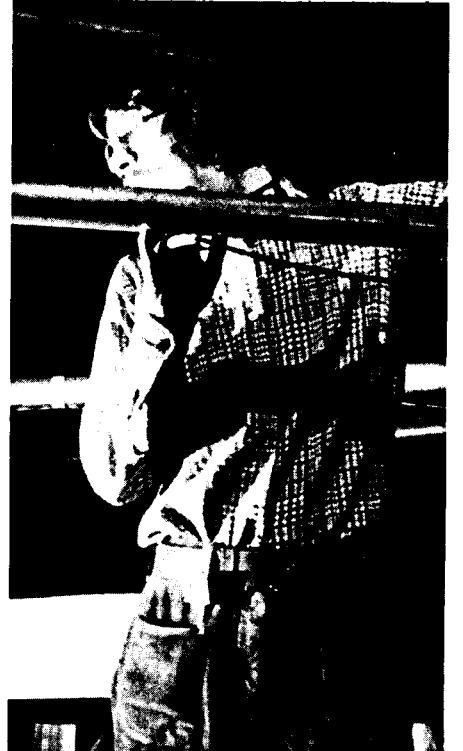


Keith Jones and Hobie Kraner making adjustments on micro-beam collimator.



Bob Shroy tunes up the vacuum system for micro-beam apparatus.

## Scattering Physics Around

A unique analytical facility to solve experimental problems that span several different fields is being created by a team in the Physics Department, known as the "Atomic Physics Group."

They are developing the small (3.5 million electron volt) Research Van de Graaff Accelerator, which has become outdated, but was once the most valuable tool for dissecting nuclear structure.

"In nuclear physics the research thrusts have moved to higher energy machines. The Research Van de Graaff was kept on as a supplement to the Tandems and was occasionally used for a nuclear physics experiment," explains Group Leader Keith Jones.

Now, he says, "about 80% of the Research Van de Graaff's time is devoted to its use in analysis, spread over environmental, biomedical, solid state, and radiation damage experiments."

The Van de Graaff is used in these experiments by placing various samples in the path of the machine's ion beam. Scientists are able to analyze the samples by studying the results of the beam interacting with particles in the sample.

Jones said, "We can expose a sample to the beam and then look for a characteristic atomic or nuclear radiation caused by the interactions taking place. Each of the characteristic radiations clearly signals the presence of a particular element or isotope in the specimen."

### Radiations

Hobart Kraner, Instrumentation, collaborates with Jones in developing new uses for the Research Van de Graaff as a part-time member of the group. Though involved with all phases of the program, his special expertise is in radiation detection. The accelerated beam of ions goes roaring by an atom in the target and because of the ion's positive charge, an electron is bounced out in a collision," said Kraner to explain the beam interactions.

Counting the electrons ejected would show the number of interactions taking place, but this would tell nothing about the source of electrons in the target. Instead, the scientists observe a more subtle reaction.

"When the electron is ejected," said Kraner, "the atom has to rearrange its electronic structure. During this process, energy radiations, called X-rays, with discrete energy values are emitted which are a unique characteristic of the particular element."

There is an energy peak observed in the detectors for the induced X-rays from each element. This energy peak is characteristic of the induced X-ray source and will not vary according to the beam used. This provides an accurate measure for the number

of atoms of a particular element in a sample.

Nuclear radiations are also induced when ions in the beam excite the nucleus of an atom. In this case, alpha or beta particles and gamma-rays may be emitted. This second category of radiations is equally characteristic of the type of atom they arise from.

### Resolution

However, the Atomic Physics Group is not satisfied with being able to count the atoms of a trace element in a sample. They are now focusing their efforts on developing the capability to locate these atoms in the sample, too.

Jones and Kraner have developed techniques for locating a particular type of atom three-dimensionally in the sample. The most simple system employs a micro-beam with a resolution of 25 microns, but they expect that this can be brought to 5 microns soon. Research Associate Bob Shroy, Physics, is focusing on this problem.

Another system uses a plastic track detector to give them a complete two-dimensional picture of certain trace atoms in a larger sample. This was successfully employed for use by doctors in the BNL Medical Department.

"One proposed application of this tool," said Jones, "is in investigating the possible toxicity of low-level tritium, a by-product of fusion reactors. For a given concentration of tritium in the environment, we want to know how much ends up incorporated in the human body and where it is located."

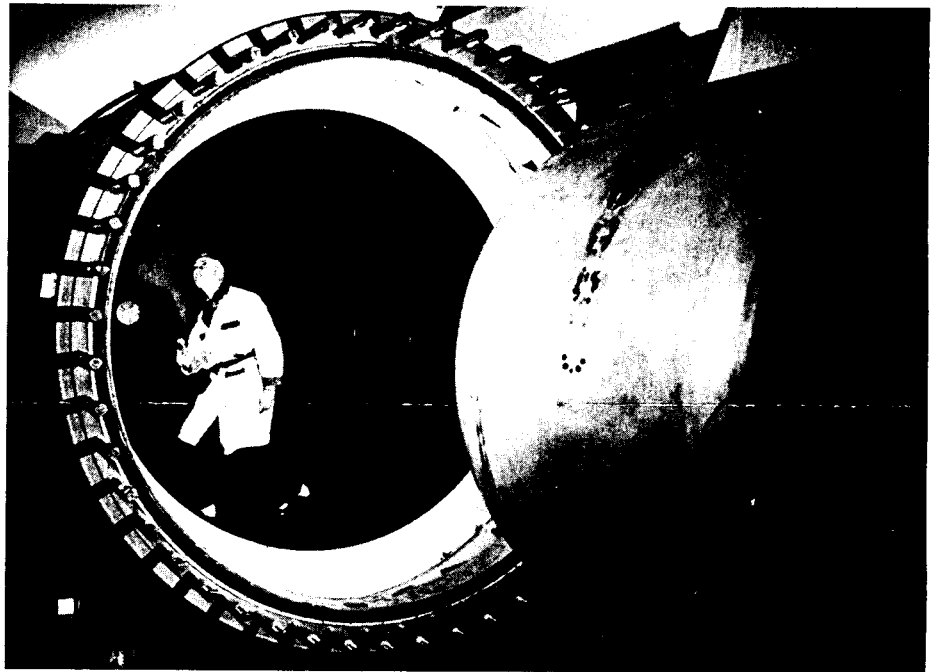
Radiation from high tritium levels damages the living systems being studied, so the team will follow deuterium instead. This should give the same information, since they are both isotopes of hydrogen and behave in very much the same way.

Jones explains the detection process: "The beam enters the cell and a reaction takes place between the ions and any deuterium in the cell. The beam is stopped by a teflon absorber that the cell is lying on, but alpha particles given off by the interaction go through."

These alpha particles pass through the teflon layer to a cellulose track detector, that would otherwise be destroyed by the beam. Physically damaged material left in the cellulose layer by the alpha particle is then etched away in a sodium hydroxide bath. This leaves microscopically visible pictures of alpha-tracks from deuterium atoms in the particular cell.

