HOTLINE

PRINCETON PLASMA PHYSICS LABORATORY

Vol. 4, No. 9 January 25, 1983

TFTR FIRST PLASMA ACHIEVED

Laboratory Director Dr. Harold Furth knew something special was in the air this Christmas Eve. "There was the general expectation that the spririt of Christmas would step in and do something," he reported.

Whether the result of friendly spirits or the round-the-clock dedication of PPL employees, TFTR achieved its first plasma at 3:06 a.m. December 24. The success capped an intensive effort by the laboratory community to reach the first plasma stage by the end of 1982.

At a December 28 press conference attended by representatives of the major broadcast and print media, Dr. Furth explained that the plasma formed was only maintained for approximately 50 milliseconds. "But the characteristics of this first plasma are not what's important," he emphasized. "It's like Columbus finding land: for a start, he didn't care how big it was. The important thing is that the machine is basically fine."

Reporters were shown a videotape made in the TFTR control room during those early morning hours on Christmas Eve. It depicts a tense crowd of physicists, listening to an Appollo-type countdown by TFTR Facility Operations Branch Head Milt Machalek. Anticipation is plainly visible as the button that will create first plasma is pushed. Milliseconds later, wild cheering and handshaking erupts as TFTR proves itself a success.

Dr. Furth recalled his reactions as the "magical event" grew nearer. "It started with me being extremely nervous, gloomy, concerned, and contemplating the possibilities for things to go wrong," he remembered. "(The night) ended with me feeling the way you just saw Don Grove act . . ."

"I'm extremely pleased and satisfied that we were able to do what we said we were going to do," he continued. "That gives us confidence, and it gives the government confidence that our predictions are realistic; that when we say in 1986 we will take ten (plasma) shots in deuterium-tritium, and the tenth one is going to be breakeven, that we will really do it."

In response to a question on funding, Dr. Furth contended that "In a sense, one could say that this administration supports fusion very strongly, because in this climate of retrenchment, they have maintained the budget (for fusion) . . .TFTR has not been cut; (its) budget has been slightly increased under the present administration. Our project has had good, steady support."

And what of TFTR's future? "Our problem is how to fill in, both scientifically and technically, the space between TFTR and . . .(the Engineering Test Reactor) so as to guarantee that that much larger step will indeed be successful."

"It is our hope that our experimental results will speak for themselves," he concluded. "If TFTR comes along as we expect and hope, then around 1985 we won't have to shout. We will just say 'look at this', and (the government) response will be 'how would you like to go on and do an ignition experiment?' That's our hope."

FIRST PLASMA REACTIONS

STATE OF NEW JERSEY
OFFICE OF THE GOVERNOR
TRENTON
08625

THOMAS H. KEAN
GOVERNOR

December 29, 1982

Dr. Harold Paul Furth
Director
Princeton University Plasma Physics Laboratory
Post Office Box 451
Princeton, New Jersey 08544

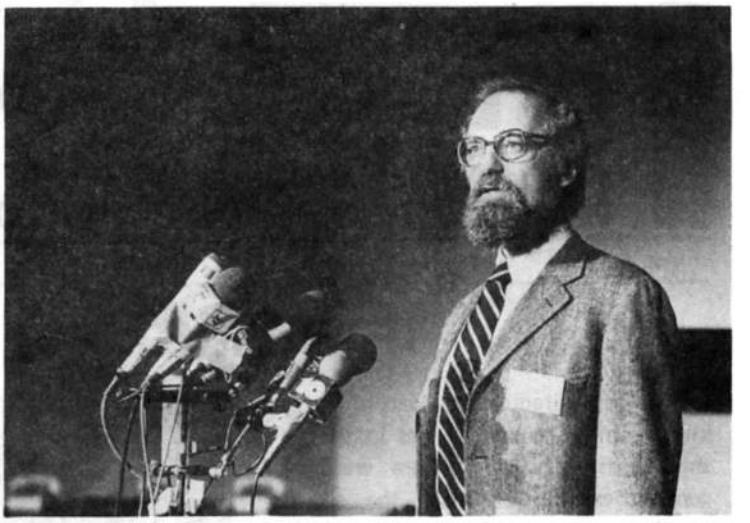
Dear Dr. Furth:

It gives me great pleasure to congratulate you, your associates and staff on your unrivaled achievement successfully generating plasma. While the world and the nation hail the achievement as a milestone, I am elated that New Jersey can look with pride as the state where a new source of energy is being researched and developed.

