BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

Neutrinos Signal Start of Supernova

Since supernova Shelton-1987A burst upon the astronomical scene two weeks ago, astrophysicists have looked upward to the skies over the southern hemisphere. But Shelton-1987A also caused some physicists to look underground, at data from proton decay experiments conducted in subterranean mines.

One such experiment is the IMB collaboration, which is made up of physicists from the University of California at Irvine, the Univeristy of Michigan and BNL, including AUI Distinguished Scientist Maurice Goldhaber.

Earlier this week, the IMB collaboration announced that their detector, located in a Morton salt mine 2,000 feet below ground near Cleveland, Ohio, had detected an excess of neutrino events on February 23. Such pulses of neutrinos were predicted and can help confirm theories about the creation of heavy elements in the universe and the nature of supernova explosions.

The eight neutrinos that interacted in the IMB detector over a period of six seconds were probably ejected from the supernova during the immense stellar explosion that produced the celestial phenomenon, 160,000 light years away in the Greater Magellanic Cloud, just outside the Milky Way Galaxy.

Since neutrinos are unimpeded by the stellar atmosphere in the supernova progenitor, they emerge immediately. The light from the supernova, on the other hand, is generated by a shock wave moving through the atmosphere at a fraction of the speed of light. Thus the neutrons arrived on earth and were detected several hours before the dying star became visible.

The IMB collaboration's findings have been corroborated by the virtually simultaneous observation of 11 neutrino events over a 13-second period at another proton decay experiment being conducted by the University of Tokyo in the Kamioka Mine, near Gifu, Japan.

Earlier, a third experiment, being done by a European collaboration working in the Mont Blanc tunnel in Italy, had reported seeing an excess of neutrinos about five hours before the IMB and Japanese experiments did.

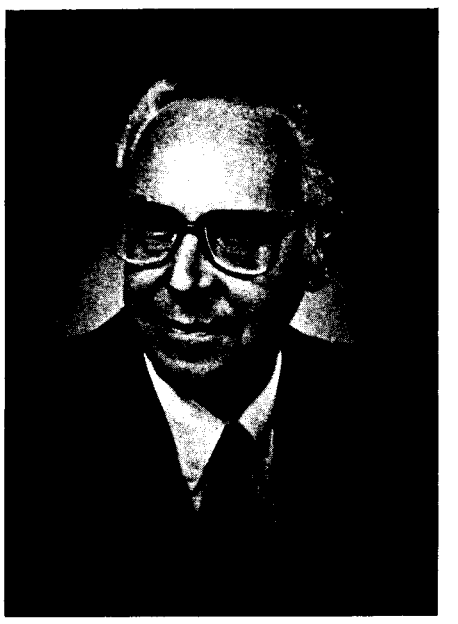
Commenting on this from France, where he was attending a meeting, Goldhaber said, "At the present time, there is still a puzzle as to why the Mont Blanc experiment reported previous findings that neutrinos had arrived at an earlier time. The neutrinos discovered in our experiment, however, are much more energetic than those in Mont Blanc."

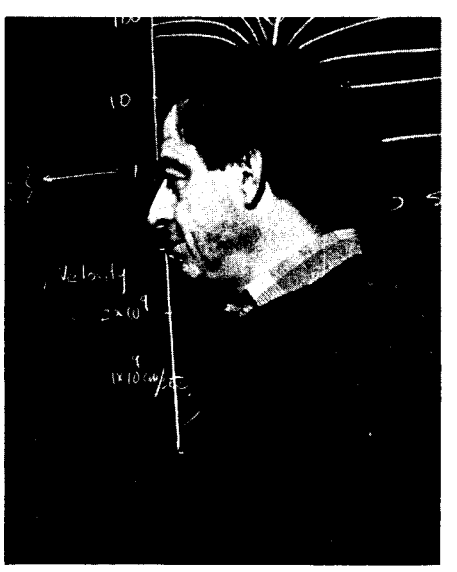
Though the IMB detector was primarily designed to observe proton decay, Goldhaber explained that the collaborators kept other possibilities in mind. "We were getting ready for this sort of thing," he said. "We could not know when it would happen, but we were ready in principle to detect such events, providing they had enough energy, because our detector does not have a low threshold. It seems like these events had enough energy."

The object of proton decay experiments is to look for evidence that protons, though extremely long-lived, have a finite lifespan and will ultimately decay. If, for example, it takes on the average 10^{32} years for one proton to decay, then in a collection of 10^{32} protons, one should decay every year. The water-filled IMB dectector contains enough protons to satisfy this requirement and is located underground so the earth can serve as a shield against charged particle cosmic radiation, which could cover up evidence of proton decay.

Neutrinos, however, cannot be stopped so readily. They penetrate the earth's surface, and neutrinos produced by cosmic rays interacting in the earth's atmosphere constitute the biggest background effect in the detector. Under ordinary circumstances, the number of neutrinos that will interact in the IBM detector should be fairly predictable, about one every three seconds. In the six-second burst, about four times this number were observed.

As BNL Physicist Sidney Kahana explained, "This is a lot of neutrinos — for example, the flux arriving from the supernova was several orders of magnitude higher than that expected from solar neutrinos alone during the observed time period, even though the sun is much closer. From astrophysical calculations, the number of neutrinos coming into the Kamioka and IMB detectors seems just right as a candidate for the neutrino precursor to the optical display."


Maurice Goldhaber


Sidney Kahana

These neutrino results support the theory that neutrinos are a by-product of the process that creates heavy elements during a supernova explosion.

Another theory affected by these results is one proposed by Kahana, Jerry Cooperstein, also of BNL, and Ed Baron, of the University of Arizona, Tucson. Working with computer models, they have shown how the shock that causes this catastrophic end to a star's life gets energetic enough to go beyond the core, promptly ejecting the mantle and envelope. "These new observations," said Kahana, "vindicate our theory of prompt explosion.

"An interesting feature of the neutrino events detected," added Kahana, "is the sharp time correlation observed, which gives one an upper limit to the mass of neutrinos. Because the group of neutrinos arrived in such a short period of time — six seconds or so — it seems there was little spread in velocities, which is what you would expect for a small mass. This interval suggests a surprisingly good limit, on the order of 30 to 50 electron volts."