"The technique for seeing this is here," said Jones, "but the end-utilization is in the Medical Department. Researchers come here because we have the analytical technique to tell them how to interpret the

(Continued on page 2)



The pressure tank is checked by Ed Reilly for particulates that could cause electrical breakdown.

## Whither Energy?

The United States stands on the threshold of new energy policies which will determine the future course of energy supply and demand. In the 145th BNL Lecture, Kenneth Hoffman, Head of the Laboratory's National Center for Analysis of Energy Systems, will discuss "Whither Energy - Future Shock or a Greening?" on March 30, at 8 p.m., in Berkner Hall.

Hoffman says, "It is clear at this point that we must accommodate our society over the next 30 years to reduced supplies of oil and gas and high energy costs. This transition poses a challenge to our ingenuity, patience and perseverance. Some see a very close relationship between energy use and national income, or gross national product, and are not very hopeful

about a future of reduced energy supply. Others see the decisions and choices that are forced on us by recent crises and by the longer term realities, leading to an improved and more sustained society where resources are used frugally and the air is pure."

Analysis of the energy system and its relationship to the economy and environment has led to several findings that give promise for the future, Hoffman says. He believes that, given some lead time, our economy can accommodate to increased energy scarcity while delivering the goods and services required by our society. Technology has an extremely important role in producing continued innovation, he says, and more emphasis should be placed on the conservation areas.

He will discuss the difficult problems to be overcome during the transition period, with regard to the distribution of energy use among various income groups in the United States, and among the developed, developing and less developed countries of the world.

Hoffman maintains that management of the transition to new energy sources and a more efficient economy will require close coordination of energy policy with other domestic policies and with foreign policy, to ensure that social strains and international tensions due to energy problems do not get out of hand.

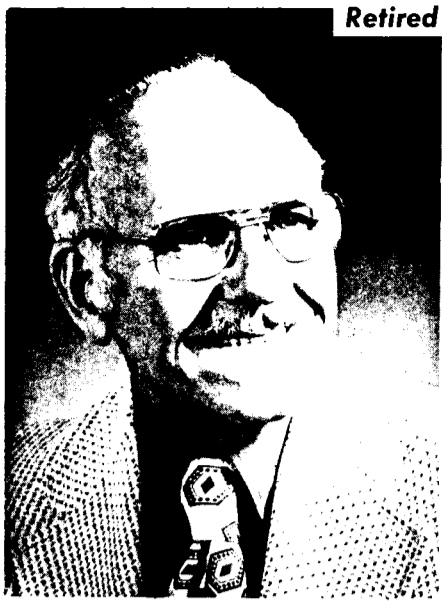
The lecture will address these policy relationships and will include some projections of our energy future at the regional, national and international levels.

After a brief period at Grumman Aircraft Engineering Corporation and two years as an Intelligence Officer in the U.S.

(Continued on page 2)



Kenneth C. Hoffman



**Retired**

Joseph T. Meyer, Sergeant-Communications, in the Safety and Environmental Protection Division, retired yesterday. He has been employed at the Laboratory since October 22, 1951. — photo by Rosen

**BNL Lecture** (Continued)

Air Force, Hoffman joined the Brookhaven staff in 1956 as an engineer. Among his engineering assignments in subsequent years were reactor development, the solar neutrino experiment, the pulsed fast reactor project and the development of hydrogen energy systems. He received his Ph.D. in systems engineering from the Polytechnic Institute of Brooklyn in 1972. In addition to being Head of the Energy Center, Hoffman is Associate Chairman for Energy Programs in DAS.

A buffet supper will be served in the Brookhaven Center before the lecture beginning at 6:30 p.m. Reservations should be made in advance by calling Ext. 3541 before 5 p.m. Refreshments will be available in the lobby of Berkner Hall immediately after the lecture.

**CREF Values**

1976			
January	\$40.31	February	\$39.76
March	40.75	April	40.10
May	39.69	June	41.60
July	41.21	August	40.94
September	41.59	October	40.62
November	40.40	December	42.66
1977			
January	\$40.27		
		February	\$39.30

**Purchasing Updated**

The Purchasing Division has outgrown its name. Effective immediately, this section will be known as the Division of Contracts and Procurement. The change was made primarily to reflect the Laboratory's increasing involvement with contracts.

**Focus**

**On The Van de Graaff**

The Research Van de Graaff was bought by BNL's founding fathers as a preliminary research tool in preparation for the Cosmotron facility.

"Principally, BNL wanted a Van de Graaff to study the injection of particles into the not yet built Cosmotron," reminisces Dave Alburger, who was then group leader at the Van de Graaff facility.

Electrostatic accelerators were not readily available household items in 1950, so the Lab arranged to buy a General Electric research model that was still being tested. This "experimental model" was billed at \$300,000 for 3.5 million electron volts, according to Alburger.

After two years of frustration, the BNL accelerator still had not topped two million electron volts. Alburger recalls that at this point, the manufacturers ran a bargain sale at 50 per cent off and sent a representative down from Schnectady to pull the GE identification plate off the machine.

"I guess removing the nameplate was their final admission that they couldn't meet their performance specifications," adds Alburger, with a smile.

BNL's savings on the deal were used to redesign and rebuild the Van de Graaff. By the time the refurbishing was completed in 1954, power was up to 3.7 MeV.

Unfortunately, the Cosmotron facility no longer required a Van de Graaff to study the particle injection systems. Not only were Van de Graaffs available on the market, but the Cosmotron had already acquired one to actually do the job.

The Physics Department responded by turning over the newly working facility to full-time low-energy nuclear physics research under Alburger. The machine not only found a home, but also success.

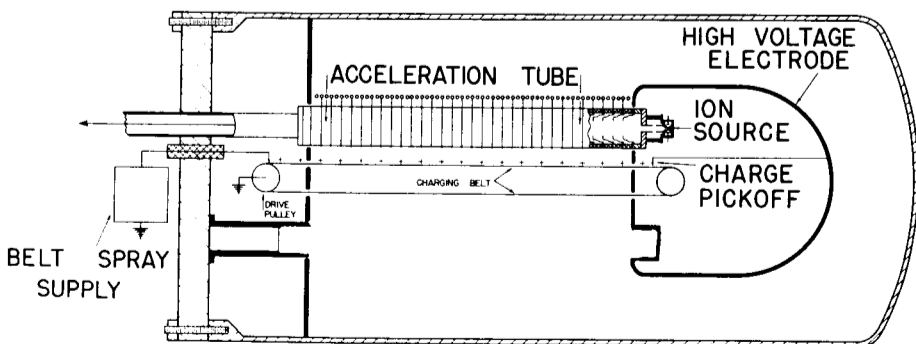
"From 1954 to 1970," said Alburger, "it was probably the most productive particle accelerator in low-energy nuclear physics . . . regardless of size, shape, etc. anywhere in the world. The people and the ideas they had were largely responsible, backed up by a very reliable machine."