Princeton University maintains a rich history of excellence in physics. This effort deserves a note of praise and I trust that the University will continue to foster a community of gifted experts in technical research. Best wishes as you build on your success.

Sincerely,

Thomas H. Kean
Governor



FIRST PLASMA TELEVISION COVERAGE

Information Services is currently arranging to obtain copies of first plasma/fusion segments broadcast on several major New York, New Jersey and Philadelphia television stations earlier this month. The segments will be compiled into one tape, which will be available for viewing on Thursday and Friday, February 3rd and 4th, in the lobby of the LOB at 12 and 12:30 p.m. each day.

POETIC LICENSE

Not all preparations for first plasma were in deadly earnest, as this bit of whimsy submitted to HOTLINE reveals:

SANTA CLAUS COMES TO FUSION

'Twas the day before Christmas
And all through the cell
Not a creature was stirring
Just the warning bell

The diagnostics were hung
On the tokamak with care
In hopes that first plasma
Soon would be there

With Harold in his coat
And I in hard cap
We were looking around
For a place to nap

When out in the cell
There arose such a clatter
Don Grove rushed in
To see what was the matter

With ladder in hand
And quick as a flash
He jury-rigged a fix
To keep on with the bash

Minutes later, ahah
To our eyes did appear
Good vacuum, good control
Nothing to fear

On TF, on OH
With EF to steer
First plasma, for sure
Soon will be here

Now we'll puff in the gas
Does TFTR really have class?
Wait a moment, what's that glow
First plasma, of course, HO, HO, HO

Paul Reardon

MG COURSE COMPLETED

John Hirthler, Dave Armiger and Rich Myslinski are the first three "graduates" of a course on TFTR motor generator (MG) operations, held at the laboratory in November.

According to Dr. Ernst de Haas, organizer of the sessions, the training was aimed at operations and maintenance employees who will be working closely with the TFTR MG sets. "These people did most of their learning while they were doing pre-operational testing on the system," he added, "so this training just filled in the gaps."

The course was taught by General Electric engineer Gene Baker. PPL's Bob Bergman provided safety information, while Paul Sichta detailed CICADA's interface with the MG sets.

This was one of eight courses on TFTR systems operations taught at PPL. In addition to short courses for those who have been involved in TFTR testing, intensified two-week training courses for other employees are being planned for the near future. Courses will cover all TFTR subsystems.

The instruction is part of preparations now underway for a TFTR ohmically heated plasma, scheduled for this spring.

Employees can be assigned to courses by TFTR Facility Operations Branch Head Dr. Milton Machalek, or by their supervisors. Those employees interested in taking a TFTR-related course should have their supervisor contact Dr. de Haas at ext. 2290.

TFTR Project Head Dr. Don Grove presents TFTR MG operations certificates to (left to right) Dave Armiger, John Hirthler and Rich Myslinski. The trio successfully completed an in-house course on the MG systems.

SERVICE AWARDS

A service awards presentation will be held January 28 at 10 a.m. in the Gottlieb auditorium. Employees with five, 10, 15 and 20 years of service to PPL will receive awards from their department heads.

The Personnel Office will contact eligible employees with invitations to the ceremony.

PPL AT EPCOT CENTER

Recent visitors to the newly opened addition to Walt Disney World in Orlando, Florida report that a number of scenes from the laboratory are on view in the World of Energy pavillion. A film crew from Walt Disney Productions visited the lab last year to photograph for the large-screen "circlevision" film. Physicists Bob Budney, Stefano Bernabei, and Doug Post were among those spotted in the production.

TYPING COURSE

A four-week technical typing course, sponsored by the Secretarial and Office Support Staff (SOSS), will begin on February 28. Classes will be held from 11 a.m. to noon twice a week; students may enroll in either the Monday - Wednesday session, or in the Tuesday - Thursday group. All classes will be held at C-Site, and will be taught by Mary Dyson and Elsie Ferreras.

