

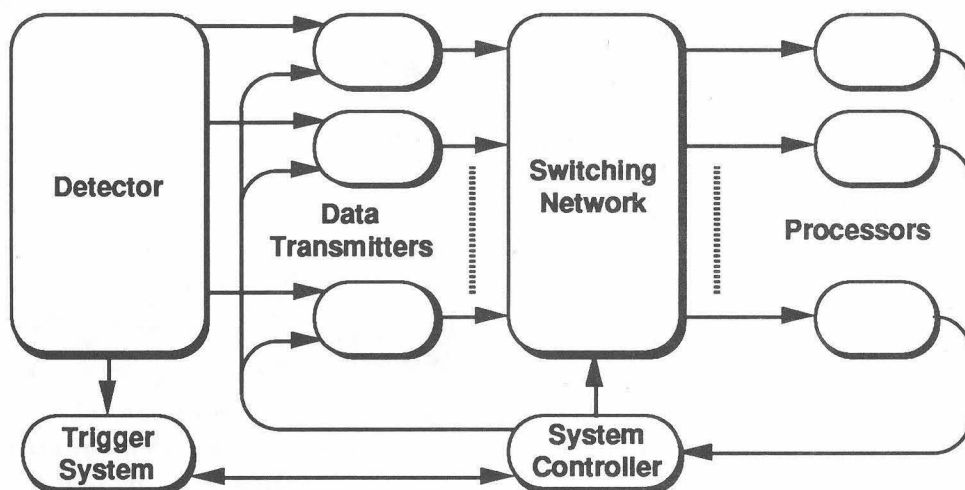
Prototype of new data acquisition system demonstrated

The Data Acquisition Electronics Department (CD) recently demonstrated a prototype of a new data acquisition system based on a high-bandwidth switching network. The switching network functions as an "event builder" by combining information from many detector data sources to produce a stream of assembled events for transmission to higher level processors or workstations.

The goal of the project is to demonstrate that the new data acquisition system architecture is simple, scales from low to high-rate experiments, is easy to maintain and adds very minimal deadtime to event data read-out. An additional goal is to demonstrate that the event building process can be performed using parallel techniques with a linear increase in data throughput.

The prototype system consists of an 8x8 switch-based parallel event builder with a peak bandwidth (data and headers) of 160 Megabytes per second (20 Megabytes per second per output). By increasing the number of channels, it is expandable within a single crate to over one Gigabyte per second (approximately 50 to 100 times faster than conventional single channel event builders). Improvements in technology allow this increase in performance with very little increase in cost or space requirements. Because the hardware and protocols are optimized for event building, the data transfer rate on each channel can be several times higher than possible with commercial general-purpose networks.

The illustration (top) shows a typical system implementation using the parallel event builder. The prototype version supports self-routing dataflow,



Proposed architecture for high-speed data acquisition systems.

built-in diagnostics and programmable switch configuration to allow any combination of inputs and outputs. The system controller can receive event requests from individual processors, match these requests against triggers generated by the trigger system and automatically route event data to the correct destination.

Much of the technology for this prototype originates in the telecommunications and computer industries. High speed, point-to-point fiber-optic data links and time-multiplexed switching are used in place of the traditional shared data buses. Development software was based on standard UNIX compilers and utilities. Remote procedure calls were used to communicate between a Sun Microsystems compatible host workstation and Sun VMEbus CPU modules for monitoring and downloading functions.

This project was undertaken in cooperation with the SSC's generic detector research program and is currently being considered for use in the CDF data acquisition upgrade project.

The switching network occupies the center crate in the photograph shown on page 8. Two additional crates are used to simulate the detector/data transmitters and the high level processor array.

Additional information may be obtained by contacting **Mark Bowden** (x4658, bowden@fnal), **Dennis Black** (x4525, dblack@fnal) or **Ed Barsotti** (x4061, barsotti@fnal).