The arrival of the Tandem Van de Graaff brought a facility which still remains the world's largest and most powerful electrostatic accelerator. Physics shifted its interest to this more powerful machine.

Alburger points out that, "The emphasis of the machine started to shift to applied work at this point. This was formalized by the formation of a separate Atomic Physics Group under Keith Jones in January 1976."

Both Van de Graaffs accelerate particles using the electrostatic energy built-up at a high voltage terminal. The positive potential at this terminal is created with a conventional belt system.

Bob Lindgren, Physics, was in charge of operations for the Research Van de Graaff during its years of fame in nuclear physics. When the Tandem beam came on in 1970, Lindgren shifted with the research thrust to the new facility. Edward Reilly, who joined the group as a technician in 1956, then assumed responsibility for the operation of the Research Van de Graaff.

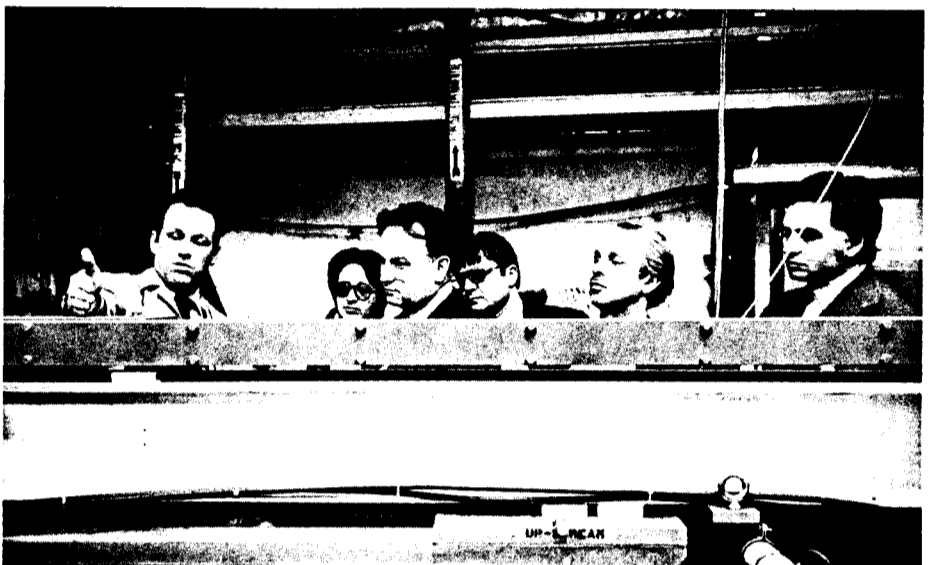


The pulley on one end of the rubberized belt is the negative terminal of a power supply. A screen lying above the belt, as it passes over this pulley serves as the positive terminal. "The high electric field draws electrons off the belt, which are discharged through the gas," said Jones. "This has the effect of spraying positive charge on the belt." At the opposite end of the belt system, electrons are drawn off an aluminum cylinder to neutralize positive charge on the belt. This cylinder, that encases the other end of the belt system, is left with a high positive potential.

This high voltage positive terminal can then be used as the driving force in electrostatic acceleration. The small Research Van de Graaff accelerates positive ions by repulsion from the positive terminal. The Tandem Van de Graaff, which operates at a higher energy level, uses the positive terminal to first attract negative ions. This acceleration becomes a two-step process when electrons are then stripped off the ion. These now-positive ions are again accelerated by repulsion.



**MEMBERS OF THE 1977-78 BROOKHAVEN COUNCIL:** Sitting: (from left) Michael Bender (Medical), Eric Forsyth (Accelerator)-*At-Large*, Sanford Lacks (Biology)-*Secretary*, Stephen Feldberg (DAS)-*Chairman*, Carl Dover (Physics), Richard Dodson (Chemistry); Standing: (from left) Richard Stoner (Medical), Richard Wiswall (DAS), Marshall Newton (Chemistry), Gen Shirane (Physics), Paul Hough (Biology). Not present, Gordon Danby (Accelerator), Joachim Fischer (Instrumentation), William Sampson (Accelerator), Harry Palevsky (Physics). The Brookhaven Council was established in 1962 to advise the Director on Laboratory policies affecting the scientific staff, including the review of proposed tenure appointments. Since 1968, Council members have been elected by the senior staff of each department, rather than being appointed, thus making them more directly representative of the scientific staff. The *At-Large* member is elected by the Council. Each member serves three years. Any member of the scientific staff should feel free to discuss matters affecting the scientific staff with a Council representative. A "Council Commentary" discussing some of the recent efforts of the Council will appear in a later issue of the *Bulletin*. — photo by Rosen



**UNDER THE US-USSR COOPERATIVE PROGRAM - FUNDAMENTAL PROPERTIES OF MATTER - A Russian delegation visited the Laboratory to study the possibilities and conditions of joint research work on nuclear physics. After visiting the Tandem and the HFBR, they stopped at the AGS. Inside the AGS ring are, from left: Horst Foelsche, Physics Department Chairman Nicolas Samios, W. Okorokov, Institute of Theoretical & Experimental Physics (ITEP), P. Krupchitsky (ITEP), and W. Manko (Kurchatov Institute).**

**Van de Graaff** (Continued)

quantity and spacial distribution of a particular type of atom in a target."

**Scattering**

Kraner and Jones put the beam to a more conventional, but unexpectedly revealing, use in the analysis of semiconductors. This technique, called scattering, literally involves observing the beam as it hits atoms in the target and is scattered.

"The Van de Graaff's helium (mass number 4) ion beam is well-suited to the analysis of light to medium weight elements," said Kraner. "We simply bounce the beam off the sample and then measure the energy of the ions scattered elastically in a backwards direction."

This particular interaction is known as "Rutherford Back Scattering." The deflected ions can be detected with a solid state energy spectrometer.

The group's first real experience with this technique was stimulated by Prof. Sidney Butler, Lehigh University. His group wanted to know the amount and position of chlorine in the silicon oxide layer on silicon semiconductors.

**Other Paths**

Simultaneous studies being done at this time focus on fluorine, lead, bone composition, and ocean water particulates. Jones and Kraner are not yet tired of the many avenues their diverse research program leads them down.

"There are applications for this beam throughout science," asserts Kraner. "If there are tough problems this technique can solve, then we're all further ahead. So we're going to find more interesting and illustrative problems to solve on a pilot scale by being as communicative as we can." — Cliff Cockerham

**New York City Train Trip**

The Hospitality Committee is planning a group railroad trip to the city, Wednesday, April 6. Departure will be at 8:32 a.m. from the Patchogue LIRR station. Round-trip fare for adults is \$2.45, children under 6 years ride free. Reserve a ticket by sending your fare through the U.S. mail to P.O. Box 322, Upton, New York, no later than March 31. Make checks payable to "Cash." Refunds will be made only if cancellations are received before noon on April 1.

For those who are interested, the group has arranged a tour of the NBC studios from 11 a.m. to 12 noon. The cost is \$1.85 for adults; \$1.20 for children 5 to 14 years; and children under 5 will be admitted free. If you are interested in taking this tour, please include the admittance fee with the train fare and follow the procedure as indicated above.