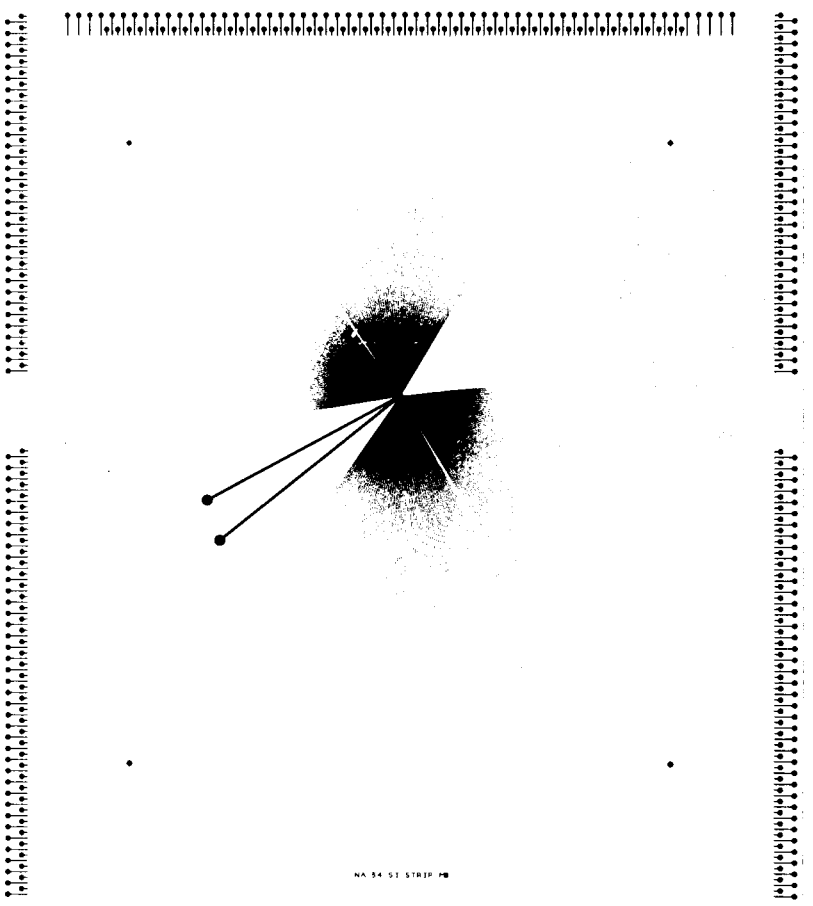
The supernova itself was a big surprise — and a stroke of luck for those who wish to test these theories, since it occurred close enough to Earth for the neutrinos to be detected — and while detectors were in place and operating. The last time a supernova was observed was by Johannes Kepler in 1604.

Just over a year ago, Kahana told the Bulletin, "A possible candidate for a close supernova in our lifetime is Betelgeuse, the shoulder star in the constellation Orion." What neither he nor the rest of the world knew then was that a different star, Shelton-1987A, had already exploded, probably about 160,000 years ago, but its existence was unknown because neither the neutrinos nor the light from the explosion had yet reached Earth.

Kahana explained that the astrophysics community was delighted by Shelton-1987A, viewing it as "an SSC for astronomers, taking place without Congressional approval or the expenditure of a large sum of money."

— Anita Cohen

Butterfly or Detector? The Difference Is a Fine Line



An abstract butterfly? No, a printed circuit (pc) board pattern for a particle physics silicon strip detector, designed by Senior Technical Specialist Rolf Beuttenmuller, Physics Department.

Four of these 18 cm x 20.5 cm detectors and one similar pad detector are used in conjunction with a large, uranium/liquid argon detector for BNL's High Energy Lepton Ion Spectroscopy (HELIOS) experiment at the Super Proton Synchrotron at CERN.

The HELIOS detector is being used to look at high energy collisions producing electrons, and the strip detectors are used to purify the electron sample. The experiment, which began taking data last summer, is an international collaboration of physicists from the U.S., Canada, Switzerland, Belgium, Israel, West Germany, England, Sweden, Italy and the Soviet Union.

The image for the pc board was generated on a computer, plotted on clear mylar, then photographed and reduced to proper size during printing by Photography & Graphic Arts. This photograph is then placed on top of a fiberglass pc board covered with copper, over which a photosensitive film lies. After being exposed to light and processed, the white areas are etched and the lines of copper remain. Technical Associates Anthony DiLibero and Ronald Angona of the Printed Circuit Laboratory in the Instrumentation Division perform the processing.

The copper lines are 0.0035 inches or about the thickness of a human hair. They have to be that fine so that 400 of them can fan out from the point in the center of the butterfly. The butterfly's antennae are ground connections.

When the strip detectors are assembled by Beuttenmuller, the dark circle is cut out of the board and a circular silicon wafer, the actual working part of the detector, is inserted in the hole. The 400 copper lines are then bonded to the wafer using 0.001-inch alumninum wire.

The lines fan out to the edge of the board where they are attached to connectors. These are immediately connected to preamplifiers, which are hooked to other electronics and eventually to computers.

— Marsha Belford

Put Your Heart Into CPR Training

Last Friday the 13th, in February, six members of the Physics Department got a lucky break: They learned CPR through a course currently being offered to Lab employees.

CPR stands for cardiopulmonary resuscitation, a technique in which mouth-to-mouth breathing and chest compressions are combined to provide breath and to circulate blood for a person whose heart and lungs have stopped working.

People who know CPR are lucky because they don't have to stand by helplessly while someone else dies. The victim also may be lucky because the person possessing CPR certification may be able to keep him or her alive, without brain damage, until further help arrives.

Bob Malachowsky knows CPR can save lives. A Training Specialist in the Safety & Environmental Protection Division (S&EP), Malachowsky has twice used his skills to help victims survive an initial crisis, though they later died.

The important thing, Malachowsky feels, is that he was prepared to do all he could. And these days, he's helping to prepare others to do the same, as the certified instructor for the three-hour "CPR: Race for Life" course.

Designed by the American Red Cross, the course was announced in a December S&EP Information Bulletin. Since then, about 70 people from Physics have signed up, and, Malachowsky says, some 50 other requests have been received from others at the Lab. So far, he has conducted about six courses averaging six people per class and will continue until everyone who wants to learn or relearn this valuable skill has been accommodated.

The class on Friday the 13th of February was typical. Everyone was there for similar reasons. As Ed Meier Jr. put it, "I thought it would be a good idea. If an emergency ever comes up, at least I will know what to do."

Jackie Mooney knows how important that can be. "Both of my parents died of heart attacks," she said. "I wanted to learn it when they were sick. I can't imagine anyone having the opportunity to take this course and not taking advantage of it. It just takes a morning."

The morning began with individual study and practice on lifelike mannequins. Then the participants had to demonstrate two skills to Malachowsky's satisfaction: first, mouth-to-mouth resuscitation, for situations where the victim is unconscious and not breathing but still has a pulse; second, one-rescuer CPR for an adult victim who is not breathing and has no pulse.

Bill Love found all the practice reassuring. "It's hard to know what you'll do under such an unusual situation," he said, "but now I have an idea of what to do."

Both Jim Rutherford and Bob Scheetz had taken CPR training before, though they had never needed to use it. They found the practice familiar — but a bit different. Rutherford explained. "My card had expired, and I thought it would be a good idea to have it renewed and updated." Sure enough, he found, "Some things have changed. They have modified the procedures to make it easier for the person administering the CPR."

The official class ended with a test, but, because the participants were interested, Malachowsky then described two other techniques — using CPR on an infant and using the Heimlich maneuver when a victim's airway is blocked by food or a foreign object. Charlie Zein appreciated that extra emphasis and, after the day's training, he said, "I think I would be able to help in any of these situations."