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Prairie Path gets an Earth Day face lift

Families from Experiment E769/E791 and from the Computing Division's Online Support Group celebrated Earth Day by cleaning up a portion of the Illinois Prairie Path. The Prairie Path is a network of approximately 46 miles of biking, horseback riding and hiking trails.

The group of about two dozen spent Saturday morning, April 20th, picking up trash along the five miles of the southern leg of the trail. After the recyclables were separated from the trash, the remaining trash filled up a good portion of a dump truck provided by the Fox Valley park district. Along with the standard items of old beer cans and bottles, the trash ranged from the large (old car tires) to the unusual (a bed pan).

Many members of the group are frequent Prairie Path users. **Pauline Gagnon**, a graduate student from the University of California at Santa Cruz, commutes on the path to Fermilab from her apartment in Aurora. "It is much more pleasant than driving, especially on a nice spring day. It's too bad there isn't a better connection between the path and the bike trails on the Lab." (Although the Prairie Path cuts across near the southern edge of Fermilab, there is no direct connection to the Lab's bike trails or roads.)

The Prairie Path is actually a group of trails running from the towns of Aurora, Geneva, Batavia and Elgin west through Wheaton towards Chicago. (See map on page 3. Additional maps are available in the Public Information Office, WH1W.) The trail currently ends around the Tri-State Tollway, although additional expansions are planned. The surface of the trail is compacted gravel or asphalt, an easy surface for any biker or hiker. It is linked to the Fox Valley River Trail in several spots and runs through the central parks in several of the connected towns.—*Tom Carter*



Armed with garbage bags, wheel barrows and a dump truck provided by the Fox Valley park district, families from E769/E791 and the Computing Division's Online Support Group spent a Saturday policing a portion of the Illinois Prairie Path. Most of the group are frequent users of the path, and for some, it is even a means to get to and from work at Fermilab.



As an Earth Day celebration activity, Kathy and Keith Thorne, E769/E791, (right) pitch in to help clear unsightly debris from a portion of the path.

About the Prairie Path

The Illinois Prairie Path follows the route of the former Chicago, Aurora and Elgin Railway from Maywood to Wheaton, then branches to Elgin and Aurora with spurs to Batavia and Geneva.