**Cafeteria Menu**

**Week Ending April 1, 1977**

<b>Monday, March 28</b>	
Cream of mushroom soup	
Chicken a la king on rice	1.10
Cheese omelet & 1 veg.	1.15
Hot deli - pastrami	
<b>Tuesday, March 29</b>	
French onion soup	
Chinese pepper steak on rice	1.25
Barbecued spare ribs & black eyed peas	1.35
Hot deli - sloppy joes	
<b>Wednesday, March 30</b>	
Split pea soup	
Breaded flounder filet & fr. fr.	1.20
Hot deli - baked Virginia ham	
<b>Special</b>	
Spaghetti, meat sauce, garlic bread	
All you can eat	\$1.20 plus tax

<b>Thursday, March 31</b>	
Cream of chicken soup	
Beef hash & 1 veg.	1.15
Veal pattie parmigiana & 1 veg.	1.20
Hot deli - meatballs	
<b>Friday, April 1</b>	
Manhattan clam chowder	
Broiled filet & 1 veg.	1.15
Meat loaf & 1 veg.	1.15
Hot deli - roast beef	

**Gardening Anyone?**

With spring weather hopefully only days away, it is time to get plants and seeds ready for the season. Anyone living on site who is interested in a garden plot, and who has not yet signed up, should contact Lisa Klopfer, Ext. 3193.

# BROOKHAVEN BULLETIN

Published weekly for the employees of BROOKHAVEN NATIONAL LABORATORY

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**CARL R. THIEN**, Public Relations Officer

## In Memoriam

Stanford L. Browell, a Sr. Technical Specialist in the Accelerator Department, died on March 17, 1977 after a long illness. He joined the Laboratory on November 12, 1962. Browell is survived by his wife, Helen, who is employed in the Physics Department, and a son, Douglas.

## Playoff Tickets

During the regular playing season of the NY Islanders, employees who had purchased tickets from the BERA Sales & Services Office were asked to put their names in a box for a drawing for tickets in the event the Islanders qualified for the National Hockey League playoffs. We're happy to announce that this eventuality became a reality and BERA has four tickets for each of the games to be played at the Nassau Coliseum.

The drawing will take place at the BERA Sales & Services Office on Thursday, March 31, at noon.

The seats are the same we had during the regular season and tickets for the playoff games are priced at \$13.00 each.

## Encore

**Francine Berger, Dowling College, will repeat her popular lecture on assertiveness training, Monday, March 28, in Berkner Hall, from 12:30-1:30 p.m. The lecture is open to all employees.**

## Pre-Paid Mailer Sale

A special one-day holiday sale on pre-paid processing mailers has been scheduled for Friday, April 1, at the BERA Sales & Services Office.

Substantial savings, as shown below, will be offered.

	Reg. Price	Sale Price
12 prints	\$3.25	\$2.73
20 prints	4.50	4.06
36 prints	7.95	7.04
20 slides	1.75	1.65
36 slides	2.95	2.75
8mm movie film	1.95	1.80

Also featured on this day only, will be a 10% discount on Fiji film.

The Sales Office is open Monday through Friday from 11:00 a.m. to 3:00 p.m. and the telephone extension is 3347.

## Concert Series

The distinguished Spanish classical guitarist Narciso Yepes will present an all-Spanish program at Berkner Hall, on Monday, March 28, at 8:30 p.m.

Admission	\$4.00
Persons over 65	2.00
Students with ID	2.00
Persons under 18	1.00

Employees who live off-site and bring their laundry to the Laboratory, should cease and desist. The laundry facilities in the apartment area are for the use of on-site residents only.

## Sale Of Mets Tickets

Tickets for the 1977 NY Mets baseball season will go on sale at the BERA Sales & Services Office on Wednesday, March 30, at 11:30 a.m.

Again this year, we have tickets for all the night, Sunday and holiday home games to be played at Shea Stadium. The eight excellent box seats for every game are priced at \$5.00 plus 50¢ service charge for each ticket. There will be no limit on the number of tickets an employee may wish to purchase.

### Schedule

April	July
17 Sun Chicago	8 Fri Montreal
22 Fri Pittsburgh	10 Sun Montreal
24 Sun Pittsburgh	12 Tue Chicago
26 Tue Montreal	13 Wed Chicago
27 Wed Montreal	15 Fri Pittsburgh
May	17 Sun Pittsburgh
10 Tue San Diego	29 Fri San Diego
11 Wed San Diego	31 Sun San Diego
12 Thu San Diego	
13 Fri Los Angeles	August
15 Sun Los Angeles	1 Mon Los Angeles
17 Tue San Fran.	2 Tue Los Angeles
18 Wed San Fran.	5 Fri San Fran.
19 Thu San Fran.	6 Sat San Fran.
30 Mon Montreal	7 Sun San Fran.
31 Tue Montreal	8 Mon St. Louis
June	9 Tue St. Louis
3 Fri Philadelphia	19 Fri Cincinnati
5 Sun Philadelphia	21 Sun Cincinnati
6 Mon Cincinnati	22 Mon Houston
7 Tue Cincinnati	September
8 Wed Cincinnati	2 Fri Atlanta
16 Thu Houston	4 Sun Atlanta
17 Fri Houston	5 Mon Montreal
19 Sun Houston	7 Wed Philadelphia
20 Mon Atlanta	16 Fri Chicago
21 Tue Atlanta	18 Sun Chicago
22 Wed Atlanta	20 Tue Pittsburgh
27 Mon Philadelphia	21 Wed Pittsburgh
28 Tue Philadelphia	23 Fri St. Louis
29 Wed Philadelphia	25 Sun St. Louis

## Sports News

### Bowling

#### Red League

The Anachems had a great team effort and knocked down 3104 pins, including a 1077 game. T. Prach bowled a 214, and L. Newman a 212. The Old Timers only took 5 but still hold onto first place. H. Frei had a 245 game and 658 gross pins. The 76'ers took 8 and are a half point out of first. They were led to victory by R. Larsen's 636 scratch (221/234), bring his average to 190. The Designers took 8 and are only 7 out of first. M. Bull (212) had 651 gross pins and A. Pinelli a 219.

The Sandbaggers took 5 and remain 11 out of first. C. Bohnenblusch had a 242 game and 665 gross pins. The Freon Loaders took 8 led by R. Marlow's games of 230/205 and 665 gross pins. A lot of guys came close to club awards this week. Let's win some next week!

#### Black & Blue League

Each week the point spread between the top teams decreases. The Quiet Ones lead the league one point ahead of the Jokers and two points ahead of the Pinsplitters.

Team standings take second place to the battle of the sexes. Despite a meeting held in the men's room before bowling (there was talk of a meeting next week to be held in the women's room) six of the ladies outdid their spouses in individual games. During the night, comments such as "guess who beat her husband" were heard. For the record, Dot, Rosemary, Joan, Virginia, Debbie and Pat all had individual games higher than Budd, Barney, Dick, John, Howie and Bill.