Anyone interested in taking the course can obtain more information from Mary Dyson at ext. 2489.

ART EXHIBIT

Weavings created by Anja Chance will be on display in the Dorothy Brown Room at the Princeton University League headquarters through February 11. The exhibit is open weekdays from 9 a.m. to 1 p.m.

MODEL A

A significant piece of PPL's history has joined the offical national archives of science and technology. The Model A stellarator, the machine that began the laboratory's experimental program, was given to the Smithsonian Institution during ceremonies held here January 7.

Constructed in 1952, the Model A machine was the first of PPL's experimental devices. Its unusual figure-eight design followed the concept of Professor Lyman Spitzer for a controlled fusion reactor based on closed-surface magnetic confinement. To test Spitzer's concept, Model A was built to permit experimental operation in either a racetrack or a figure-eight mode.

It was Professor Spitzer and his Astronomy Department colleague and close friend, Professor Martin Schwarzschild, who themselves wound the copper coils for the 1000-gauss field onto the 2"-diameter, 12' - long glass vacuum vessel. Other aspects of the engineering and fabrication were supervised by Professor Norman Mather and by the late Professor Clodius Willis.

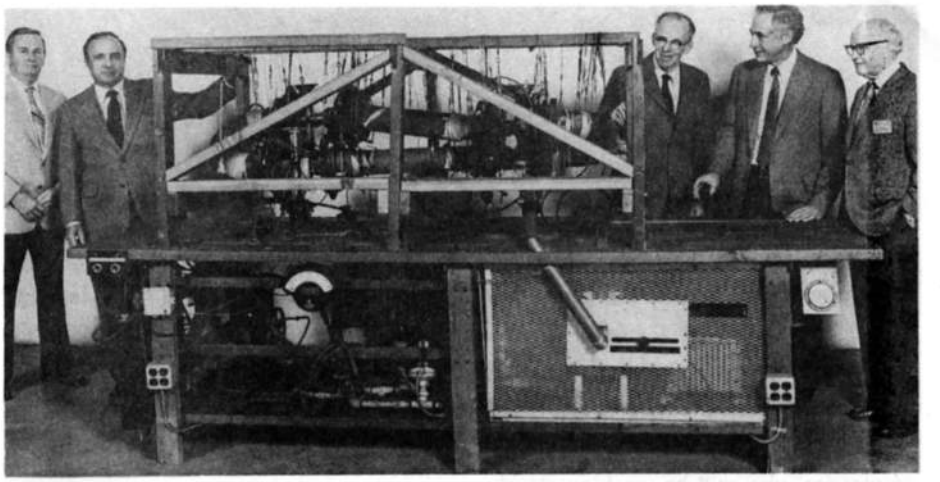
The first theorist for Project Matterhorn S (as PPL was then called) was Martin Kruskal, now chairman of the University's Applied Mathematics program. The first experimentalists were Leonard Goldman (now working in laser fusion at the University of Rochester) and PPL's Thomas Stix. The technicians were PPL's Hank Dymoski and Joe Csenteri.

The glass vacuum system and the magnet coils for Model A were all suspended by wires from a wooden frame, itself bolted to a wooden workbench. Plasma heating was provided by a 250 - kHz induction heater, coupled to drive an ohmic current in the stellarator plasma.

Dr. Stix feels that Model A's major accomplishment was "to show that it was significantly easier to establish a discharge in the machine's figure-eight configuration than it was with the device in a racetrack arrangement." This successful demonstration was followed by the construction of the more powerful B stellarators, which featured much stronger magnetic fields, much better vacuum systems, and were able to test unidirectional ohmic heating, magnetic pumping, ICRF, helical windings and divertors.

Plans are now being formulated that will allow Model A to be displayed during TFTR's dedication. The machine will then be turned over to the Smithsonian.

Accepting Model A at the ceremonies on behalf of the Smithsonian were Dr. Paul Forman and Roger Sherman. Also attending the ceremonies were Mel Gottlieb, Don Grove, Bob Ellis, Ken Wakefield, Mary Shoaf, Jack Joyce and Jim Clark.



Posing with the Model A stellarator at its unveiling were (left to right) Joe Csenteri, Hank Dymowski, Lyman Spitzer, Tom Stix and Norman Mather. All five men worked on the Model A project here in the early 1950's.