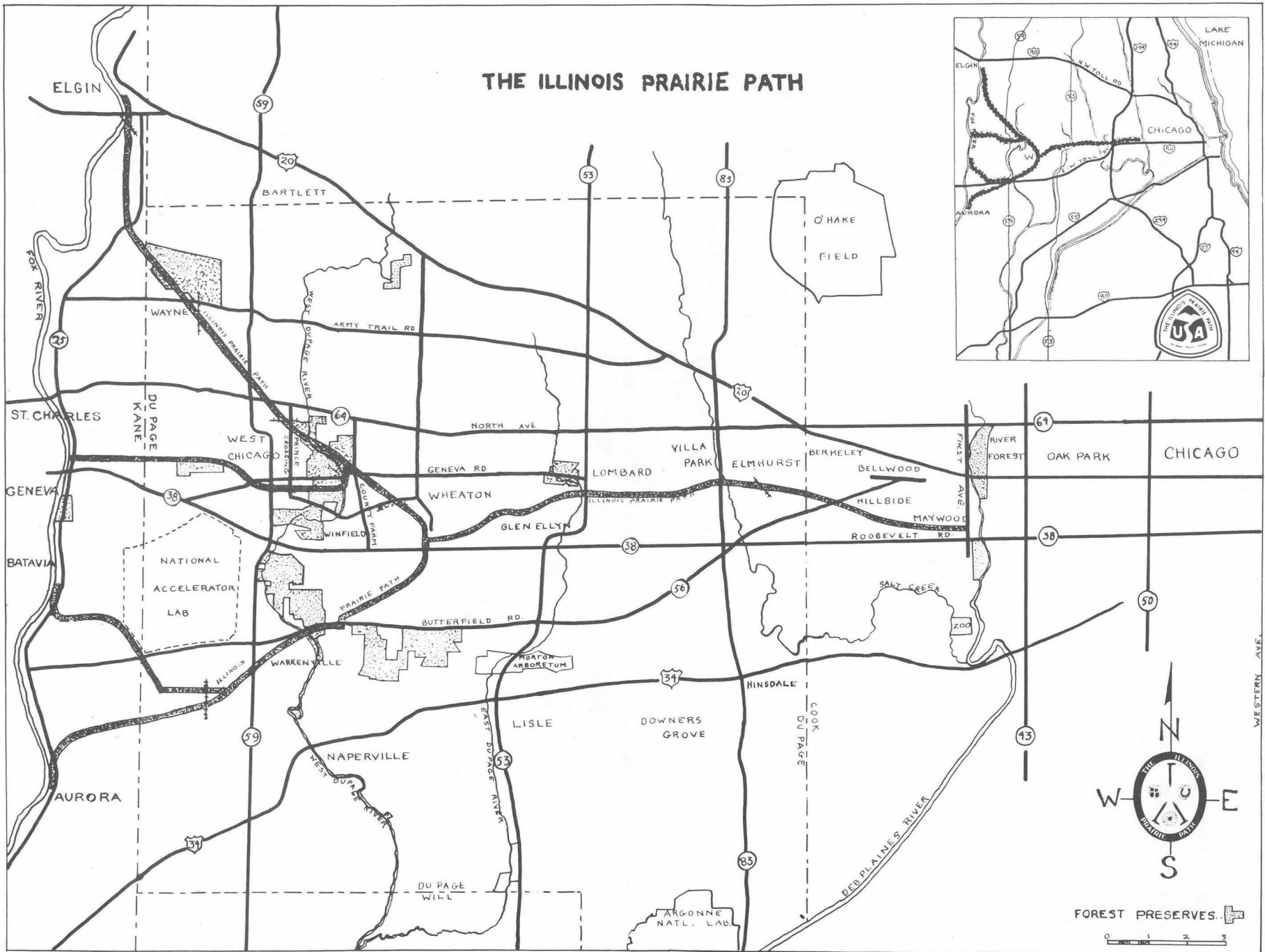
May Theilgaard Watts, distinguished naturalist, had the idea of preserving the abandoned railroad right-of-way and converting it to a nature trail. She and a small dedicated group of people generated warm

public response and in 1966 the path was formally established.

It is open to the public—free—all year and can be used by joggers, hikers, strollers, bicyclists, bird watchers, equestrians and nature lovers.

For more information on the Prairie Path, you can send a self-addressed, stamped envelope to the Illinois Prairie Path, P.O. Box 1086, Wheaton, Illinois 60189.

THE ILLINOIS PRAIRIE PATH



Activities Office news

Summer activities

Summer at Fermilab offers a variety of activities sponsored by the Activities Office. For rosters, sign-up or more information about participating in the following activities, contact Jean at x3126 or Sheri at x4544 or stop by the Activities Office located in WH1E. Office hours are 8:30 a.m.- 5:00 P.m.

Scuba course

Come and take a scuba course right here at the Fermilab pool. The course begins on Wednesday, July 10 and will meet every Wednesday for five weeks from 7:00 -10:00 p.m. with 1½ hours of class time and 1½ hours of pool time. The cost is \$110. Students will need to provide masks, fins and snorkels by the second class. Open water training dives for certification are separate and at an additional cost upon completion. Payment for the course is due prior to the first session. Make your check payable to Fermilab and mail it to Sheri at MS 125. The minimum age requirement is 12 years old. Class size is limited.

Canoe rentals

Take a relaxing canoe ride down a river, in a pond, around a lake or wherever you choose. The Activities Office offers canoes for rent. The cost is \$5 per day, per canoe. Life jackets are also available. Reservations and payment must be made in advance. To reserve a canoe, stop by the Activities Office.

