

Hotline

The Princeton Plasma Physics Laboratory is a United States Department of Energy Facility

Computer Division Scrambles to Add Sixth Digit for TFTR Shots

By Patti Wieser

The Computer Systems Division at PPPL was up against the clock. The TFTR shot clock, that is.

All the computer systems associated with TFTR — which had accommodated a five-digit shot — had to be converted to accommodate a six-digit shot.

"TFTR has a master clock called the shot clock and it was designed way back in about 1982 with five digits. The shot numbers would go from one or zero to 99999," said Michael Diesso, of the Computer Systems Division (CSD). "The machine was supposed to shut down in the late 1980s or early 1990s but it got extended so many times that we ran into the problem of using up more shots than we had room for in the clock. We needed another digit — a sixth digit — to go up to shot 100,000 and above." TFTR averages 250 shots per week of operation.

By the time TFTR shut down in the summer of 1996 for maintenance, the Lab was up to shot 96391. "Various people calculated how many shots we needed by the time

TFTR would end and found we would be over the limit. This past summer, most of the people in this division were busy going through all of the codes that related to TFTR to see if they used a shot number — and most of them did



The PPPL team involved in the "sixth digit" project are, from left, Gretchen Zimmer, Dick Wieland, Ken Silber, John Dong, Tom Gibney, Marilee Thompson, James McEnerney, Michael Diesso, Lewis Randerson, Jane Montague, James Hirsch, Christiane Ludescher, Doug McCune, and George Christianson. Not pictured are Phyllis Roney, James Chu, and Judy Giarrusso. The insert is the shot clock with six digits.

Continued on page 3

Potensky Receives Gore's Hammer Award



P PPL's Carl Potensky recently joined the Lab's honored award recipients.

Potensky, Manager of the Maintenance Engineering Branch for the Lab's Facilities and Environmental Management Division (F&EM), helped "reinvent government" and received the prestigious Hammer Award from Vice President Al Gore for his efforts.

"Carl worked with a team of representatives from Department of Energy (DOE) laboratories to consolidate an onerous number of DOE orders — 13 orders consisting of over 500 pages — into one order less than 10 pages. It was truly a feat of accomplishment that took about two years to achieve," said J.W. Anderson, Head of the Lab's F&EM.

Potensky was a member of a 12-person utility and energy sub-group that was awarded for its contribution to the DOE Headquarters' initiative to dramatically improve the way DOE manages its physical assets. Physical assets include real estate, real property and facilities, i.e. land, buildings, structures, and roads.

The sub-group, which was one of four technical sub-groups that supported a performance improvement team, included four contractors, four DOE Field Office employees, and four DOE Washington Headquarters representatives. The group met periodically from the fall of 1994 until the spring of 1996.

Eliminate Thick Layers

"During the whole time I felt like I was working toward something — a goal that was well defined. Our job was to eliminate thick layers of orders and allow contractors to do the jobs they were hired to do," said the award recipient.

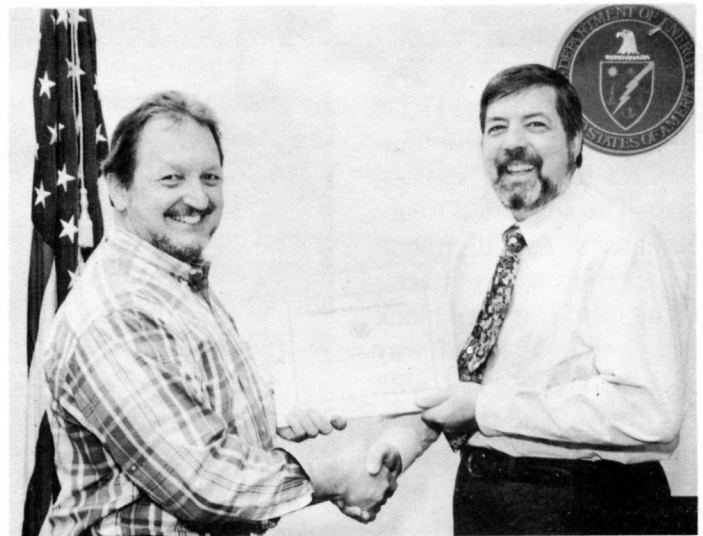
As part of the DOE's contract reform efforts to manage operating contractors through performance-based contracts, and through the change in DOE's management approach to say "what," not "how" in DOE orders, the sub-group was able to consolidate 13 DOE orders relating

to physical assets into a single order called Life Cycle Asset Management.