If you want to get lucky and learn CPR, call Ext 7717 for further information about enrolling in an upcoming class.

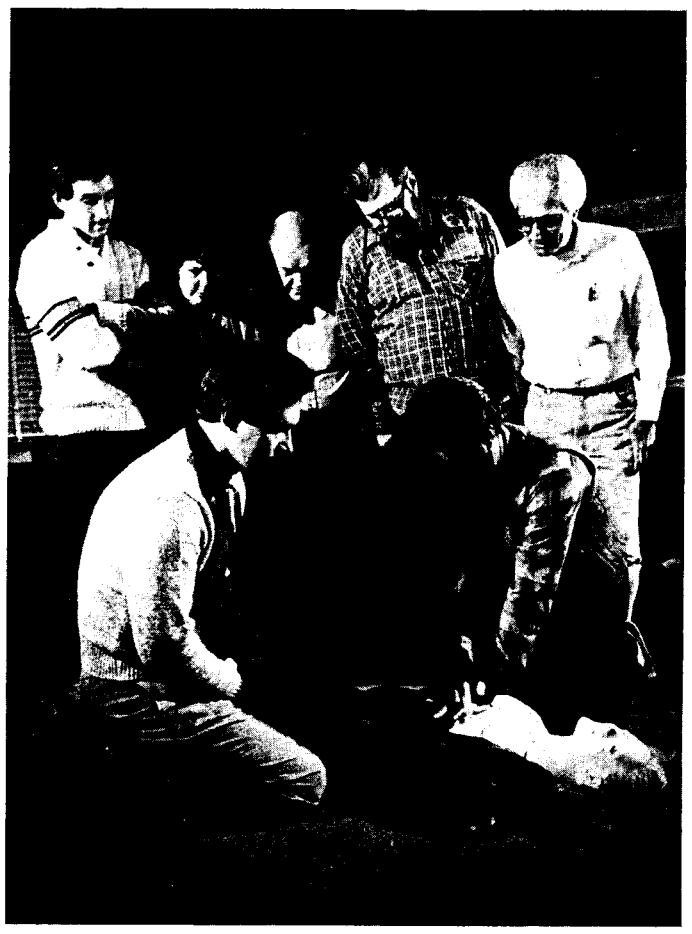


Photo by Rosen

At the CPR training class held in Physics on Friday, February 13, Bob Scheetz administers chest compressions to a mannequin, while Instructor Bob Malachowsky checks his technique. Looking on are the other class participants: (from left) Ed Meier Jr., Jackie Mooney, Bill Love, Jim Rutherford and Charlie Zein.

BNL's Fabulous Forty

The BNL we know today is the sum of thousands of events that have taken place here since 1947. This sampling shows the variety of events — from the monumental to the minor — that occurred in the months of January, February and March during the Lab's first 20 years.

1947

February 28 — Trustees of Associated Universities Incorporated (AUI) first met at BNL.

March 21 — The Atomic Energy Commission (AEC) transferred Camp Upton to AUI.

1948

January 8 — An Engineering Department was organized to serve both as a research and service unit.

March 8 — The first officers of the Rifle & Pistol Association were elected.

March 24 — Administration #2 Women's Bowling Team was the first to win the BNL Women's Bowling League by downing the Physics Women's Team four to one.

March 31 — The AEC Bowling Team became the first champions of the BNL Men's Bowling League by defeating the Purchasing Team, also four points to one.

1949

January 10 — The Badminton League was established.

January 13 — In front of a packed house, 35 members of the Dramatics Club first performed "Life and Half-Life," an original musical in three acts and eight scenes parodying life at "Creekhaven."

January 24 — The Camera Club held its first meeting.

February 1 — The Listening-to-Music Group met for the first time to hear records of works by Beethoven, Brahms and Sibelius.

February 2 — The Brookhaven Employees Recreation Association (BERA) announced that over 300 popular fiction and non-fiction books, including a liberal sprinkling of mysteries, were available for rent from their library.

February 9 — The first BERA organizational chart was published; the physical, cultural, social and outing activities listed were: bowling, softball, tennis, golf, riflery, archery, badminton, basketball, volleyball, horseshoes, dramatics, movies, music, photography, crafts classes, rental library, dances, bridge, parties, pet shows, picnics, field days, fishing and excursions.

1950

January 28 — First BNL Employees Day was held, attended by over 1,100 employees and their families, who toured laboratories and work areas.

January 31 — The Chess Club was formed by ten staff members.

February 6 — The Film Study Group presented its first foreign film, "Brief Encounter."

1951

February 1 — AEC authorized BNL to make available for distribution certain radioistopes with very short half-lives produced in the Brookhaven Graphite Research Reactor.

1952

February 28 — AUI offered for sale by bid seven acres of waterfront, residental property in Bellport Beach Estates, which had been acquired during the BNL housing shortage in 1948.

1953

February 16 — The Cosmotron and its role in investigating the atomic nucleus were featured on The Johns Hopkins Science Review, a television program.

March 26 — Harvard Glee Club and Radcliffe Choral Society gave their first Long Island concert at BNL.

1954

January 10 — AEC announced approval of design and construction of the Alternating Gradient Synchrotron.

1955

January 3 — Hofstra University formed Brookhaven Extension Division, giving BNL employees the opportunity to take undergraduate courses for credit on site for the first time.

1956

March 29 — The newly formed Ceramics Club conducted its first meeting.

1957

January 3 — The formation of the Applied Mathematics Division was announced by Laboratory Director Leland Haworth.

1958

February 26 — BERA announced the availability of a radio and television tube testing machine.

1959

March 15 — BNL's Medical Research Reactor went critical at 9:44 p.m.

1960

March 23 — Ground was broken for the 104,000-square-foot Physics Bldg. 510, to contain 27 general laboratories, special labs for the programs in nuclear moments and solid state, and the scanning and data analysis for the High Energy Physics emulsion and bubble chamber program; and 66 single and 50 double offices.

1961

February 25 — President John Kennedy announced appointment of BNL Director Leland Haworth as a member of the AEC.

1962

February 21 — Operation of Brookhaven's IBM 7094 computer began at the Applied Mathematics Division.

March 15 — Discovery of anti-xi-minus particle by BNL-Yale team of 17 physicists using the 20-inch Liquid Hydrogen Bubble Chamber at the AGS announced in *Physical Review Letters*.

1963

February 19 — Ground was broken for the 138,000-square-foot Chemistry Bldg. 555, to contain 71 laboratories and 51 offices.

1964

February 24 — Omega-minus particle discovery, using 80-inch Bubble Chamber at the AGS, reported by BNL team headed by Ralph Shutt and Nicholas Samios.

1965

January 18 — Creation of AUI Trustee Scholarships for the children of regular BNL employees announced by Laboratory Director Maurice Goldhaber.

March 1 — Charter-membership drive for the BERA Golf Association ended.

March 10 — The Brookhaven Office of the AEC announced the signing of the contract to construct the two Tandem Van de Graaff particle accelerators.