Basketball league

Sign-up for the summer indoor basketball league. An organizational meeting will be held on Thursday, May 30 at 5:15 p.m. in the gym. Games will be held on Thursday nights beginning June 6. A gym membership is required.

Softball season

The Fermilab softball season is here. It's 14 inch, slow pitch, co-ed fun! An organizational meeting will be held on Wednesday, May 15 at noon at the Village ballfield. Games will be played on Wednesdays at 5:30 and 6:45 p.m. beginning May 22. There is no cost—just the obligation to have fun. We also need a few good women and men to umpire.

Education update



Karen Schock of Highland School in Elgin and Diane Cullen of Eastview School in Bartlett participate in a Teaching Integrated Math and Science (TIMS) graphing activity during a follow-up meeting held at Fermilab. Forty-two teachers from 29 schools are involved in learning new hands-on math and science activities through the TIMS program.

Nalrec offers tickets to Great America

Once again Nalrec is making Great America tickets available to Fermilab employees. If purchased at the main gate, an adult admission is \$21.50. Through Nalrec, you can purchase an adult ticket for \$16.50—a savings of \$5. A Prime Timer ticket (ages 60 & over) is \$12.50 and can be purchased at the gate. Children 4-10 are \$18.50 at the gate, so an adult ticket purchased at the Lab is a better value. Children ages 3 and under are free.

Tickets are available at the Atrium desk daily from 8:00 a.m.—4:00 p.m. If paying by check, please make payable to Nalrec. If further information is needed, please contact **Jesse Guerra** at x4305 or **Connie Kania** at x3353.

Harper's index

Number of bees that invaded a Bayport, New York house while the owners were on vacation last spring: 20,000

Estimated pounds of honey they produced before being removed: 10

Anniversary posters available

Copies of Fermilab's twentieth anniversary commemorative poster are available outside of the Publications Office, WH6NW. Quantities are limited. Pick up is available on a first come, first served basis.

More Nalrec news

Nalrec set up a game night with our very own AAA Kane County Cougars—professional minor league baseball team for the Baltimore Orioles. Unfortunately, the game was rained out. Anyone holding tickets will be allowed to attend another game. Nalrec plans to set up another Fermilab day at the ball park soon. Watch *FermiNews* for details.

Ed Justice, Paul Gentry, Nancy Bartlett and John Jones really have things rolling for the Old Timer's Steak fry to be held on May 31. The band will be great, the food delicious and of course the company will be the best. Hope you will mark your calendar and join us.—*Charlotte Smith*

Sports report

Bowling league season results

The season for the 1990-91 Wednesday Night Mixed league concluded with teams featuring a Fermilab roster taking first and second place. The first place team was comprised of **Roy Justice**, captain (Phys. Sect.), **Jose Delao** (AD/Safety), Mike Towle, Pat Turkot and **Ed LaVallie** (RD/Mech. Dept.). The second place team members were **Gary Smith**, captain (RD/Mech. Dept.), Linda Smith, Brenda Shenk, **Paul Kurylo** (AD/Cen. Hel. Liquif.) and Randy Shenk.

Individual and team awards were as follows:

Most improved:	Brenda Patton and Jose Delao
High series scratch:	Mike Towle (689), Donna Upton (562)
High game scratch:	Dan Rubek (288) and (tie) Donna Upton, Janet Perez (213)
High average:	Glenn Federwitz (194), Donna Upton (161)
High series handicap:	Jose Delao (746), Brenda Shenk (668)
High game handicap:	Paul Kurylo (288), Linda Smith (259)
Team series scratch:	Gary's team (2711), Roy's team (2654)
Team game scratch:	Gary's team (3140), Roy's team (3129)
Team series handicap:	Gary's team (3140), Roy's team (3129)
Team game handicap:	Roy's team (1115), Gary's team (1102)

Volleyball champs



Champions of the Batavia Park District volleyball league for the second consecutive year are: (back row, l. to r.) Margaret Votava (CD/D A Support), Don Flynn (BS/Info Systems), Glen Populorum, Alma Karas (BS/Contracts), (front row) Dong Chen (E761), Yangling Zhang (E760), not pictured are substitutes Maria Roco (E790), Mika Masuzawa (E760) and Tim Dubbs (E761). The team finished first in the league for the season and won the double elimination tournament.