High games for the night were Lew Jacobson 213, Fred Hohmann 201, Renee Flack 188, Debbie Antonio 167. High gross pots were won by Lew Jacobson 240 and Renee Flack 237.

#### Pink League

The Med squad is still in first place with a 2 point lead over the Gutter Getters. High games for the night were Colleen Holland 194/256 gross game, Lindora Boyd 184/187/161 for a 532 scratch game, Carol Beckner 181/180, Kay Conkling 175, Marie Brenner 173/164, Betty Jellett 168, Renie Rosati 164, Fran Scesny 162.

#### Green League

The Super Cools maintained 8 points to keep them in first place by the same number. The Charley Browns are still in second place taking 8 points with P. Borzi having

a 201 game. The Blue Jays could only scramble together 3 points with J. Berech having a 208 game. The Got-A-Hit-Ums took six points from the Old Timers with R. Taylor having a 204. The Trouble Shooters took 6 from the Sandbaggers while the Sparks were being downed by the 76'ers.

In the Long Island Industrial Tournament, BNL had another rough night on the lanes. Bright spots for the team were R. Larsen 202/212 for a 597 scratch and J. Connelly 201. The team slipped another notch in the standings though, and we may have to let them have their trophy back - until next year.

## Skin and Scuba Diving Course

The Porthole Scuba Diving Center instructors will begin classes on Saturday, March 26. All those who signed up for the course are asked to report to the BNL swimming pool at 9:00 a.m., equipped with a bathing suit, towel, writing material and the registration fee.

As stated previously, all students will be required to present a medical release, signed by a doctor, at the time of registration.

Cost per student:	
Registration Fee	\$35.00
Certification Card	4.00
Rental Fees	
Tank, Regulator & Pack	40.00
Wet Suit (3 sessions)	8.00
Buoyancy Compensator	8.00

Rental fees will be applied to the price of equipment if the student desires to make a purchase.

## 1st Bicycle Tour

The BNL bicycling season starts April 3 with a tour to Sagamore sponsored by the Massapequa Club and the AYH. The tour begins at 9 a.m. at the parking lot of the Commack High School North on Schala and Town Line, and is about 40 miles round trip.

There are three additions to the biking calendar published in the Feb. 11 *Bulletin*; these are tours on April 17, May 1 and Sept. 11, sponsored by the Riverhead Preservation and Landmarks Society, of historic sections of Suffolk County. A fee of about \$1 is charged. The tours are only a few miles along Sound Ave. north of Riverhead, but a bike ride to the beginning point from BNL will be set up if there is sufficient interest - this would make the entire trip about 50 miles round trip.

For additional information phone Gerry Morgan, Ext. 4841, or send a note to Building 815.

## Soccer

Med-Bio-Chem continued their league dominance with a hard-fought victory over Physics 1-0. While both sides had chances, MBC appeared to make the best opportunities. Vera Ruiz finally pushed the ball past the Physics goalie while using a melee of players in front of the net as a screen. Stony Brook took the measure of DAS 5-0 with Cornish getting two goals.

Stony Brook and MBC are aiming for a showdown on April 1; however, AGS and Physics will be fighting to stay in the race on March 25 against MBC and Stony Brook, respectively. Both DAS and Port Jeff were eliminated this past week in the race for first place.

### League Standings (including 3/18)

Team	W	L	T	Pts.
Med-Bio-Chem	6	2	3	15
Stony Brook	6	3	2	14
Physics	4	5	2	10
AGS	4	5	2	10
DAS	3	6	2	8
Port Jeff	3	7	1	7

## Table Tennis Meeting

The BNL Table Tennis Club will hold a meeting on Tuesday, March 29, in Conference Room A in Berkner Hall, at noon.

It is important that all members attend.

## Mountain Club

At the last meeting of the Mountain Club, slides were shown of canoe trips taken by the group in the Florida Everglades in February and on the Carmen River last fall.

A schedule of trips for the spring was also set up. If you are interested please contact the person in charge of the trip.

April 16	Day canoe trip, Peconic River Ray Tessmer, Ext. 2002
Apr. 30 - May 1	Overnight backpack, Slide Mt., Catskills Dave Potter, Ext. 4234; Pete Tuhy, Ext. 3379
April 14-15	Overnight canoe trip, Delaware River, near Narrowsburg Ray Tessmer, Ext. 2002; Don David, Ext. 3942
May 28-30	Possible 3-4 day trip to New Hampshire or Maine, backpacking Don David, Ext. 3942; Pete Tuhy, Ext. 3379

## Volleyball

### Employees' League

#### Final Standings

	W	L	Pct.
Phoenix	16	2	.889
Spikers	14	4	.779
Cool Tools	12	6	.667
Atom Spikers	10	8	.555
Road Runners	6	12	.333
Chemistry	4	13	.222
Circuits	1	17	.055

#### Mixed League Up For Grabs?

Final standings for both Divisions are in doubt as the Division A Trolls are challenged by Oceanography in the last third of the season, and the Division B Nuts & Bolts have dropped to second place behind the "Lookin Good."

At the March 18th captains' meeting it was decided that the Trolls would play for the Division A Championship with whichever team wins the last third, and the Nuts & Bolts will play the winners of the second half for the Division B Championship. The two winners will meet for the Mixed League title. All these games will be scheduled for the soonest Monday available. Standings as of March 14.

#### Division A

	W	L	Pct.
Trolls	9	0	1.000
Oceanography	7	2	.778
Spikers	5	4	.556
Pushovers	3	6	.333
Parton Props	3	6	.333
Upstarts	0	9	.000

#### Division B

	W	L	Pct.
Looking Good	12	3	.800
Terabits	13	5	.722
Nuts & Bolts	10	5	.667
Diamonds	8	7	.533
Nuke Powers	5	10	.333
Center Crew	4	11	.267
Flashers	2	13	.111

#### Spring Volleyball League?

Team entries for a spring-summer volleyball league are hereby invited. Contact Greg Donaldson, 510A, Ext. 3722. Eligibility is the same as the Mixed League (employees and spouses) and the games may be scheduled for either Monday or Wednesday evenings. Entrants should indicate whether they wish to play with current mixed rules (no spiking, no overhand serving, no blocking, etc.) or upgraded mixed league rules (no spiking, but tight refereeing - no carries, etc.) or regular volleyball rules (as in Employees' League).

In addition, all Mixed League captains are requested to submit names of eight women from their division to play in the 1st Annual BNL Women's All-Star Game. Division "A" women will play Division "B" when the league concludes. Award presentations and an end-of-season party will follow the All-Star Games.

## Arrivals & Departures

### Arrivals

Richard P. Kuczumarski	Plant Engrg.
Robert P. Miltenberger	Saf. & Env. Prot.
Flemming B. Pedersen	Accelerator
Michael Todosow	App. Science
Joyce Wund	Personnel

### Departures

Jacques Antoine	App. Science
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## 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, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all nonscientific 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, as indicated below. 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 Personnel Placement Supervisor, Ext. 2874 or 2882.