1966

January 6 — The synthesis of human insulin by a BNL Medical Department team of five headed by Panyotis Katsoyannis was announced.

February 9 — The High Flux Beam Reactor time reached its design power level of 40 megawatts for the first.

March 3 — AMD took delivery of the 11 computers comprising the CDC 6600 system, which was to replace the IBM 7094.

1967

March 21 — Thirty-seven employees completed 20 years of service to the Lab. Over 3,400 people were employed here, and facilities were valued at over $200 million.

Concert in Memory of George Vineyard

Former Laboratory Director George Vineyard, who died on February 21, will be remembered at a memorial concert this Sunday, March 15, at 4:30 p.m. in Berkner Hall.

Performing will be the Stony Brook Trio, which is composed of violinist Janet Orenstein, cellist Mark Stewart and pianist Patricia Tau. The ensemble will present a concert of classical and romantic music.

On the program is Wolfgang Amadeus Mozart's Trio in C Major, K. 548, to be followed by the Trio in A Minor, Op. 87, by Johannes Brahms.

In Memoriam

John Van Ryzin, Chairman of the Department of Statistics at Columbia University and consultant to the Applied Mathematics Department (AMD), died on March 5, at the age of 51. A biostatistician, Van Ryzin's association with BNL dated back to July 1966, when he accepted his first guest appointment at the Laboratory. In October 1980 he went from guest to employee, becoming a part-time Senior Mathematician in AMD. He remained in that position until last December, when he became a consultant. He was a resident of New York City and is survived by four children: Gregg, Garrett, Jeanne and Christopher.

Macintosh Lectures

A series of lectures on the Apple Macintosh computer will be presented by Chris Hoogendyk, Department of Applied Science. As Hoogendyk explains, "There are approximately 50 Macintosh computers on site and the number is growing rapidly. If you already have a Mac and want to see what it can do, or if you are thinking about getting one, or if you're just curious, this series of lectures should be helpful."

Beginning on March 17, the lectures will be held on five Tuesdays in March and April at 10 a.m., in the Seminar Room in the Applied Math Department, Bldg. 515, as follows:

Date	Topic
3/17	What can you do with a Macintosh? (Introduction to the Mac and an overview.)
3/24	Technical document processing on a Macintosh (Word processing, equations, graphics, page layout.)
3/31	No lecture
4/7	Technical graphics on a Macintosh. (Object-oriented, bitmapped, scientific and statistical graphics.)
4/14	Managment and analysis of data (Spreadsheets, databases, statistical analysis software.)
4/21	Getting along with the IBM world (Networking, communciations and translations of spreadheets, documents, databases and programs.)

Study by the Sea In Summer Program

The National Center for Excellence in Education invites academically talented high school students, ages 13-18, to spend four weeks at either the Southampton campus of Long Island University (June 28-July 25) or Chapman College, Orange, California (August 2-29). The program consists of academic courses such as advanced mathematics, computer science and physics; lectures by leading scientists, including several Nobel laureates; special seminars; and sports, recreation and cultural activities.

The program cost of $2,000 includes room, board, tuition and payment for six transferable college credits. For additional information and application forms, contact Seth Magot, (516) 283-4000.

If they are selected to participate in this program, children of BNL employees may be eligible for limited financial assistance. For information call Donald Metz, Ext. 3054.

Consider Exploring

As part of the Boy Scouts of America, Exploring is a co-ed program for teenagers focusing on career, fitness, citizenship, and social, service and outdoor activities. Explorer Posts, serving over 6,000 youths, with interests ranging from firefighting to computing, are organized throughout Suffolk County.

The Lab's representative on the Executive Committee of the Suffolk County Boy Scouts is Business Manager James Desmond. For more information about Exploring, contact Jon Brennan, 924-7000.

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English Class Location Changes

Starting Tuesday, March 17, the English as a Second Language class will be conducted in the Personnel Training Room, Bldg. 459. Class begins at 7 p.m. Employees, their families and guests are welcome to attend. If you have any questions, call Pat Knisely, Ext. 7631.

PSI Meeting

Elise Langman, President of the Long Island Chapter of the Association for Women in Computing, will speak on "The Computer-Altered Workplace," at the next monthly meeting of Professional Secretaries International. This meeting will be held on Thursday, March 19, at 6 p.m., in Berkner Hall, Room C.

Group Meeting: DEC Local Users

The next meeting of the Upton Local User Group will be on Wednesday, March 25, at 11 a.m., in Berkner Hall, Room B. Robert Loughrey of EMC^2 Corporation will talk on "Main Memory and the VAX System." For further information, call Zohreh Parsa, Ext. 4748.

Arrivals & Departures

Arrivals

Diane C. Barsky ..... DNE
Barbara A. D'Agostino ..... Fiscal
William A. Lanyi ..... DNE
Mary Anne Quigley ..... Plant Eng.
Lorraine Solomon ..... NSLS
Suzanne C. Van der Kolk ..... S&EP
Douglas T. Zigrosser ..... AGS

Departures

This list includes all employees who have terminated from the Laboratory, including retirees:

Peter R. Mendelsohn ... Sfgrds. & Sec.
William T. Stuono ..... MIS

Coming Up

Viki Diamond, a children's entertainer who has performed at BNL several times, will return on Sunday, March 22, to give a concert at 3 p.m. at the Recreation Bldg. Sponsored by the Upton Nursery School, the concert is open to the public, and a donation of $3 per family is requested.

Volleyball

Standings — Week of March 2

League I	
Dinkers	36-6
Upfagrabs	32-7
Xrayted	19-17
Phoubars	15-21
Bumpers	9-30
Net Results	6-36
League II	
Cannonballs	27-9
Nuts & Bolts	26-10
TNT	23-7
Fossils	20-16
Chunga's Revenge	12-21
Upton Ups	5-25
Misfits	4-29
League III	
Floaters	31-11
Printouts	29-13
Foul Ups	25-17
Screwballs	20-19
Sourcerers	15-24
Not Yets	14-28
Odd Couples	10-32
Open League	
Phoenix	45-3
Dakota	41-7
Odds & Sods	28-20
Court Jesters	23-25
Target	22-26
Rowdy Radicals	21-27
Duituits	7-41
Out of Control	5-43

Pianist Minoru Nojima In Concert March 16

Japanese pianist Minoru Nojima, whose career was launched following his prize-winning performance at the 1969 Van Cliburn Competition, will perform at Berkner Hall on Monday, March 16, at 8:30 p.m.

Minoru Nojima was born in Tokyo and began his piano studies at age three. At age 15, he entered the famed Toho Music School and, at 18, he won the First Grand Prize in Japan's nationwide Music Concours. In 1966, he was awarded a special scholarship by the USSR to study in Moscow for two years under Lev Oborin.

Mr. Nojima made his Carnegie Hall debut in 1970. Additional Carnegie appearances have included several performances with the American Symphony and a second solo recital in 1977. He has toured the United States, the Far East and Europe.