In memoriam

Jon Borg, Department of Energy, Batavia Area Office (BAO), passed away on Monday, April 8.

Jon graduated from Michigan Tech with a masters degree in physics and mathematics. He began his career at the Chicago Operations Office in 1964 in the then named "Reactor Engineering Division." He participated in the development of power reactors, now a commercial reality.

In 1982 he transferred to the BAO located at Fermilab where he utilized his technical skills on the development of proton accelerators. In addition to his technical expertise, Jon was known and frequently described by his peers as an extremely talented writer.

Jon is survived by his daughter, Julianna; his parents, a brother, Steve and a sister, Diani.

The family has requested that any donations be made to the American Diabetic Association.

Congratulations to:



Don't forget to remember!

Donate blood

The Heartland Blood Center blood drive will be held at Fermilab on Thursday, May 9 from 9:00 a.m. - 2:00 p.m. in the WH1W conference room.

Fermilab sends team to national science bowl

A team of high school students from Lake Forest High School won the Fermilab-sponsored Science Bowl competition at the Illinois State Science Olympiad held April 6 in Bloomington.

With tense fingers poised over buzzers, team members from Lake Forest answered their way through three rounds of questions ranging in topics from astronomy to physics en route to their first place finish.

But, there was no cheering audience; not even any shouts of encouragement from the crowd as the Lake Forest team intellectually grappled their way to a narrow margin of victory over Palatine's Hersey High School. That's because the crowd, actually a 1,000-person audience, was in another auditorium watching Fermilab senior technical aide Mike Urso conduct a cryogenics show in which he used a locomotive propelled by liquid nitrogen changing to gas to demonstrate the law of conservation of energy.

Meanwhile the event, the last of the day at the Illinois State Science Olympiad, took place behind closed doors, and the air—unlike that at a sporting event—was not so much filled with perspiration as it was with the concentration of the high schoolers.

As the battle of wits raged, their young faces took on expressions of seriousness and consternation, their eyes fixing on the moderator who would decide their fate with an ill-answered question on biology — or maybe chemistry.

And after the smoke cleared, the Lake Forest High School team walked away as the winners. Dave Rickard (16), Julie Summers (16), Joe Madrigano (18), Elise Wolfgram (17), alternate Mark Hoffman (17) and coach Dr. William Conway arrived on the the University High School campus Saturday as competitors, but they left that evening as champions.



Dr. William Conway (r.) and members of the Lake Forest High School science bowl team. The team, sponsored by Fermilab, placed first in the State science bowl competition and will now advance to the Nationals.

"I was proud of the work of the winning team," said Robin Dombeck of the Education Office, who helped coordinate Fermilab's role in the Science Bowl event.

Dr. Conway, an outstanding physics teacher who uses a variety of methods to help his students understand science, is no newcomer to innovative and interactive learning exercises like the one employed in the Science Bowl format. He already works with Fermilab's Topics in Modern Physics program and the DOE High School Honors Research program, both of which use innovative teaching sessions to increase student awareness and aptitude in the high energy physics arena.

"Bill Conway always does a great job with his kids," Robin said. "It's serendipitous that one of the teachers that we have working with some of our programs should be the coach of the winning team."

The two educational programs that Dr. Conway is involved in form only two of the more than 30 such programs which the Laboratory sponsors.

Through participation in the National Science Bowl, Fermilab has demonstrated again that it is working closely with the Department of Energy (DOE) to stimulate even greater interest in science among precollege students.