A number of PPL employees instrumental in the laboratory's energy conservation program were commended for their efforts by Director Dr. Harold Furth recently. Congratulated for a job well done were (front row, left to right) Ray Pressburger, Bob Longmuir, John Vallace, Dick Terhune, Carl Potenski, John Grabowski, (back row, left to right) Dick Farley, Ben Velivis, Mark Kijek, Steve Ragolia, Bob Gulay, Frank Fumia, Henry Chandler, Marvin Richey, John Pacuta, Ed Rogers, Conrad Stout, Dr. Ernst de Haas, Dr. Furth, and Head, Facilities and Support Bob Smart. Their work, coupled with lab-wide conservation efforts, resulted in a savings of over $1.7M during the past year.

TFTR OPERATIONS/INFORMATION CENTER

It's 11 p.m. on a Thursday night. One of PPL's engineers, participating in the final testing for first plasma, detects a potential trouble spot in the energy storage capacitor bank and wants to examine the vendor's manual for that component. He needs the manual right away; he can't wait 'til morning. What does he do? Where can he go?

Although Carol Sherbet and her staff at the TFTR Operations/Information Center are likely to be at home watching the late news on that Thursday night, our engineer will find his manual thanks to their efforts over the past six months.

A first floor room near the CICADA complex has been transformed into the TFTR Operations/Information Center, whose purpose is to collect, catalogue, and make easily accessible and retrievable the critical documentation required to support the assembly, testing and operations of TFTR. The "Ops Center" is part of the TFTR Facility Operations Branch, headed by Milton D. Machalek and responsible for the operation of the TFTR facility. The Ops Center houses drawings, vendor manuals, operations and maintenance manuals, project specifications, test data, nonconformance reports, and other useful documents.

A manual can be located by examining computer printouts, which have been cross-referenced so that information on a major component can be found under various headings or sorts. For example, our engineer needs the vendor manual for the energy storage capacitor bank. He can look under that title on a printout, where it will be listed alphabetically with an identification number (e.g., M020K). This number will identify the physical location of the manual on the assigned shelves in the center.

The identification number for the energy storage capacitor manual can also be found by looking alphabetically on the printout under the system, *electrical;* the subsystem, *energy conversion;* or the vendor, *Westinghouse.* For some pieces of equipment of a more generic nature, such as a pump, the appropriate manual identification number can even be found by searching the printout under the building location.

If our engineer decides he also must see a particular drawing, he can use the vendor manual identification number to pinpoint the location of the drawing in the "aperture card" system. Approximately 15,000 drawings will eventually be stored on these 35 mm photographic film cards, and can be viewed using a special reader similar to a microfilm reader. If desired, an 18 x 24-inch print of the drawing can be made instantly from the aperture card.

One of the key functions of Operations/Information Center Manager Carol Sherbet has been to gather and correlate the various bits of information relating to a particular component or aspect of TFTR, and design the appropriate information retrieval systems. Richard Whalen, Drawings Coordinator, is responsible for collecting the drawings and schematics that will be kept in the center. They are assisted by Pat McMahan, Programmer, and Terri Williamson, Staff Assistant.

Once the elements of a complete information package are identified and assembled, they are catalogued on the computer. If any TFTR components malfunction, the almost instantaneous availability of such information in a central location will help to minimize or avoid costly delays in operation.

The Operations/Information Center has also served as a conference area to plan pre-operational testing, and for classes to train technicians. When TFTR is fully operational, the center is slated to serve as a "war room" when problems develop with the machine. Key operating decisions and procedures will be formulated there, with all of the necessary resources immediately available for consultation.

In addition, a terminal has been installed in the center so that the TFTR Daily Status Report can be entered into the CICADA video display system. The report is shown on television monitors throughout the TFTR area and in the lobby of the Laboratory Office Building.

In conjunction with its ongoing function, the TFTR Operations/Information Center has a long-term purpose. Its resources and those of the TFTR central file will be used as part of a longer-range effort to ensure that the data on the design, assembly, and operations of TFTR will be accessible to the developers of future, more advanced experimental machines.