Critics have described Nojima as a genius at the piano, with such versatility as to be a poet one moment and a virtuoso the next. For the March 16th program, he has chosen music by Bartok, Schubert and Liszt.

First on the program will be the Suite for Piano, Op. 14, by Bela Bartok (1881-1945). Although the influence of folk music is explicit in many of Bartok's compositions, the Suite for Piano contains no transcriptions or reworkings of folk tunes. Instead, it is pure music, albeit reflecting an internationalization of the folk idiom. The work is marked by strong dissonances.

Following, in contrast to the Bartok, will be the Sonata in B-flat Major, Op. Post., D. 960, by Franz Schubert

Pianist Minoru Nojima

(17971828). The piece dates from the composer's last year of life. One description of the work, given by pianist Claudio Arrau, reads: "The B-flat Sonata is a work written in the proximity of death....The Andante...is one of the greatest movements of solitude and loneliness in music I know."

Last on the program will be the Sonata in B Minor, by Franz Liszt (1811-1886), the composer's sole composition in this form. Dedicated to the composer Robert Schumann, a contemporary of Liszt's, the work consists of a single movement, with varied moods and tempos.

Tickets will be sold at the door the night of the performance. Prices are $9 for general admission, $6 for students and those over age 65, and $5 for those under 18.

Bowling

Red/Green League

High games were bowled by J.Morris 224, K. Riker 221/205/203/629 scratch, T. Prach 219/203, R. Sick 212, H. Ackerman 211, D. Jesaitis 211, A. Warkentien 210, J. Roesler 207/205, C. Bohnenblusch 205, E. Sperry IV 201.

Pink League

Maryann Reynolds rolled a 192, Sandy Asselta 180, Maria Apelskog 178, Andrea Epple 177, Ellie Kristiansen 177.

White League

Joe Mayeski had games of 214/201, John Niemczyk 205, Marilyn Picinich 200, Ron Picinich 197, Sharon Smith 191/185, Maria Apelskog 189/186, Donna Riendeau 185.

L.I. Industrial Tournament

Representing BNL in this tournament were: Ken Riker 220, Ken Asselta 210, Ed Sperry IV 198, Charlie Bohnenblusch 193, Ed Meier. After the first night of bowling, the team was in 8th place out of 16 teams.

Scotch Doubles

Applications are still available for the Scotch Doubles, which will be held Sunday, March 15, at 1 p.m., at Port Jeff Bowl. Contact Maria Apelskog, Ext. 3138.

Softball

The beginning of another BERA Softball season is fast approaching. Any existing or new teams wishing to participate must submit preliminary team rosters for planning purposes, to Sharon Smith, Bldg. 510, or George Green, Bldg. 820, by March 27. Organizational meetings will be held after the receipt of preliminary rosters.

Golf

The BERA Golf Association will hold an organizational meeting on Friday, April 3, at 5:15 p.m., in the lounge of the Recreation Bldg. Membership applications have been mailed out to last year's members, and new members may obtain applications by contacting Ron Webster, Ext. 2845, or Bob Mills, Ext. 5043. The deadline for returning membership applications is Friday, March 20.

BERA Elections Next Week

Elections for two candidates to serve on the BERA Board, replacing John Connelly and Ed Taylor, will take place during the week of March 16. Eligible voters include employees of BNL, AUI, DOE and permanent onsite employees (Saga Food Service, Barclays Bank and others).

The candidates are Haskell (Skelly) Frei, Reactor Division; Jean Ramirez, Department of Nuclear Energy; Sharon Smith, Physics Department; and Edward Sperry IV, Accelerator Development Department.

Ballots may be cast as follows:

Date	Time	Place
Monday, 3/16	11:45-1:15	Cafeteria
Tuesday, 3/17	11:45-1:15	Cafeteria
Wednesday, 3/18	11:45-1:15	Cafeteria
Thursday, 3/19	1:00-2:30	Bank
Friday, 3/20	9:00-3:00	Bank

Absentee votes, for employees who will not be on site during voting week because of business trips or other reasons, will be accepted if a signed memo is sent with candidate selections to the Recreation Office, Building 185. Memos must be received no later than 5 p.m., Thursday, March 19.

Basketball

First Game

Hollywood	**79**	**Runaways**	**66**
E. Meier	36	J. Desmond	19
G. Mack	14	G. Shepherd	14
D. Nordstrum	11	R. Moran	11
B. Gunther	9	T. James	10
R. Domenech	5	M. Annerella	8
R. Kowalski	4	J. Repka	4

Second Game

Longshots	**101**	**Celtics**	**69**
W. Cummings	27	P. Browne	16
L. Walcott	19	M. Williams	13
J. Cyr	13	T. Mendez	12
L. James	11	T. Farmer	7
J. Garrison	9	J. Gaeta	6
F. Malone	9	P. Ratzke	6
R. Seymore	6	N. Schaknowski	5
S. Springton	6	R. Mease	4
R. Rowley	1		

Swim Club

Represented by six swimmers, the BNL Swim Team earned 18 medals for top-three, age-group finishes at the New York City Masters Meet on Sunday, March 8. At this meet as well, three swimmers each established a new personal record.

50-yard Freestyle		
Peter Heotis	25.50	2nd men 35-39
Roger Klaffky	30.84	4th men 40-44
Paul Michael	32.48	4th men 55-59
100-yard Freestyle		
Peter Heotis	57.16	1st men 35-39
Roger Klaffky	1:06.46	2nd men 40-44
Paul Michael	1:20.60	4th men 55-59
200-yard Freestyle		
Roger Klaffky	2:34.00	3rd men 40-44
Paul Michael	3:14.85	4th men 55-59
50-yard Butterfly		
Peter Heotis	28.10	3rd men 35-39
Wlodek Guryn	29.78*	4th men 35-39
Toshi Sugama	34.42	2nd men 40-44
Marsha Belford	40.86	4th women 30-34
100-yard Butterfly		
Peter Heotis	1:02.09*	2nd men 35-39
Marsha Belford	1:36.31	1st women 30-34
50-yard Backstroke		
Wlodek Guryn	33.60	1st men 35-39
Roger Klaffky	37.79	2nd men 40-44
100-yard Backstroke		
Roger Klaffky	1:23.55	2nd men 40-44
50-yard Breaststroke		
Toshi Sugama	33.46	2nd men 40-44
Wlodek Guryn	34.53	2nd men 35-39
Marsha Belford	43.97	3rd women 30-34
100-yard Breaststroke		
Toshi Sugama	1:14.39	1st men 40-44
Wlodek Guryn	1:17.36	2nd men 35-39
Marsha Belford	1:35.26	4th women 30-34
200-yard Breaststroke		
Toshi Sugama	2:45.93	1st men 40-44
100-yard Individual Medley		
Wlodek Guryn	1:11.25	2nd men 35-39
Marsha Belford	1:30.53	5th women 30-34
Paul Michael	1:31.71*	4th men 55-59

* indicates personal record

The Swim Club will practice as usual on Thursday, March 19, at 5:15 p.m. at the BNL pool. For more information, call Marsha Belford, Ext. 5053, or Peter Heotis, Ext. 2304.