Each member of Potensky's sub-group received the Hammer Award by the National Performance Review for their "contribution to building a government that works better and costs less."

The Hammer Award is given to teams of individuals who are responsible for participating in an effort that "smashes" government bureaucracy. It is the Vice President's answer to yesterday's government and its \$400 hammer. About 600 Hammer Awards have been presented to teams comprised of federal employees, state and local employees, and citizens who are working to build a better government.

"I'm very proud to have received the award and thankful to PPPL and DOE for selecting me to serve on the team," said Potensky, who received a plaque signed by Vice President Gore and a pin of a hammer signifying the elimination of government waste. ●



DOE Princeton Group Manager Jerry Faul (right) congratulates Carl Potensky on receiving the prestigious Hammer Award. DOE officials at the Lab presented the award to Potensky.

HOTLINE

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Computer

Continued from page 1

— and whether there was room for six digits. Most of the time there wasn't. We had to check all the codes and modify those that used the five-digit shot number," said Diesso. Diesso worked along with CSD's George Christianson and Jim McEnerney, who took the lead on the project.

That included looking at low level operating systems, all the diagnostic applications and display programs, as well as the controls systems. "Basically the entire guts of the computer system for TFTR was looked at and most of it was modified," Diesso said.

The task became trickier with a reduced staff level. "Over half the programmers had just been laid off so those of us who were left had to do this along with our other work," said Christianson. In addition, many of the people who had designed the programs were no longer at the Lab.

Forge Ahead

After weighing the alternatives, the group decided the best solution was to forge ahead and use six digits. "We talked about just starting over again at zero the way you would roll back an odometer on a used car. But all the solutions that could have saved work in one place produced as much or more work in another place," said Christianson.

For instance, the database information had dates, times, and shot numbers in sequence on graphs. If the graphs were to keep increasing with the shot numbers, there had to be increasing shot numbers. Rolling back would mean that data would go up and down. Another suggestion was to use alphanumeric figures, but that would entail modifying all the applications programs, which assumed the numbers were in digital format.

"If you had to go in and do something major anyway, you might as well do it the right way and go to six digits," commented Diesso.

Luckily, the hardware clock that produces the shot number had been designed for six digits, although power had not previously been put to the additional digit. That meant that the project simply became a huge software job.

McEnerney said about a dozen people were involved in modifying the code for several months, including about five who worked on the project full-time. "We got started in August right after the machine stopped. And we had a contractor off site helping us out," said McEnerney. "We were ready for first plasma when they started the machine again in the winter and we started with shot number 101,000."

Diesso added, "When we began TFTR, we reserved shots 99,000-99,999 for testing and calibration shots. At the end of the previous run, we made all of the code changes to handle six digits, tested the new code with six-digit test shots in the range 100,000-100,999, and began the latest run with shot 101,000."

He said the group devised a fall back plan that entailed pushing the clock ahead to 101,000. "That way when they started up the testing shots, the digits would all be six digits and in case we missed something critical, we could always roll back to 96,000 where we had left off and use the few remaining numbers until we could figure it out and then roll forward again," said Diesso.

The project leaders said that the six-digit accommodation posed such a problem that if the team had run into a wall, operation of the machine would have been halted. But there was also a chance the magic number would not have been needed. "When we did reach it, we realized that it had been absolutely necessary to have done all the work. It paid off," said Diesso, noting that TFTR is now past shot 104,000.

Christianson said the solution of adding a digit meant numerous routine changes rather than any real redesign. "Basically hundreds of programs had to be changed to accommodate more room for the six-digit shot number. But we did the same kinds of changes to each program so the work was routine in that sense," he explained. "Most of the work was not actually in physically changing the code but in rebuilding the programs. Then we needed time without the machine running to test the entire system."

Hundreds of Programs

Between 500 and 1,000 programs were affected, as well as routines of a systems nature that return shots or handle the naming of files. All the routines had to be modified before the programs were changed, and all the work had to be done sequentially. "I couldn't make my changes until low-level systems changes were done. And that couldn't be done until some even lower systems modifications were done," said Diesso, adding that hundreds of programs had to be looked at to see if they used shot numbers.