Operations/Information Center staff view drawing on aperture card reader. From left Dick Whalen, Carol Sherbet, Terri Williamson, Milton D. Machalek, and Pat McMahan, seated. To their left is new, more advanced aperture card reader/printer.

HAZARDOUS WASTE PROGRAM

In a continuing effort to upgrade its services to the laboratory community, Health & Safety has made hazardous waste identification cards available at both stockrooms and from Material Control.

Virtually all chemicals used at PPL constitute hazardous wastes upon disposal. These include solvents (such as Philsolve, Inhibisol, J88, acetone, ethyl and methyl alcohol, and so on), uncured epoxies, varnishes, non-water base paints, alkali metals, and asbestos (transite). They CANNOT be disposed of down the drain, in sewers, or in dumpsters.

The identification cards are an integral part of PPL's hazardous waste program. Since the lab's hazardous waste contractor cannot dispose of an unknown substance, proper labeling of such wastes is essential.

When disposing of any substance, make sure you know what the waste is. It should be placed in a suitable container and properly labeled; unlabeled containers will not be disposed of.

If the waste is hazardous, fill out both halves of a hazardous waste identification card as completely as possible for each waste. Leave the space for the number blank, but be sure to include the location where the waste can be found. Attach the top half of the card to the container, using either the string for bottles or the adhesive back for cans and drums.

The bottom half of the ID card should be sent to Material Control, A-Site, Bldg. 1-E. Material Control will then contact you to arrange pickup of the waste material.

Section 8.3 of the Health & Safety manual contains more information about the ID cards, and the laboratory's policy on hazardous wastes. If you're not sure whether a substance is a hazardous waste, contact Health & Safety at ext. 2526.

The University has the responsibility of maintaining a safe atmosphere for its employees. Traffic regulations are a very important part of maintaining that safety.

Traffic signs have been posted in specific areas to inform you of potential problem areas. For example, stop signs have been posted in areas which could be potential accident zones. Yield signs are present to allow for smooth traffic flow. Handicapped parking signs have been placed in certain parking areas for those individuals who have mobility problems. Speed limit signs have been posted to ensure the safety of pedestrians as well as motorists.

The regulations these signs and markers indicate are not arbitrary. Handicapped zones should be used only by those who have special handicapped parking permits. New Jersey statutes regulate the handicapped zones, and require 24-hour-a-day enforcement. This is NOT a Univeristy policy; it is state law.

Speed limits should be obeyed to ensure everyone's safety, and stop signs require motorists to come to a complete stop.

The Security Department realizes that, at this particular point in the progress of TFTR, parking is a problem. We apologize for the problem, and are doing everything we can to accomodate our employees. Special areas have been set up for extra parking on designated roads.

We will accomodate our employees, but we must make sure that emergency areas are not blocked by employees' vehicles. We appreciate your cooperation, and anticipate that this problem will only last for a short period.

EMERGENCY CLOSINGS

While the U.S. Mail may continue to operate through snow and other inclement winter weather, will PPL? Perplexed employees can find out from their radios or telephones.

On those occasions when the laboratory will be closed for the day, or the normal starting time will be delayed, special announcements will be made over the following radio stations:

Princeton	WHWH	1350 kc
Trenton	WTTM	920 kc
Trenton	WPST (fm)	97.5 mhz
Levittown	WBCB	1490 kc
New Brunswick	WCTC	1450 kc

The laboratory has also arranged with the Answering Service of Princeton for an emergency telephone number, which is 609-924-1760. Callers should identify themselves as PPL employees, and should call ONLY when they are unable to obtain radio announcements. The service will only report whether the lab is open or closed; no other information will be available from it.

In the event the laboratory remains open, employees who find it impossible to report to work due to hazardous conditions should notify their immediate supervisors.

SPICE ALERT

A safety alert concerning Schilling spices has been received by the laboratory's Health and Safety Office.

The alert covers all sizes of Schilling spices, manufactured by McCormick & Company of Hunt Valley, Maryland, which are sold in glass bottles. Bottles bearing lot numbers 7257 through 7430 inclusive may have a chip or crack at the lip of the glass jar, under the threads of the plastic cap. This defect is not visible unless the plastic cap is removed.