Cafeteria Menu

Week of March 16

Monday, March 16		
French onion soup	(cup)	.75
	(bowl)	.95
BBQ chicken w/1 veg.		2.75
Veal Parmesan w/1 veg.		2.85
Ham salad w/vegetable sticks (lite-weight)		2.20
Hot deli: Roast beef	(bread)	2.45
	(roll)	2.60
	(hero)	2.65
Tuesday, St. Patrick's Day		
Split pea soup	(cup)	.75
	(bowl)	.95
Corned beef & cabbage		2.75
Baked ziti w/garlic bread		2.65
Hot vegetable plate (lite-weight)		2.20
Hot deli: Monte Cristo		2.55
Wednesday, March 18		
Cream of broccoli soup	(cup)	.75
	(bowl)	.95
All-you-can-eat special (no take-outs):		
Spaghetti w/meat sauce & French bread		3.25
Beef stew w/biscuits		2.85
Hot deli: French dip		2.65
Thursday, March 19		
Tomato beef vegetable soup	(cup)	.75
	(bowl)	.95
Chicken stir-fry		2.75
Broccoli & cheese quiche (lite-weight)		2.65
Hot deli: Boneless pork rib sandwich		2.65
Friday, March 20		
Seafood gumbo	(cup)	.75
	(bowl)	.95
Broiled fish w/1 veg. (lite-weight)		2.95
Spanish pot roast w/1 veg.		2.85
Hot deli: Fresh ham	(bread)	2.45
	(roll)	2.60
	(hero)	2.65

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position, with consideration given to candidates in the following order of priority: (1) present employees within the department and/or appropriate bargaining unit, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants. In keeping with the Affirmative Action plan, selection decisions are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all non-scientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment.

Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Employment Manager, Ext. 2882.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

2569. TECHNICAL POSITION - Requires AAS degree in electronic technology and knowledge of vacuum and cryogenic technology or the equivalent experience. Will assist with neutron beam-line setups, perform irradiations and operate Cold Neutron Facility at the HFBR. Some evening and weekend work routinely required. Must be able to obtain a DOE "Q" clearance. Reactor Division.

2570. ENGINEERING POSITION - Requires a BS in engineering and broad experience and demonstrated ability in the conception, design, estimation and implementation of energy conservation projects, including modification to existing mechanical and electrical environmental systems. Duties will consist of field investigations, identifying, developing and determining feasible energy conservation opportunities, preparation of implementation costs and providing justification for requesting DOE funding. PE registration is desirable. Plant Engineering Division.

Autos & Auto Supplies

77 CHEVY CAMARO - blue, 8 cyl., a/t, a/c, am/fm cass., excel. tires, new paint, $2,500. Melanie, Ext. 5141.

77 CAMARO - V8, a/t, black; 73 Capri, standard, decor. group, many new parts, must sell. 744-0725.

81 BUICK ELECTRA LIMITED - excel. cond., low miles. Frank, 732-3885.

74 DUSTER - standard, 6 cyl., 107k mi., good cond., $300. Serban, Ext. 3721.

84 FORD ESCORT - black, 2 dr., hatch, a/c, 4 spd., $2,950. Ext. 4293 or 567-9362 after 6 p.m.

76 DODGE COLT - 4 dr., runs well, won't pass inspection, $200. or best offer. Norm, Ext. 3465 or 744-7981.

76 FORD TRANNY - 3 spd. standard, new clutch, complete w/bell housing & press plate, $65. Mike, Ext. 3464 or 737-1458.

68 VW - vintage squareback, orig. owner, under 70k mi., extras, $300. or best offer. 286-9158.

73 CHARGER - new brakes, tuned, mechanically sound, good transportation, asking $600. 698-4341 after 6 p.m.

81 TOYOTA TERCEL - standard, a/c, am/fm deck, excel. cond., orig. owner, garaged. 286-0934 eves.

76 OLDS CUTLASS - V8, a/c, new a/t, p/b, p/s, good tires, am/fm, runs well, $950. Ext. 4332 or 286-2114.

79 BUICK ESTATE WAGON - a/c, am/fm, loaded, power everything, $1,500. Jim, Ext. 2432 or 821-9178.

78 TOYOTA CELICA - 5 spd., 100k mi., new battery, am/fm stereo tape deck, $900. neg. Tom, Ext. 5350.

75 MERCURY MONARCH - V8, stick, 2 dr., good cond., $750. Marie, 588-4806 after 5 p.m.

64 FORD FAIRLANE 500 - sport coupe, 2 dr., hardtop, 289 engine, 4 spd., needs some body work, must see. Eileen, Ext. 4194 or 924-4922.

86 JEEP CHEROKEE - 4 cyl., 5 spd., a/c, stereo, Laredo pkg., 3k mi., $14,800. 475-4792 after 5 p.m.

PARTS - Duster and Demon., cheap, engine, doors windshield, etc. 727-3608.

76 OLDS - 4 spd., 350, new tires, engine work, good for parts, $350. Kevin, 563-1189.

85 CHEVY K-20 - 4 WD, Silverado pkg., loaded, $12,000. 878-2542.

80 VOLVO - standard, 2 dr., tan, am/fm tape, excel. cond., $4,500. 929-6442.

80 HONDA PRELUDE - 5 spd., electric sunroof, Blaupunkt stereo, good cond. 325-0447 after 6 p.m.

72 PLYMOUTH STATION WAGON - full-size, excel. running cond. Ext. 2022 or 744-8386.

76 WILDERNESS CAMPER - 18', fully self-contained, excel., $3,500. 874-3796.

79 SUBARU BRAT - 4 WD, new exhaust, tune-up, $1,200; 70 VW, restored, new interior/exterior, $2,200. Jeanne, Ext. 7742 or 281-7568.

75 CAMARO - good running cond., dependable, many new parts, $500. 878-8302 after 5 p.m.

84 DODGE SE - 600 series, 4 dr., fully loaded, orig. owner, $5,000. 924-3236.

79 MONZA - V6, 4 spd., 2 dr., htchbk., high mi., must sell, asking $650. Toru, Ext. 3148.

75 SAAB 99LE - new brakes, muffler, am/fm cass., excel. mechanical cond. 924-8686 days, 744-5079 eves.

65 MUSTANG - hard top, excel. in/out, a/t, 7 wheels, many extras, $4,995. 929-4701.

78 PONTIAC GRAND PRIX - V8, buckets, console, sunroof, excel. cond. 744-9764 after 6 p.m.

74 DATSUN PICKUP - parting out, L18 engine, needs head work; whole, $75. Mike, Ext. 3988 or 231-8889.

78 TOYOTA COROLLA - a/c, am/fm, runs well, top rack, very reliable, must sell, $7,500. neg. Ext. 3017.

83 YAMAHA VIRAGO - 750, black, mint cond., garaged, extras, $2,000. Charles, Ext. 7749 or 789-1744.

75 CHEVY VAN - p/s, p/b, a/t, 350 V8, new trans., high mi., $1,000. Rich, Ext. 2434 or 924-6063.

71 FORD PICKUP F350 - camper special, 1980 box, high cap, very good cond., extras duals, orig. owner, $3,000. 878-6637.

67 CHRYSLER CONVERTIBLE - 383 V8, a/t, p/s, p/b, p/w, new top. Tony, 698-9274.

74 MGB GT - 73 convertible, completely rebuilt, new fenders, rocker panels, resprayed, spares, competition parts. 722-8730.