He added, "It was the size of the project that was most daunting, and the tedium of it. You would spend your entire day looking through code."

While the work was tedious, it was also high pressure. "It was difficult to maintain momentum on this work while actually supporting the run and also trying to do other work. And you knew that you were working against the clock — literally," Christianson said.

Continued on page 4

Computer

Continued from page 3

The problem facing PPPL's computer experts is similar to that being tackled by companies worldwide concerning the millennium.

Said CSD Head Dori Barnes, "What makes this project interesting is that it is solving the same issues that are causing so many commercial organizations to panic at this time — the 'millennium problem' or 'year 2000 problem.'" When computers first came on the scene, digits were expensive, so only the last two digits of a year

were used to represent that year; the "19" was understood. For instance, "1997" simply became "97." When the year 2000 comes, computers will see "00" and make calculations as if it were the year 1900, resulting in confusion. Before the millennium, all computer programs must be examined and changed to use all four digits for the year so that the year 2000 is just another year in the sequence.

"They will be coming to the same decision that we did. They will need to look at all the code that's been written and modify it. And if they don't fix it in time, it won't run. If we hadn't fixed our problem in time, TFTR wouldn't be running," said Diesso. ●

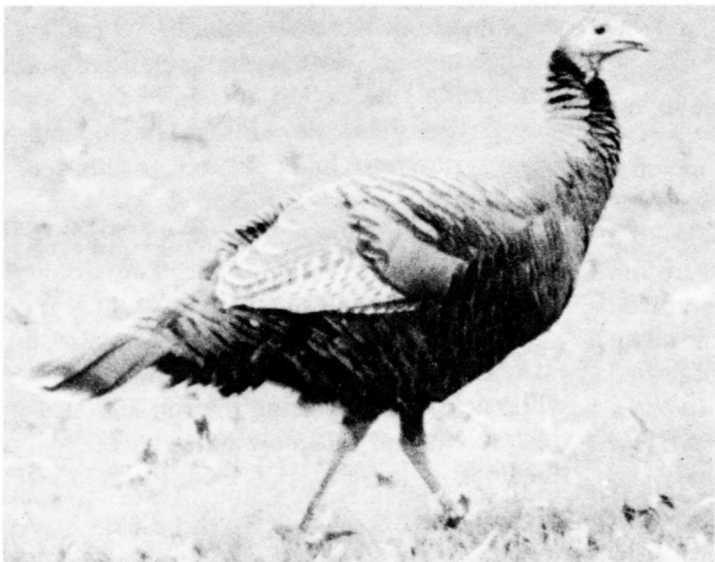


Korea Delegation Visits

PPPL Deputy Director Dale Meade led a group of Korean officials on a tour of PPPL in February. Meade is describing the Magnetic Reconnection Experiment (MRX) to the delegation, which included officials from the Korea Basic Science Institute and the Ministry of Science and Technology in Korea, as well as Korean reporters. At the front is Boo-Sik Yi, Korea's Vice Minister of Science and Technology, Ministry of Science and Technology (with button and glasses).

Blood Drive

Don't forget! There will be a Blood Drive at PPPL's Firehouse on Thursday, March 27, from 9 A.M. to 2 P.M. To schedule an appointment, call Dr. John Caruso at ext. 3200.



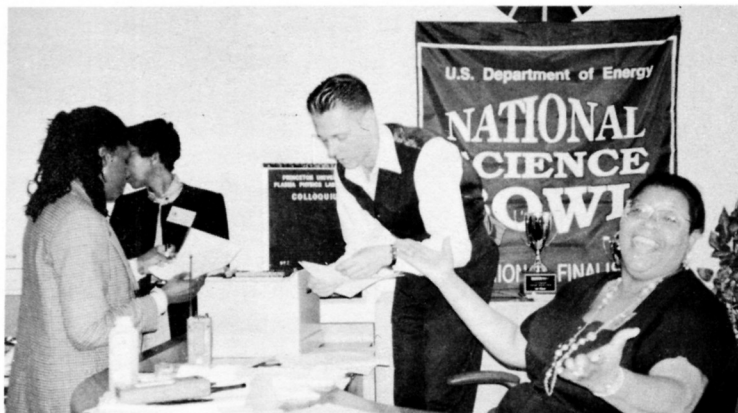
Bye, Bye, Birdie

"Harley," PPPL's own wild turkey, recently relocated. She is now happily residing at a farm in northern New Jersey. She is reportedly eating well — plenty of corn and wheat — and will be released to a natural farm or woods environment as soon as spring brings new tree growth, giving her good cover to hide in. Finding her a mate is also being considered.