For all their hard work and success at the Illinois State Science Olympiad's Science Bowl event, the Fermilab team coached by Dr. Conway will compete at the First Annual U.S. Department of Energy-Intel Foundation National Science Bowl in Washington, D.C., April 20-22. If they come out on top at the National Science Bowl, then it's off to an international competition in Australia.

The DOE has encouraged its national laboratories to continue their involvement in science education and to support Science Bowl events to further national science literacy. The DOE and the Intel Corporation Foundation sponsor the National Science Bowl during National Science and Technology Week (April 21-27) as part of a nationwide effort to increase public awareness and understanding of science, mathematics and technology.

—Brian Dick

Quality corner

The following suggestions were received by the QA office. If you have a suggestion on how to improve the quality, efficiency, reliability or effectiveness of a Laboratory service or operation, please send it to Mark Bodnarczuk, MS200 or Bitnet Bodnarczuk@FNAL.

Suggestion: For the safety of motorists and bicyclists alike, I would like to know why the bicycle path usage is not enforced? The hours between 6:30-8:30 a.m. and 3:30-5:00 p.m. are very dangerous. Batavia Road (Road D) from Eola to Sauk Circle is extremely busy and the bicyclists endanger themselves as well as others. Much money and time was spent on the path for bicyclists and joggers/walkers. I feel that for the safety of all, some type of policy regarding street usage for bicyclists and walkers/joggers during the above hours should be initiated.

Response: In traffic regulation and enforcement, the Laboratory follows the Illinois Vehicle Code

(IVC) Chapter 95 1/2 of the Illinois Statutes. We also follow the State of Illinois Rules of the Road which is derived from the IVC. All persons who have a Illinois driver's license must know these rules to pass the test to obtain a license.

When the bike paths were built the IVC mandated that when a useable bike path was adjacent to a road, the bike rider must use the path. About four years ago, this law was changed. The current IVC allows bike riders the same privilege to use the road as is allowed motor vehicle operators. Bike riders can use the road, but must observe most of the same rules that apply to motor vehicles, i.e. ride with the flow of traffic, signal when turning, stop for stop signs, etc.

Pedestrians have always had the right to walk on the roadway as long as they do so facing traffic flow.

Fermilab does not have regulations which are stronger than the State law. Bikers and walkers will continue to share the road with motor vehicles.

If you see anyone—driver, biker or

pedestrian—violating traffic regulations or good highway safety practices, please notify the Security Department at x3414 or your Senior Safety Officer.—*Jim Richardson*, Directorate, *Rudy Dorner*, Business Services

Suggestion: Why, in our efforts to recycle a majority of the paper used at the Lab, don't we have a program to recycle the outdated telephone books that we receive from the telephone company or our own generated listings?

Response: At the present time, the recycling industry is not interested in telephone books because they are not cost effective to recycle. The reasons are that the glue used to bind the books must be removed, the cover is of a different grade and the interior is low grade newspaper quality. The major cost factor is the removal of the glue. If technology changes making it practical to recycle phone books, we will make that announcement.—*Dick Auskalnis*, Business Services

MATTER MIND = Sculpture/1991

a grassroots symposium/exhibition

The Central Time Zone Organization is sponsoring a symposium/exhibition to be held at Fermilab on Friday, May 10 through Sunday, May 12. The symposium will be conducted from 9:00 a.m. - 5:00 p.m. It will begin Friday night with an opening reception and will include a barn dance and barbecue on Saturday.

Lectures and panel discussions will include such topics as, *The Enduring Bronze Age*, *Stone Vehicle for the Mystical and the Universal*, *Art Fabrication*, *Not for the Timid*, *The Fountain*, *Crosspollination*, *Light as Form*, *The Big Bang*, *How to Keep Your Art from*

Killing You, *Art on the Move* and much more.