**LABORATORY RECRUITMENT:** Opportunity for present Laboratory employees.

108. SENIOR DESIGNER - High level of competence in the design of machines, complex electro-mechanical devices, instrumentation and circuitry is required. Department of Applied Science.

109. DATA SERVICES ASSISTANT - Department of Applied Science.

110. SECRETARY - Good typing and communications skills are required. Part-time position. Director's Office.

**OPEN RECRUITMENT:** Opportunity for present Laboratory employees and outside applicants.

111. NUCLEAR ENGINEERING ASSOCIATE - Advanced degree or equivalent in mechanical or nuclear engineering. Should have a strong background in modeling, plant dynamics, numerical analysis and programming. Department of Applied Science.

112. COMPUTER SCIENCE ANALYST - Bachelor's degree or equivalent with competence in PDP-11 machine language, scientific and record-keeping routines on CDC 66/7600. Background in natural sciences is desirable. Safety and Environmental Protection.

113. CHEMISTRY ASSOCIATE - BA or equivalent in chemistry. Part-time, six-month position. Chemistry Department.

114. BIOLOGY ASSOCIATE - BS or equivalent in biology with background in biochemistry and molecular biology. Six-month position. Biology Department.

115. COMPUTER OPERATOR - Possible shift work. Applied Mathematics Department.

116. MASTER WELDER - Central Shops Division.

117. ELECTRICIAN A - Plant Engineering Division.

118. EXPERIMENTAL MACHINIST - Central Shops Division.

119. EXPERIMENTAL METAL WORKER - Central Shops Division.

120. TECHNICIAN - Quick Copy Service Center. Shift work. Photography & Graphic Arts Division.

### Autos & Auto Supplies

75 SUZUKI - 550, excel cond. \$1250. Bob, Ext. 3313.

73 FORD GRAN TORINO - 4 dr sedan, a/c, auto, p/s, vinyl top, 48,000 mi. \$2100. 929-4716 after 4.

70 CHEVELLE MALIBU - V8, 4 dr, 34,000 mi, showrm cond. Call Hal, 724-0659.

73 VEGA HATCHBACK - Auto, a/c, excel cond. \$1250. Richard, Ext. 4501.

SNACK TRAY - For Dodge van. \$15; Spoiler for Dodge van, slight crack. \$15. Bill, Ext. 4434.

WINDOWS - Heart shape for van. \$35; 1 pr gem shape windows for van. \$45. Bill, Ext. 4434.

74 GREMLIN - 6 cyl, std trans, very clean. \$1,800. John, Ext. 3354.

70 CHRYSLER - 2 dr, ps/pb, seats & windows, very good cond in & out. Ext. 3319, 751-7140.

66 VW - Squareback, dealer rebuilt, good tires & snows, great cond. Ext. 3319, 751-7140.

76 SUZUKI - 550 cc, 2500 mi, crash bars, windshield, vinyl saddle bags, excel cond. Howard, Ext. 3260, \$1500 firm.

75 TOYOTA CELICA GT - 5 spd, dk gn, am/fm stereo, 25,000 mi, showroom cond, orig owner, best offer. Borg, Ext. 3623.

74 GREMLIN - 23,000 mi, auto trans, ps/pb, package radio-roof rack. Dick, 286-8906.

TRAILER HITCH - New, fits 74 Chevy Nova, 74 Pontiac Ventura, 74 Olds Omega, 74 Buick Apollo. \$15. Helen, Ext. 3268 or 929-4173 eves.

67 BUICK ELECTRA - 4 dr, good cond, asking \$375. 473-3500.

TRIUMPH TR4 - Rebuilt 8000 ago, new paint, new parts, etc. Asking \$850. 288-1151 eves.

TIRES - Goodyear Polyglass Belted - G-78-15, less than 20 mi. \$25 each firm. Bill, 475-2409.

6 CYL ENGINE - Falcon or Comet plus extra block, head, transmissions, etc. Make offer. C. Goodzeit, 286-0271.

71 CAPRI - 2000 cc, 4 spd, 24-28 mpg, 60,000 mi, radial tires & snows. \$800. John, 981-6817.

72 DODGE CHALLENGER - 340, 4 spd, p/s, new headers, mufflers & shocks, vinyl roof, radial tires. \$1900. 727-7278.

74 HONDA CB360 - Blue, luggage rack, clean, adult driver. \$750. Ext. 2599, 821-0599.

75 MGB - Burgandy with tonneau and boot, am/fm, overdrive, 27,000 mi. \$3700. Ext. 2599, 821-0599.

71 MGB - Convertible, overdrive, 4 new radials, am/fm, plus many extras. \$1550 firm. Gene, Ext. 3945 or 744-3945.

66 VW FASTBACK - New brakes, new paint job, clean, good cond. Stan, Ext. 4278.

72 CUTLASS S - 2 dr, 4 spd, tape deck, new front tires, ps/pb, excel cond. Must see. Bob, 289-4182 eves.

70 FORD TRUCK - 4 wheel drive, 67,000 mi. \$1400. Carey Miller, Ext. 3468.

64 DODGE DART - 6 cyl, auto trans, 4 dr, good trans. Ext. 2624.

64 VW VAN - Set up for camping, cabinets, jalousie windows, extras, mechanical good, needs minor work. \$375. 727-7304. Richard, Ext. 4612.

73 HONDA - CB350, 9,000 mi, \$575. Ext. 4052.

74 HONDA 450 - Only 2,000 mi, excel cond. \$900. 281-9245.

TRUCK TIRES - (4) 9.50x16.5 Goodyear Hi Milers, 8 ply, nylon, brand new, take-offs. \$75 ea. P. Valli, Ext. 2023, 744-3289.

ZUNDAPP ENDURO - 125 cc, 1974, needs engine work. Make offer. Chris, 728-0869 after 6.

70 REBEL - 6 cyl, auto. \$475. Al, Ext. 3354, 727-7115.

72 PONTIAC LEMANS - 35,000 mi, a/c, pb/ps, clean & good cond. 281-5692.

71 TOYOTA CORONA - 25 mpg, 1 owner, 77,000 mi, a/c, am/fm. \$700. Evelyn, Ext. 2470

71 DEMON - 6cyl, auto, ps, runs very good, new alt, 7 reg, hoses & belts, app 80,000 mi. \$600. Kathleen, Ext. 3146.

75 HONDA CB360-T - Bought new in 76. 1600 orig mi, excel cond. \$850. Call 698-7113 after 5.

### Boats & Marine Supplies

17' THOMPSON - W/ 73-65 hp Merc & tilt trailer, all in beautiful cond, new canvas tops & many extras. Asking \$1500. Frank, Ext. 3254, 728-0338.

MOORING CHAIN - 3/4"x40' + buoy, pick up pennant, new cond, also line & clambag. \$65. Bob, Ext. 3848.

25' SLOOP - Excel cond, cedar on oak, sleeps 2, head, sink, stainless rigging, bronze fittings, 5 sails, very fast, \$2000. Ext. 4745 or 744-3225 eves.