PPPL Hosts Regional Science Bowl '97



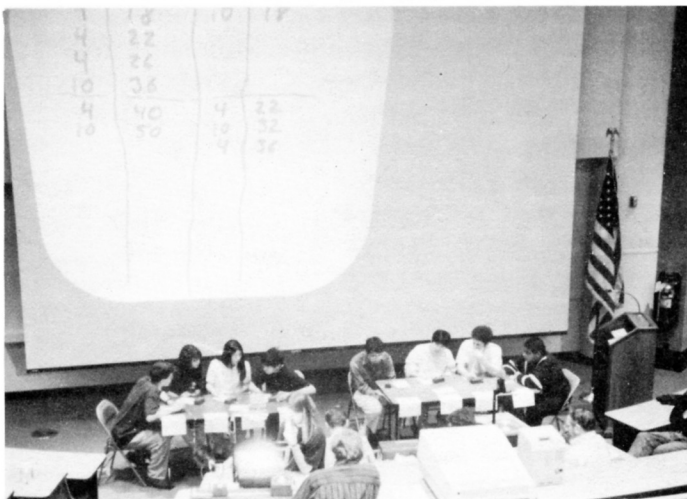
PPPL Science Education Program Head Diane Carroll (left) and Science Bowl volunteer Barbara Sarfaty, also of PPPL, get ready for the next round of competition.



From left are Pamela Lucas, Linda Harmon, James Morgan, and Christine Ritter at "Science Bowl Central."

The Laboratory hosted the New Jersey Regional Competition of the National Science Bowl® on February 22, opening its doors to 24 high school teams from New Jersey and Pennsylvania. The top prize — an all-expense paid trip to Washington, D.C., to participate in the Sixth Annual National Science Bowl® — was taken home by the Governor Livingston Regional High School team. The East Brunswick High School team and the Montgomery High School team, group A, garnered second and third place, respectively. The top three teams received trophies.

A special thanks goes to the twenty-nine volunteers who made the day such a success!



Two teams compete in the LOB Auditorium.

Science Bowl Volunteers

John Bennevich, PPPL
 Josh Breslau, Princeton University
 Martin Brown
 Mary Ann Brown, PPPL
 Linda Bullions, Princeton University
 Lisa Carlucci
 R. Caveney, Princeton University
 The Computer Systems Division, PPPL
 Bruce Draine, Princeton University
 Mel Gensamer, PPPL
 Tom Gibney, PPPL
 Linda Harmon, PPPL
 Keith Harvest
 Craig Helfgot, Princeton University
 Fran Hunt, ETS
 Dean Jens, Princeton University
 Margaret Kevin-King, PPPL
 Jason Litowitz, Cornell University
 Franco Paoletti, PPPL
 Carol Phillips, PPPL
 Andrew Post-Zwicker, PPPL
 Michael Richmond, Princeton University
 Jim Rogers, PPPL
 Barbara Sarfaty, PPPL
 Jim Scott, PPPL
 Ben Sirota, Princeton University
 Daren Stotler, PPPL
 Danny Weitz, Princeton University
 Patti Wieser, PPPL

DIVERSITY IQ QUIZ ANSWERS

Below are the answers to the Diversity IQ Quiz published in the last issue of the **HOTLINE** along with their sources and some further explanation. The Diversity IQ Quiz is intended to provoke thought and lively discussion. The quiz is also a valuable tool for teaching the facts about diversity issues in the workplace. If you would like to discuss the quiz or other diversity-related issues, please contact Pamela Lucas at ext. 3049.

1. *Is diversity a problem?*

No. It is an opportunity to appreciate and take advantage of the diversity we encounter every day. Diversity in the workplace means creating an environment where people from dissimilar backgrounds can work productively together. Diversity capitalizes on the richness of human potential that may lie untapped in the workforce. If we can learn to integrate different viewpoints and experiences, we can end up with optimal solutions to the challenges we face. We can learn from Mother Nature. Biodiversity in nature provides resistance to disease, pestilence, and protection from eventual extinction.