80 OLDS CUTLASS SUPREME - excel. cond., new paint, black w/red inter., 6 cyl., a/t, a/c, $2,900. 698-0152.

TIRES - regular & snows, various sizes, also rims. 929-3209 after 5 p.m.

TIRES - (4) E78-14, for Nova, low mi., $40. Ext. 2836 or 289-1831.

77 ELDORADO - new tires, exhaust system, paint & vinyl roof, am/fm stereo cass., must sell. Ext. 7732.

87 MAZADA 323 - htchbck., red w/gray int., 4 spd., stereo., alum. wheels, alarm, rustproof, $8,700. Doug, 744-9764.

73 PLYMOUTH FURY - 318, runs well, $300; 70 Maverick, runs, $200. Rich, Ext. 4867 or 744-8910 after 5 p.m.

73 PINTO - rebuilt engine, good tires, new brakes, am/fm stereo, $650. Bob, Ext. 4847 or 473-3987.

81 CORVETTE - mirrored T-tops, cruise control, tint/tele., a/c, p/w, p/s, p/l, rear defog, asking $12,000. 744-3968.

81 ELDORADO - low mi., full power, electric sunroof, new tires, $7,500. 758-5592 after 6 p.m.

79 MONTE CARLO - 2-tone, a/c, c/c, p/s, p/b, am/fm cass., new exhaust, tires, brakes, shocks, $2,300. Don, Ext. 4661 or 654-2106.

71 VW BUS - custom camper, furnace, sink, stove, refrig., closets, single bed, best offer. 286-0478 after 6 p.m.

71 DODGE W300 - 1 ton, flat bed, new carbureter & brakes, $900. Bob, Ext. 2957 or 878-4556.

84 PONTIAC FIERO SE - low mi., a/t, a/c, p/w, am/fm cass., sunroof, tilt wheel, $7,000. Jeff, 288-6375.

82 MERCURY LYNX - 4 dr., htchbk., a/t, am/fm, snow tires, $1,500. Mary, Ext. 2815 or 472-4087 after 6 p.m.

78 DODGE OMNI - 4 dr., p/s, p/b, asking $550. Steve, 653-8703.

80 BUICK REGAL LIMITED - very clean, all options, excel. cond. Chris, Ext. 4185 or 698-9116.

79 CHEVY PICKUP - 6½' bed, 6 cyl., 3 spd., 10x15 lt. front, 11x15 lt. rear, stereo, many extras, asking $2,100. Ray, Ext. 3536 or 289-7615.

Boats & Marine Supplies

26' SAILBOAT - fiberglass, 10 h.p. Volvo diesel, fully equipped, best offer. 589-0559.

28' OWENS - 1985, wood hull, fiberglass flying bridge, motor not running, hull sound, dual/station, asking $700. Ray, Ext. 2536 or 289-7615.

27' CATALINA - 1976, 3 sails, compass, radio, Atomic 4. Bob, Ext. 2144.

14' ALUMINUM STARCRAFT - w/trailer, $350. 283-4741 after 6 p.m.

CHAIN - ⅜" galvanized, $2. per foot, 50' minimum. Bob, 399-1679 Wed.-Sun. eves.

18' RENKEN - 1983, 120 h.p. I/O, OMC, w/trailer & full cover, excel. cond., $5,900. Ady, Ext. 4531 or 331-3785.

Miscellaneous

LIVING ROOM SET - Colonial, 4 mo. old., coffee table, couch, 2 chairs, end tables, $600. Ext. 2910.

FRANKLIN STOVE - 744-0725.

19" TV - Zenith, b/w, good cond., $50. Ext. 3701.

WEDDING GOWN - ivory organza, off-shoulder, size 7, $150 or best offer. Gloria, Ext. 2837.

POOL - 25' round, 4' deep, needs new liner, very good cond., extras, $250. 744-7947.

FIREHOSES - (2), 50', clean cond., only used to pump out water, $25. ea. 727-5455.

BOOK SHELVES - Mediterranean, $25; twin headboard & footboard, $25; Roth violin, $200; Thomas organ, $500. Frank, Ext. 5105 or 981-2529.

KITCHEN TABLE - oak, small; pecan & glass end & coffee tables; sofa, negotiable. Sheryl, 689-7725.

RACCOON COAT - full-length, small size, good cond., $200. 475-4792 after 5 p.m.

FOX JACKET - brand-new, size 9-10, $200; Frigidaire washing machine, needs minor work, $100. 286-0466.

TELEPHONE ANSWERING MACHINE - beeperless remote playback & message change, $50. Ext. 4211 or 821-2246.

SEASONED OAK - cut, split, 4x4x18, delivered or you-pick-up, $90. Scott, Ext. 4808/Sherrie, Ext. 2414 or 727-1492 after 5 p.m.

BENCH DRILL PRESS - $200; abrasive cut-off saw, $200; hand sander, grinder, router, roto hammer kits. 878-6637.

CRIB - good cond. 751-4539.

HUMIDIFIER - large, very good cond., 1'x2½'x2½, $35. Dan, 698-7322 days or Ext. 4987 eves.

WALL PHONE - beige, AT&T, modular rotary, like new, $10; corner china cabinet, w/2 doors, white, $60. 924-2726.

SCHWINN BICYCLE - LE Tour II, 10-speed, Avocet saddle, toe clips, $200. Frank, Ext. 2377 or 325-9584 after 6 p.m.

CORD ORGAN - upright, wood cabinet, $35. Ext. 4226.

SEARS TRASH COMPACTOR - coppertone, $100; oct. end table, marble top, $35; wicker changing table, $15. Judy, 698-4882 after 6 p.m.

SONY STEREO SYSTEM - HP 250, am/fm, w/external speakers, $70; poker table, needs legs, $50; (2) twin headboards, maple, $20. Tony, Ext. 2050.

FURNITURE - housewares, glass/brass table, lamps, dishes, pots, pans, etc. Carol, Ext. 4398.

FURNITURE - conv. love seat, (2) stuffed chairs, (4) wood window shutters, (1) wood desk w/chair, stereo, (2) speakers, reasonable. 929-8287.

UNITED FREEZER - 20 cu. ft., hinged on right, excel., w/lock & key, $125; Lady Sears dryer, brown, ask. $75. Mike, Ext. 3464 or 737-1458.