18' SKIFF - 4 cyl inboard, gauges, lights, preservers, extinguisher, rod holders, seats 8, 20 gal gas tank, extras. Tom, 325-1524.

17' BOAT - Clamming or fishing, + Holsclaw trailer, brand new, plus extras. \$1200 takes all. 286-8582 after 5.

24' ZOBEL SKIFF - Lapstrake hull, 125 hp Chrysler crown, stern cover, good family/fishing boat. \$500. 286-9619.

15' CENTURY - Wood boat, 25 hp, Elgin elec start motor, tilt bed trailer. \$350-\$450 depending upon state of refurbishing. 928-2803.

61 CRIS CRAFT - 25', din, sleeps 4, galley, 327 Chevy, running, needs minor repairs. \$500. 281-2813 eves.

68 PEMBROKE - 28' cabin cruiser, sleeps 4, refrig, stove, flying bridge, head, twin 190 hp Chevy engines fresh water cooled, VHF, depth finder, surveyed 76. \$7900. 928-2727, 928-5130.

18' CATBOAT - With outboard, many extras, new standing & running rigging. R. Stoehr. Ext. 4851 or 363-8981 after 6.

SKIFF - 200 hp fresh water cooled V8, cuddy cabin, navy top, good cond. \$1400. Marine toilet-new model. \$25. Ron, Ext. 4082, or 289-1003.

73 JOHNSON ELECTRIC START OUTBOARD - 65 hp, used, only 1 1/2 seasons, mint cond. \$800. C. Goodzeit, 286-0271.

PROP - For 50 hp Merc. 10 1/2 x 15, fits most years, try before buying, brand new. \$15. Daniel, 588-5833.

18' SAILSTAR - Centerboard sloop with cuddy, fiberglass with full rigging. \$1200. 3.5 hp motor, trailer extra. Ext. 2599, 821-0599.

18' THOMPSON - In/outboard engine, elec winch, Cox Tandem trailer, exc cond. Asking \$1800. 727-5912.

PROP - For 72-73 50 hp Mercury 10 1/2 x 11 new. \$25. 281-8458 after 5 p.m.

75 MERCURY - W/power trim controls, cable harness, tank & hose. \$1400. 281-8458 after 5 p.m.

ALUM BOAT - 12' - 14' ft. Sheldon, Ext. 3354.

75 MERC ENGINE - 50 hp, used one year, good cond. \$850. 286-8517 after 5:30 p.m.

20' FLYING DUTCHMAN - Racing sailboat (wood hull) main, jib, Genoa & Spinmaker sails included, very good cond. Asking \$1000. Ext. 2008, 2070, or 928-5875.

### Miscellaneous

EXHIBITION SALE - Batiks by Judith Turner, sketches by Stephanie Durston. Shoreham Public Library, Route 25A east of Wm. Floyd. 'Til April 15. Turner, Ext. 2106.

2 BELL HELMETS - 1 white super Magnum (still in box) and 1 Topex (slightly damaged). Both for \$55. Jack, Ext. 2253, 744-6467.

2 BICYCLES - Girl's 20", good cond. \$15 each. 473-1295.

LONDON FOG - All weather coat, 44 long, beige, belted, zip out pile lining, worn once. \$35. 473-1286 after 6 p.m.

HAM RADIO - Heath HW-16 w/HG-10B VFO. \$150. Ruppert, Ext. 3255.

WELL PUMP - Sears, Model E110 convertible, 3/4 hp, built-in pressure gauge, good for 110 ft depths, used 2 yr, good cond. \$65. Call 289-1855 after 6.

CAMERA LENS - Auto-telephoto lens, Vivitar 135 mm, 2.8, fits Minolta, lens shade & clear filter. \$50. Ext. 2885.

ANTIQUE PIPE - Merscham, hand carved stallion w/alligator case, very nice. \$125. 399-1718.

19" B&W TV - Zenith solid state w/stand, 2 yrs old, seldom used, \$90; Danish modern couch frame, \$15. 399-1718.

SWEDISH WOODWORKING BENCH - Excel cond, new cost \$400, my price \$200. 286-2292.

PIANO - Spinnet, excel cond. \$450. Pat Fox, Ext. 2939.

COLONIAL FURN - 90" couch, wine/gray eagle design, \$50; love seat flower design, \$25; solid wine color wing back chair, \$25. Regina, 475-5266.

TABLE LAMPS - Pair, provincial, beige, very tall, \$35 ea; large white lamp, gold leaf design, \$50. Excel cond. Jack, Ext. 2907.

COMMODE - Fruitwood table w/marble top. \$75. Excel cond. Jack, Ext. 2907.

GARDEN SEEDER - Planet, Jr. #4 w/plow & cultivator attachments. Ext. 3120, 286-0641.

PIANO - Upright. \$75. Ext. 3870, 732-3003.

GAS DRYER - \$20. Ext. 3870, 732-3003.

BABY ITEMS - Battery, 12 V, Sears, good cond; tri-cycle; brown suede fringed vest. \$5 ea. Brooks, 289-6197.

ACCORDION - Excelsior, 120 base, 3 keyboard changes, excel cond. \$250. Carolyn, Ext. 2446, 929-6172.

3 TV'S - All perfect. Jack, Ext. 4526.

SET OF GOLF CLUBS - Ideal for beginner, 2 woods, 4 irons, putter & bag, some balls, \$20. Robert Ligrosser, 472-0251.

EXHIBITION - Batik on silk, Judith Turner, sketches & paintings, Stephanie Durston, Shoreham/Wading River Public Library, Rt 25A east of 46, March 15-Apr 12. For info call Ext. 2106.

DOG FOOD - Cycle 1 beef, costs 37¢ in supermarket plus tax, 10 cans for \$3, less than wholesale. Phil, Ext. 4722.

20" GIRL'S BICYCLE - Columbia, good cond, banana seat, high rise, handle bars, \$20. Charlie, Ext. 4691.

MATH BOOKS - Intro college math, elem stat. \$3 ea. Ext. 4279.

SUMP PUMP - Unused new Sears 1/2 hp, vertical sump drainer w/float switch, 1 1/2 NPT outlet, cost \$64 in 1975, make offer. Hendrie, Ext. 2912.

CAMERA - Polaroid SX-70 w/leather carry case & some accessories. \$75. Audrey, Ext. 3489.

CHEAP USED USED FURN - Are you handy? 929-4885 Sat & Sun.

NIKKOR ZOOM LENS - 43-86 mm, F 3.5, \$110; Soligor zoom lens, 45-135 mm, F 3.5 Nikon mount, \$90. Irv Meyer, Ext. 3038, 929-4326.

GOLF CLUBS - Titlist Ac108 irons, 2-PW reg shaft, 3 yrs old, excel cond. \$95 firm. Jeff, Ext. 4539.

TOUR HOME - 8' truck/camper, sleeps 6, heater, stove, ice box, toilet, sink, ladder & jacks. \$800. 732-6173 after 6.