2. *Is diversity the sole responsibility of the Human Resources Department?*

No. Too many people think, "That's not my problem; our HR people have to handle the diversity issues." Wrong. We all (employees, supervisors, and managers) play a significant roles.

3. *Is diversity just about race and gender?*

No, it is much broader than that. (see below)

4. *Is diversity for minorities and women?*

No. Diversity is about all employees and our external customers. According to the Princeton University Statement on Diversity & Community, "We seek to enable all members of this community to pursue their educational, scholarly, and career interests in an environment that recognizes both the distinctiveness of each person's experience and the common humanity that unites us all, and permits us to take full advantage of the variety of talents, backgrounds, and perspectives of those who live and work here."

5. *Does diversity exclude me (because I am white/male)?*

No. Diversity is about inclusivity. If you feel diversity is about attacking the white male, you are mistaken. Diversity is about creating a culture where everyone — each individual, not each identity group — can flourish, based on performance. Diversity recognizes, supports, values, and utilizes every person's differences and similarities in support of the Laboratory's mission.

6. *Is diversity training just another fad?*

No. Look at the workforce today and compare it with five and ten years ago and try to consider five and ten years into the future. Look at what is going on in industry, academia, and other laboratories.

7. *Is diversity just another version of Equal Employment Opportunity (EEO)? Affirmative Action (AA)?*

No. It is very different from EEO and AA. Diversity concerns all employees and is all-inclusive. AA and Diversity are separate points on a continuum of interventions that are designed to stimulate inclusion of people from different backgrounds in an organization. Minorities and women are the main context for EEO/AA. Major differences between EEO/AA and Diversity are:

- EEO/AA is government initiated while Diversity is voluntary and company driven.
- EEO/AA is legally driven while Diversity is productivity driven.
- EEO/AA is quantitative and Diversity is qualitative.

- EEO/AA is problem focused whereas Diversity focuses on opportunities.
- EEO/AA assumes assimilation among its participants and focuses on getting people into an organization. The emphasis is on "having a presence." Managing diversity is about cultural change. It is strategically driven, and a pragmatic business strategy that focuses on maximizing the commitment and productivity of the workforce.
- EEO/AA is reactive while Diversity is proactive. Diversity focuses most of all on creating an organizational culture that emphasizes inclusion of all employees.

Source: Workforce America! Managing Employee Diversity as A Vital Resource, by Marilyn Loden & Judy B. Rosener, Irwin Professional Publishing and Mosaics, A publication of the SHRM® Workforce Diversity Initiative. 1997.

8. *Corporate managers from diverse Asian-American backgrounds consistently observed that:*
- C. Asian-Americans have been stereotyped as being good at technical tasks but weak in management.

9. *Eighty-one percent of employers offer dependent care account benefits that allow employees to annually set aside up to \$5,000 of their pre-tax pay toward child or elder care. The percentage of employees who make use of that benefit is:*

E. Only 5 percent of employees make use of dependent care accounts benefits.

Source: Hay Group. See PPPL's Benefits Office for more information.

10. *Studies reveal that in a comparable job, women earn:*

D. A woman earns 70 cents for every dollar a man earns.

Source: U. S. Department of Labor.

11. *Between 1990 and the year 2005, the labor force aged 16 to 24 is expected to grow approximately 14 percent; the labor force aged 25 to 54 is expected to grow approximately 17 percent; and the labor force aged 55 and older is expected to grow:*

D. The labor force aged 55 and older is expected to grow by 43 percent from 1990 to the year 2005.

Source: Bureau of Labor Statistics.



The Director's Minority Advisory Committee (DMAC) for Calendar Year 1997 includes, from left, Human Resources Advisor Susan Murphy-La Marche, Chairperson Arlene White, John Clark, Secretary Linda Harmon, Robert Kaita, Council Advisor Rush Holt, Patricia Buggs, Vice-Chairperson Erik Perry, and Pamela Lucas. Not pictured are Charles Bush and Subrahmanya "Raki" Ramakrishnan.



Directors Advisory Committee on Women

Open Meeting

Friday, March 21

1:30pm—3:30pm

M.B. Gottlieb Auditorium

- **Guest Speaker - Carol Kivler**
- **Refreshments**
- **Informal Discussions**

Women of the Lab Invited!!!