting, please call Val if interested in purchasing one of these kits (Parkway Central 851-8251).

Participating teachers will need to bring a camera that has the ability to function in "bulb" mode shutter, along with some high speed ISO 400 film. In addition to your camera and film you should consider selecting a high action event that produces noise to photograph like a balloon popping, or a firecracker exploding. Please bring the materials necessary for these events along with you. Some limited results have been obtained with video cameras applied to this photography. Please bring your own video camera and tape if you would like to try this.

Parkway Central High School is situated on the west side of Woods Mill Road, just 1/2 mile north of the intersection of Ladue and Woods Mill Roads. The Senior High shares the grounds with Parkway Central Junior High School and the Parkway School District Offices. Parkway Central can be easily accessed by driving west on Highway 40 (Interstate 64) to Woods Mill Road and exiting North on Woods Mill Road. Parking lots are in the center of a one-way circle driveway. The teachers will be meeting in Room 1004 and signs will be posted to direct you.

The Physics Teachers Rolodex

This is the Physics Teachers Rolodex, the place where you find the places to get the things that you really didn't know you needed.



This month the Physics Teacher's Rolodex focuses on the places where to buy the materials used in the January 1994 'On-the-black-board' electrical Demos.

Anchor Sales Inc.
Wholesale Distributors
1693 Fenpark Drive
Fenton, Missouri 63028
314-646-6520

Anchor Sales is distributor of a variety of cabinet makers supplies. Contact Rick Williams for ordering Belwith PT110-TP cabinet magnets. Sold in packages of 25 magnets they original cost was \$.40. You could pay twice that in hardware stores. Best magnets at the lowest price.

Marlin P. Jones & Assoc. Inc
P.O. Box 12685
Lake Park, Florida 33403-0685
407-848-8263

They have a really great electronics catalog with low prices and some nice hard to get items. The #4298 TS Quick Connect Terminal Strip (2-way) costs only \$.45. You can also buy a (4-way) strip if you want more connections on your component boxes.

Sams Wholesale Clubs
variety of St. Louis & Ill Locations
Membership club for purchase of all sorts of home, personal, and office supplies. My choice for sourcing the 20-packs of high quality video tape boxes (clear) for \$6.68. (Add 5% if you are not a member.)

RS - Olive Electronics
2555 Metro Blvd.
Maryland Hts. MO. 63043
Formerly industrial - wholesale only electronics distributor but now anyone can buy. Fanstock clips cost \$.08 in boxes of 100. Contact Chris Robertson for pricing on digital meters and other instruments.

Teachers Kit Teachers Companion to 'A Brief History of Time'

You can now order a teachers kit for A Brief History of Time, a 1993 feature film documentary on the life of astronomer Stephen J. Hawking. The kit includes a video of the movie, a study guide entitled *The Readers Companion to A Brief History of Time*, a teachers guide, and a science quiz for students. The kit costs \$39.95, and can be ordered by contacting Joy Scott and Associates, 15027A Sherman Way, Van Nuys, CA 91405, telephone number 800-433-9833



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First Class Mail

1994 Calendar

St. Louis Area Physics Teachers

February 1994

“PTRA Workshop”

Date: Saturday, February 12, 1994

Time: 8:30am

Place: Clayton High School

Host: Debbie & Rex Rice

Light Wave Communicaitons

March 1994

“High Speed Sound Activated Photography Workshop”

Date: Saturday, March 12, 1994

Time: 8:30am

Place: Parkway Central High School

Host: Val Michael

Demonstration and construction techniques for equipment used in producing High Speed Sound Activated Photographs.

April 1994

“St. Louis University Physics Competition and Annual Meeting”

Date: Saturday, April 16, 1994

Time: 8:30am

Place: St. Louis University -Monsanto Hall

Host:

Annual meeting for Physics Competition — Meeting Topic Open

April 1994

“Physics & Math Day at Six Flags”

Date: Friday April 29, 1994

For more information and reservations call Chris Geisert at 314-938-5300

May 1994

“Laboratory Practicum - SIUE”

Date: Saturday, May 14, 1994

Time: 8:30am

Place: SIUE

Host: Mr. Zurheide

Physics Lab Practicum

1994 February 1994						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
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1994 March 1994						
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1994 April 1994						
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1994 May 1994						
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