Coupled with the symposium, the Central Time Zone Organization will also sponsor an invitational exhibit which will remain at Fermilab for two months. The exhibit features both an indoor and an outdoor display. The indoor display will be featured in the art gallery located in Wilson Hall on the second floor crossover. The outdoor exhibit will be displayed in areas adjacent to Wilson Hall. The exhibit will include scolograms, bronzes, totems, ceramics, resins, wildflower works, kinetic steel, satellite broad-

cast art, holograms and holography, nuclear experience, stone, computer work, iron aluminum, soundworks, a medicine lodge, kinetic aluminum, clay and latex, fiber glass, stainless steel, aluminum/neon and concrete.

Fermilab employees and users are invited to visit the exhibits while on display at the Laboratory. The symposium is also open to the public. For information regarding attendance, contact Penn Stallard, Central Time Zone Organization, P.O. Box 4651, Chicago, IL 60680 or call 312-829-3635.

Cla\$\$ified ad\$

Miscellaneous:

Schwinn LeTour 10-spd bicycle, men's 25", \$95. **Quasar Console TV** with remote, like new, \$175. **Book shelf cabinet**, custom made, \$200. Call Larry at x3377 or x3378.

Water filters, 3 new Multipure carbon block water filters. Filters out chlorine, particulate iron, organisms and many other chem. pollutants. Lab reports available. Free 3 day trial. \$290 each (reg. \$329). Call Joy at x8209 or 708-729-6566 after 7 p.m.

Toro 21 inch lawn mower with catch bag, \$35. Call King at x4597 or 708-983-0279.

Men's ten-spd bicycle, 26" wheels, 20" frame, ex. con., \$85. **Armstrong alto saxophone**, good con., just right for a student player, \$330. Call 708-898-6312 after 6 p.m.

Above ground swimming pool, 21 ft diameter, filter and everything with it. Five years old, good working order, \$200. **Antique Hoosier-style kitchen cabinet**, 2 piece with sliding porcelain top, \$250. Call Jeff at x3880 or 708-556-3721.

13 inch Goldstar color VGA monitor & swivel base, \$220. Call Dan at 312-630-6498 days or 708-920-9132 evenings.

Motorized vehicles:

1979 Olds Cutlass Supreme, V8, auto., pow. str./br./wndws; A/C, silver; good con., asking \$1,400. Call Joy at x3111 or 708-859-3671 evenings and weekends.

1981 Honda Accord LX, 3 dr. hatchback, 130k mi. (37k highway mi. on rebuilt engine); 5 spd., pow. str and

br.; excel. tires, 4 spkr. am/fm stereo, some rust, carefully maintained with records, \$1,250. Call Brian at x3748.

1984 Subaru GL wagon, 77k mi., ex. con., 5 spd., pow. wndws and side mirrors, tilt str. wheel, am/fm radio, roof top carrier, \$2,450. Call David at x3471, 708-406-9864 or FNAI::DFANDERSON.

1923 T-Bucket Roadster, rolling chassis with fiber glass body, Ford 351 Cleveland with C-6 auto trans., 9" Ford rear end, partially assembled, extra parts; \$1,500. Call Ron at x4663 or 708-466-7109.

Wanted:

Women's style mountain bike or **10-spd** in good working con. Call 708-527-0875 and leave a message.

Girl from Europe seeks to stay with a family for 1-2 months during the summer, 16, speaks Eng. Will help at home, baby-sit etc., has medical insurance. Call Vladimir at x2394.



The Computing Division Data Acquisition Electronics Department recently demonstrated a prototype of a new data acquisition system. Department members include: (Back row l. to r.) Mark Bowden, Ken Treptow, Don Walsh, Dennis Black (front) Rick Kwarcianny, Rick Van Conant, Jeff Andresen, Kelly Knickerbocker, Oscar Trevizo and John Urish. See page 1 for story.

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The deadline for the Friday, May 17 *FermiNews* is Wednesday, May 8. Please send your article submissions or ideas to the Publications Office.