Consumers should check their home spice racks for bottles bearing the lot numbers involved. If you find a questionable bottle, contact the Health and Safety Office at ext. 2531 for disposal instructions.

BENEFITS NEWS

All PPL employees' leaves of absence for temporary disability are now being handled by the PPL Benefits Section.

Please submit all leave of absence forms to Eleanor Schmitt. All questions should be directed to Ellie at ext. 2046, or to Mary Bersch at ext. 2043.

SKI HOUSE

SKIERS -- Rent a three bedroom lakefront house, centrally located in New York State Adirondack State Park. The house is fully equipped, and includes a cosy fireplace. Gore Mountain (one of New York's largest ski centers) is only 15 miles away. Great for the Alpine or Nordic skiing enthusiast. For reservations or brochure, call Ed Moshey, ext. 2306 or ext. 2258.

The PPL Hotline is issued by the Princeton University Plasma Physics Laboratory, a research facility supported by the U. S. Department of Energy. Correspondence should be directed to PPL Information Services, Module 2, C-Site, James Forrestal Campus, ext. 2754.

FOR SALE

FOR SALE --A stamp collection of issues from the United States, East and West Germany. Recently appraised at $3,370, asking $2,000. Call (609) 393-0609 after 5 p.m.

YOGA GROUP

The Princeton University League has formed a Hatha Yoga group, which meets each Tuesday at 5:30 p.m. in the Dorothy Brown Room. Those interested in joining the group should call the league office for further information.

HOUSE FOR SALE

Three bedroom ranch in Montgomery. Living room, very large kitchen, recreation room, 1½ baths. Basement, double garage, air-conditioned. Located on 1¼ acres seven miles from Nassau Street; qualifies for University mortgage. Asking $105,000. Call ext. 2290.

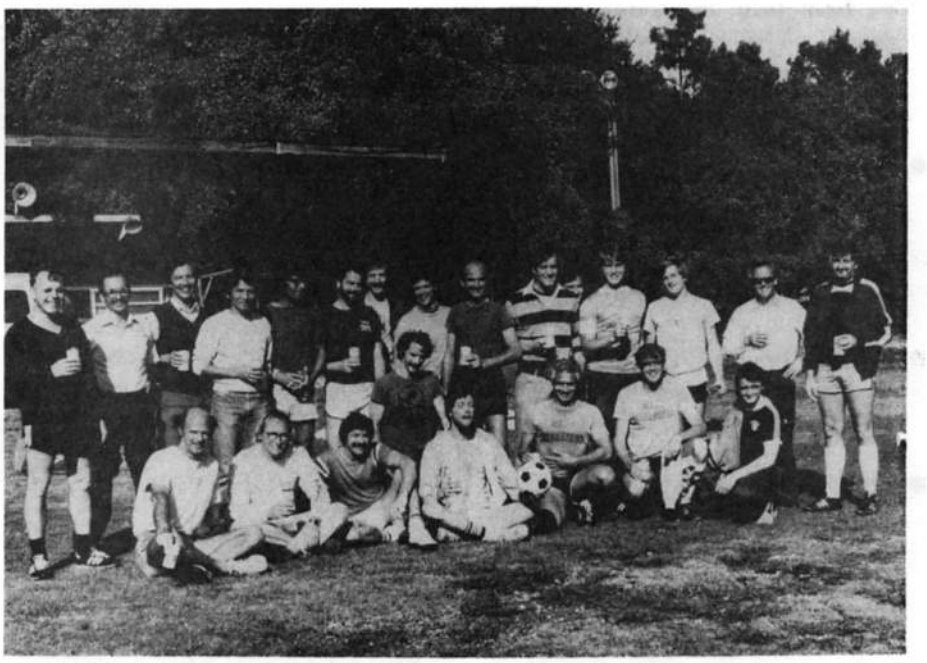
DANCE CLASSES

Dance classes, sponsored by the University League and the Princeton Getaway Club, have begun at the University League office, 171 Broadmead. Mr. Gary, a professional instructor, will teach class members swing (jitterbug) and waltz dance steps each Wednesday from 8 to 10 p.m. for the next five weeks.

This beginners series costs $20 per person for five lessons. For further information about the classes call "B" Jones at 452-6003 during the day or at 771-0485 during the evening. Information can also be obtained from Kathryn Cramer at 452-8792.