SEARS WASHING MACHINE - portable/stationary, good cond., w/manual, $125. Neil, Ext. 4261 or 878-8875.

TRUNDLE BED - dresser, 6-drawers, mirror, $250; bunk beds, L-shaped, wood, attached mirror, dresser. Joan, 475-8252.

GE RANGE/OVEN - electric, gold w/matching exhaust hood, like new, $225. John, Ext. 4662.

QUARTER HORSE - registered, gelding, sorrel, excel. disposition, shown successfully English, 15.3 h, asking $3,500. Ext. 4904 or 929-4753.

PINBALL MACHINE - Williams, good working cond., kids love it. Rich, Ext. 3499 or 435-4316.

CAR SEAT - like new, $25; 2-way, 3-speed attic fan, good running cond. $10. Ext. 7505.

LUGGAGE - Jordache, 5-piece, brown/beige tweed, on wheels, used once. $93. Ext. 3389.

SURVEYOR'S LEVELING ROD - Philadelphia, metal face, two seciton, 7'x13', $25. John, Ext. 7671.

SOFA - traditional, dark red, 8'x3', (4) cushions, $225; walnut desk, glass top, T-top drawer, (1) side drawer, 5'x2', excel. cond., $75. 277-4091 eves.

STEREO SPEAKERS - (2), Ultraliner 260, 75 watts, $80; stereo cabinet, $20. Brehm, 744-3767 after 6 p.m.

CAPTAIN'S CHAIRS - from motor coach, brown suede, orange & brown inserts w/bases, $50. ea. Bob, Ext. 4847 or 473-3987.

RIDING LAWN MOWER - 8 h.p., 34" cutting deck, $100; antique china cabinet/wardrobe, $350. 751-8240 eves.

REFRIGERATOR - 10 cu. ft., 24" electric stove, (2) base cabinets, 5' almond counter top w/sink & faucet, 2 yrs. old, $400. takes all. 751-8240 eves.

LAWN MOWER - Sears, battery-powered, self-propelled, 22", excel. cond., $125. Victor, Ext. 2395.

HARDWICK STOVE - electric, 30", white, (4) burner w/oven & drawer. $25. Bill, Ext. 2906 or 929-6189.

CERAMIC EARRINGS - hand-made, orig. designs, hypo-allergenic posts & wires, $8.-10. Gene, Ext. 3080.

TOP RACK - used once. Ext. 3017.

Free

IBM TYPEWRITER - good for parts only. Ext. 2384.

CAT - named Tigger, tri-colored, clean, gentle, lovable, spayed female, needs active family, kennel cab. 286-1592.

RABBITS - (2), healthy, Dutch, cages available. Sally, 821-1726.

HOT POINT REFRIGERATOR - 28", white, works well, you pick up. Bill, Ext. 2906 or 929-6189.

Car Pool

OAKDALE/BOHEMIA - would like to form car pool. Frank, Ext. 2314.

Real Estate

Real Estate advertised for sale or rent is available without regard for the race, color, creed, sex or national origin of the applicant.

For Rent

HILTON HEAD, SC - 2 bdrm. condo, sleeps 6, beach, tennis & golf, many extras, $300/wk., before April, $400/wk after April. 585-9149.

CATSKILLS - 3 bdrm. chalet, w/sleeping loft, fully furnished, near Hunter & Windham Mtns. Judy, Ext. 3595 or Bea, Ext. 3642.

SANIBEL ISLAND, FL - May 15-22, Tortuga Beach Club, fully equipped, 2 bdrm. apt., sleeps 6, on Gulf, pool, spa, tennis, golf and more, photos avail. 924-9519.

SHIRLEY - 7 min. to Lab, 1 bdrm., eik, l/r, full bath, pvt. yard, deck, appli., new w/w, city water, walk to stores/town pool, working single/couple, ref., sec., $525. + gas for stove/hot water. 399-5048 eves.

MORICHES - 1 bdrm. large apt., nice complex, transfer renewable, lease, $635/mo. Ext. 3765.

MANHATTAN - E. 34 Street apt. for weekends, first avail. March 25-28. Don, Ext. 4821.

For Sale

PORT JEFFERSON - 3V school district, split level, 4 bdrms., 2½ baths, den, gar., deck, lg. bsmt., wooded ⅓ acre, $210,000. 928-0281, leave message.

PATCHOGUE - cape, 2 bdrm., bdrm./den, l/r, d/r, eik, new bath, 1½ car gar., bsmt., unfinished 2nd floor, porch, many extras, taxes $1,000, ¼ acre, $123,000. 654-5049.

E. SETAUKET - 3V school district, mint, move-in cond., 4 bdrm, center hall Colonial, 2 car., bsmt., custom fp, den, eik, owner, $169,900. 473-6429.

MOUNT SINAI - ranch, 3 bdrm., 2 bath, ½ acre, full finished basement, w/bar, pool table, large redwood deck, 6' fence, a/c, w/w carpet, all appl., burglar alarm, fp, $164,900. 928-5737.

CENTER MORICHES - 2 bdrm. expandable cape, full bsmt., detached gar., low taxes, quiet dead-end street, walk to main street, $177,000. 878-9534.

POCONOES - 3 bdrm. chalet, l/r, d/r, family rm., w/wood burning stove, kitchen, w/w, garage, paved roads, pools, lake, clubhouse, tennis, guarded entrances, more. $110,000. 286-4652.

Wanted

SHOP MANUALS - 1978 AMC, 1977 Ford Maverick, 1972 Chevrolet van. Ed, Ext. 4035 or 727-3608 after 5 p.m.

SKIS - approx. 110-120 cm, boots, poles approx. 28", for 7 yr. old. 929-3209 after 5 p.m. or wknds.

EXTERIOR DOORS - (2), 30"x79", w/ or w/o windows or hardware. 929-3209 after 5 p.m.

MEN'S TOURING BIKE - inexpensive, 3, 5 or 10-speed. Joe, Ext. 2898.

HOME TO RENT - 4-5 bdrm., professional family, from June 1987 in Shoreham. 744-2275.

BUILDING LOT - ⅓ to 1 acre, within 15 mile radius of Lab. 475-8219.

BABY ITEMS - Ed, Ext. 4768.

MATURE WOMAN - to care for 84-yr.-old woman, Sat. & Sun., 8 a.m.-11 a.m., no housework. 473-3987 or 744-3926.

FLOTATION VESTS - two to four front-fastened, adult sizes, collarless. John, Ext. 7671.

SMALL TRAILER - any cond., 4x6. Ext. 4446.

RIDING MOWER - excel. cond. 874-3796.

SUNFISH SAILBOAT - good cond. 298-4398.

HOME - for orange/tabby cat, male. Ramona, 928-3088.

COLOR MONITOR - 80 col., RGB/NTSC combination, TTL. Cadwell, Ext. 2934 or 744-2816.

FOREST HILL HIGH GRADUATES - 50's & 60's, contact Reunion Inc., 304 Van Buren Ave., Teaneck, NJ 07666.