REFRIGERATOR - Very good cond. \$150 or trade for freezer. Jeff, 281-8401.

MTD SHREDDER/BAGGER - 5 hp, leaf ramp, extra bag, very good cond. \$140. Ext. 2497, 281-2767 eves.

WINCH - Small cable, hand operated. \$20. Frank, Ext. 2022.

BICYCLE - 10 spd Fuji special tourer, purchased 4/76. \$120 firm. Ext. 2144.

COUCH & LOVE SEAT - Contemporary, blue & white, almost brand new, cost \$700, will accept \$400. Ext. 2882/2883, 473-9121 after 6.

POP UP TRAILER - Bravo 1972, sleeps 6, stove, ice box, htdp, excel cond, trunk. \$1200. Jerry, 475-5591 before 3, Ext. 3303 after 5.

WATER TANK - Sears vertical water storage tank, 82 gal, glass lined, used 2 yr, good cond. \$35. Call 289-1855 after 6.

WEBER GRILL - New (black). Cost \$80 still in box, only \$50. Glass sliding door only \$50 with all parts. 475-4930 after 6 p.m.

CHILD'S TABLE - 30" diameter round formica top, very sturdy, 2 chairs, maple finish. \$25. Call Joan, 744-3919 or Jack, Ext. 4447.

BAY GELDING - 15 hands, 8 yrs, western, potential for barrel racing, excel health. 288-6021 eves.

### Real Estate

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

### For Sale

ROCKY POINT - Immaculate 4 bedrm Colonial, eat-in kitchen, formal dining, lvg, 2 1/2 baths, beamed paneled den, fireplace, w/w carpet, all appl, garage, wood deck, 1/2 acre, private beach. \$57,000. 744-1156.

MASTIC BEACH - Cedar Gambrel mother/daughter, 200' from bay on 1/2 + quiet acre. Spacious, tastefully decorated living areas plus large isolated room for home business. Sacrifice \$45,000. 281-7550.

BELLPORT VILLAGE - 1 1/2 acre on quiet Cul-De-Sac S of S Country Rr, beautiful location near dock and Country Club. 273-0139.

SELDEN - 6 yr old, 4 bedrm splanch, eat-in kitchen, paneled den, formal dining, 1 1/2 baths, basement, fenced. 732-6231.

E SETAUKET - Colonial 4 bedrms, 2 1/2 bath, finished basement, patio. Must see. After 5:30, 751-8918.

WADING RIVER - Charming Cape on landscaped treed 3/4 acre, 3-4 bedrms, 2 baths, muraled living rm, den, fp, formal dining, eat-in kitchen, w/w carpet, full basement w/patio doors. \$54,000. 929-8313.

WEST YAPHANK - 8 rooms, 3 bedrms, 1 1/2 baths, 2 fp, indoor barbeque, finished basement & laundry rm, all beamed ceilings, w/w carpet, swimming pool, tennis court, all fenced, also 3 stall barn, tack room, hay room. \$45,000. 924-3749.

SHOREHAM - 4 bedrms, 2 1/2 baths, liv rm with fp, large kitchen, w/w carpet, central a/c, fully landscaped, 1/2 acre. \$45,000. 744-0269.

ISLIP - Prime location, 100x100 residential lot. \$10,500. 277-1332 after 4.

2 BEDRM HOUSE - W/expansion attic, liv, kit, bath, 4 appliances, fenced, garage, 20 min to Lab. Low 30's. My broker, Mercy, 981-8800.

MIDDLE ISLAND - Townhouse, 4 bedrms, 2 baths, storage area, all appliances, central a/c, w/w carpet; extras, clubhouse, swimming, tennis, 1 yr old, immaculate. \$29,900. 924-5457.

CORAM - Immaculate 4 bedrm Colonial, eat-in kitchen, formal dining, lvg, 1 1/2 baths, full basement, garage, extras. Principals only, \$38,900 negotiable. Owner, 929-8300, Ext. 202, ask for Bill.

NORTH SHORE - 10 min from Lab, one acre bldg plot, approx 100x400, all wooded private custom homes. Asking \$14,500. 924-3236.

BELLPORT VILLAGE - 4 bedrm Cape, lg lvg rm, dining, fp, country kitchen, 1 1/2 baths, garage, inground pool, fenced yard. \$55,000. 286-0795.

POCONO PROPERTY - Horses, swimming, ski lifts, tennis, near boating in Delaware, priv community w/gate guard, will hold mtgage. Ext. 3870, 732-3003.

### For Rent

VACATION IN VERMONT - 3 bedrm, 2 bath, fully equipped, trout fishing, swimming, hike, reasonable. 732-6499 after 6.

MASTIC - 4 lg rm apt, furn, all util incl. \$265/month. 281-6116.

APT - 10 min from Lab, 1 bedrm, fp, carpeting, tennis, pool & golf incl at Pine Hills Country Club, avail May or June. 286-3333, 878-4794.

SAYVILLE - 3 bedrm, lg kitchen, laundry rm, fenced yard, near schools. \$325/mo + 1 mo security. 289-0413.

RIVERHEAD - 2 bedrm, no pets. \$225/mo + util, 1 mo security. 727-5621.

WEST INDIES - Beautiful 2 yr old colonial, fully furn, 2 bedrms, lg living rm, hot water, maid's quarters, lots more, Dominica, long & short term lease. Ext. 2470, 928-6930.

SHIRLEY - Apt for rent, single only, 281-5068, week-ends; (212) 270-2616 days, ask for Margie.

APT - Patchogue area, kitchen, living rm, 2 bedrms, bath, private entrance. \$250/mo. Walt, Ext. 2907, 698-0576.

### Wanted

1 BEDRM APT - Priv entrance, bath, kitchen, approx \$150-\$160. Ext. 3575.

ELEC BOAT TRAILER WINCH - 475-4199.

HOME - In Wading River, 3 bedrm ranch w/3/4 to 1 acre land, \$50,000. Larry, Ext. 4526, 924-5898.

BABY ITEMS - Port-a-crib, car seat, high chair. 281-5296.

LAWN MOWER - Child's bicycle seat, child's car seat. Ext. 3859, 286-1712.

2 RIMS - For 1971 Valiant. Rich, Ext. 4172.

STEREO CAMERA & EQUIP - Also old viewmaster viewer or projector. Rich, Ext. 4172.

GENERATOR - Lg gas powered. Jack, 727-3654.

RIDER LAWN MOWER - In good cond, cheap. Gail Borruso, 878-4664.

ENGLISH BICYCLE - Women's 3 spd. 698-3188 after 6.

HOUSEMATE - Someone to share 4 bedrm house in Farmingville, 3 acres land, garage, lg shed, rent + util approx \$120, 11 mi to BNL. 698-9059 after 5:30.

EXCHANGE ALBUMS - Interested in temporarily exchanging jazz, rock & roll records for purpose of recording on quality equip? Jack or Gary, Ext. 2253/2093, 744-6467.

TIRE - 165-15 Michelin steel belted radial, fair