FREE

FREE TO GOOD HOME --Three adult guinea pigs, two females and one male. Healthy, friendly; make great pets. Call Meg Gilbert at ext. 2036.



Bill Heidbrink and Gary Hay each scored two goals to lead the PPL soccer team to a 4-1 victory over the General Atomic squad when the teams clashed at the APS meeting in New Orleans. The victory evened the record for the annual event at 3-3-1. In addition to Hay and Heidbrink, PPL team members included S. Von Goeler, Dennis Mueller, Lane Roquemore, Steve Davis, Dave Ruzik, Manfred Bitter, Ray Grimm, Jim Sinnis, Charlie Daughney and Fred Skiff.

VOLUNTEERS : PEOPLE PEOPLE

In response to contacts from the HOT-LINE, several Voluntary Action Centers (VACs) throughout New Jersey have provided a selection of volunteer opportunities. Since PPL draws employees from many areas of the state, these listings will enable interested individuals to volunteer their time in their own home areas.

The six volunteer opportunities that follow were supplied by the VAC of Mercer County, a member agency of the United Way. For further information about any listing, call the VAC at (609) 896-1912.

- The American Red Cross is seeking a disaster action team member. Training will be provided in first aid, CPR and other disaster procedures.
- JACS (Joint Action in Community Service) needs an advisor to provide local support for young men returning from their Job Corps training. Hours are flexible; training and orientation will be provided according to the volunteer's needs.
- CONTACT of Mercer County is looking for a telephone counseling trainee for its 24-hour Hotline. A 50-hour training course is needed to qualify for this poistion.
- Family Service of Princeton is seeking a writer for agency publicity work.
- The Historical Society of Princeton needs a museum guide to provide background on the Bainbridge House and general Princeton history. A volunteer should have a genuine interest in history, and be able to deal with the public effectively.
- The Association for the Advancement of the Mentally Handicapped needs people to assist in recreation and social programs, adult education programs, money management classes crafts education, and other ongoing activities.

The four volunteer opportunities listed below have been supplied by the Voluntary Action Center (VAC) of Middlesex County. For further information about any listing, call the contact person indicated below, or the VAC at (201) 249-8910.

- The Animal Rescue Force (ARF) needs people to interview prospective pet adopters at their Route 1 flea market booth on weekends. People willing to board animals during the week are also being sought, as are office workers. Contact Alicia Bottari at (201) 249-1975.
- The 4-H is seeking volunteers to teach children about pet care. If you're interested, contact county 4-H agent Tony Moskal at (201) 745-3446.
- The YWCA of New Brunswick is seeking academic tutors to help with their after-school program, run between 4 and 5 p.m. Other volunteers are required to supervise young swimmers in the Y's pool on Mondays and Wednesdays. Openings are always available for those interested in the after-school sports, recreation or crafts programs for children ages 5-12. Contact the YWCA at (201) 545-6622.
- Many agencies, such as the Family Services Association of Middlesex County, the New Jersey Home for Disabled Soldiers, Literacy Volunteers, Women Helping Women, and many more, need board members. Contact the VAC for more information.

The next six listings were provided by the VAC of Morris County. Positions are listed by general duty outlines; further information is available from the VAC at 201-538-7200.

- A museum concerned with the past needs a retiree with financial expertise to serve as Chairman of the Finance Committee for the museum's Board of Trustees. Responsibilities would include preparing federal and state grant applications, as well as soliciting corporations and private sources for funds.
- An organization providing money management advice to consumers and corporations is starting a speakers training program. The program, which will teach volunteers to address groups of 25 to 100 people, begins this month and continues for six sessions.
- A nursing home needs volunteers to work with the elderly. Activities include reading aloud, playing tapes, or providing similar entertainments.
- An organization that provides food for the needy needs volunteers to contact the community in a food appeal, as well as to price and keep inventory of the food collected. An opening is also available for writing the group's newsletter.
- An ancillary-medical organization needs researchers to design and carry out projects concerning stress management. This position requires students who have had education in psychology, nursing or pre-med.
- A nursing home is seeking volunteers to accompany patients to the doctor's office or hospital during daytime hours. Training, a uniform and meals are all provided.