BROOKHAVEN BULLETIN
Vol. 37 - No. 38 September 23, 1983
BROOKHAVEN NATIONAL LABORATORY

Does it Pay to Go Solar?

Summer's heat is past, and in the morning chill, sunlight feels good on the shoulders again. Thoughts turn to the coming winter. What about using all that solar energy to keep warm? There's so much of it. And it's free. Isn't it?

Yes and no, according to John Andrews, who was recently asked by the Bulletin to tackle the question of solar economics. Andrews is head of the Architectural and Building Systems Division in DAS. Prior to that, he headed the Solar and Renewables Division for four years, where he did an analysis of active solar heating systems. (Note that this discussion does not include the Brookhaven House, built on site in 1980 to demonstrate an energy-efficient passive solar house design.)

Doug Humphrey

John Andrews

First of all, a solar system needs a backup conventional system. That might not be the case if you live in Yuma, Arizona, which has sunny days 90 percent of the year, but the Northeast has sunny days only about 60 percent of the time. So given that you need two systems, can the total operating cost of both be less than that for a conventional system alone? A lot depends on what a solar system costs.

"Five years ago, the attitude among researchers in the field was that cost was not a factor in designing solar heating systems," says Andrews. "There was a mystical feeling that cost eventually would come down by itself. Instead, researchers concentrated on making systems durable, since a lot of failures were showing up in field demonstrations."

As a result, early units that came out on the market were not economical. And most commercial ones available today are still not.

Here's why. According to Andrews, a typical price for a solar space heating system is $40 a square foot. That includes $20 per square foot for the collector installed and another $20 per square foot for the rest of the system. A three-hundred square foot system, prescribed for an average three-bedroom house, would cost a total of $12,000. One square foot of a solar system will collect energy roughly equivalent to one gallon of fuel oil per year. That means $40 for sunshine compared to $1.25 for oil. So if you invested in a solar system, it might take 30 years before the savings from not buying oil would pay for the high initial cost of a system that uses free fuel.

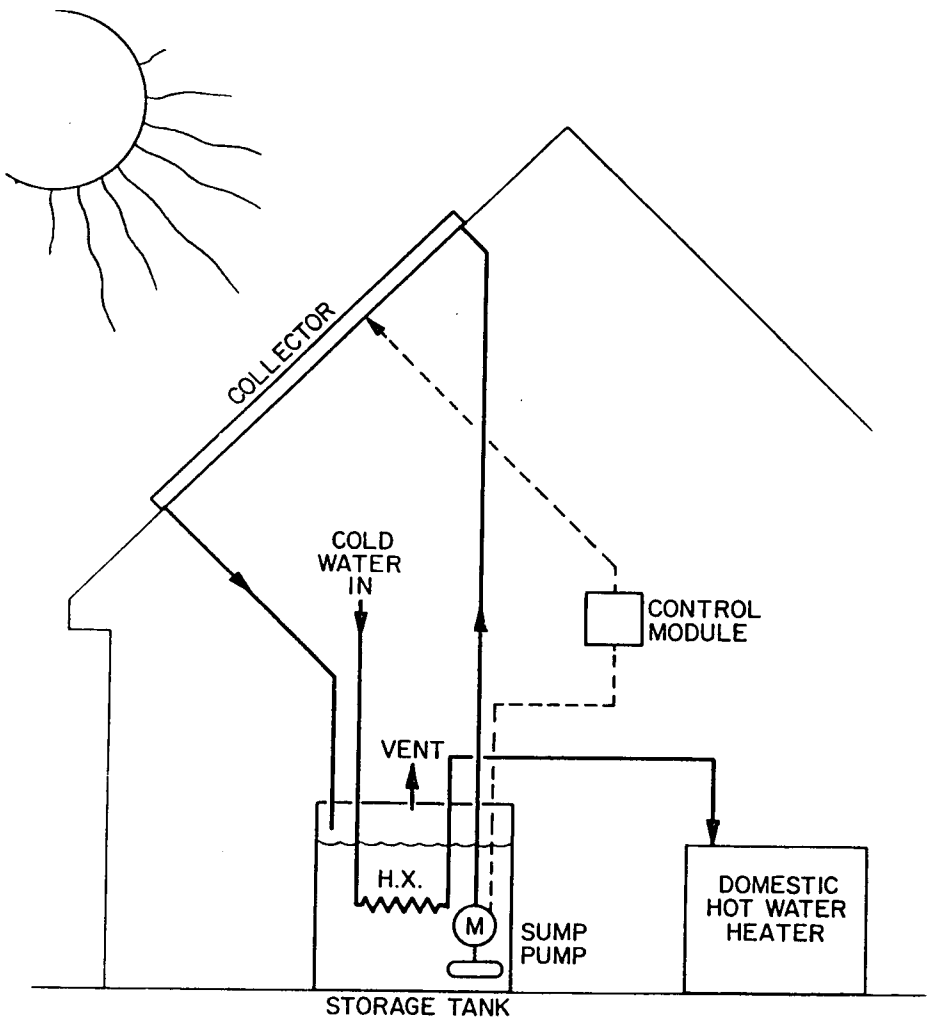
For a buyer interested in a lower investment, a hot-water only solar system can be considered. Initial costs for a 60 to 80 square-foot system generally run in the $3,000-$4,000 range, or about $50 per square foot. The energy savings per square foot of collector are higher for hot water than for space heating because the collectors are used year-round. A generally valid rule of thumb counts a savings of two gallons of oil for each square foot of collector. Under these conditions, there would be a $2.50 savings to compare with the $50 per square foot cost, for a payback of 20 years.

These payback calculations do not consider tax credits, nor the use of fuels other than oil. But they illustrate the problem faced by researchers attempting to reduce solar costs to levels considered acceptable.

Andrews says industry will market only products with a payback time of three to five years. Anything longer will not sell. For the consumer, anything longer is not a good buy. The system may not last 30 years. And within that time, advances in technology may be so great that it would be foolish to buy now.

Why hasn't the cost of solar come

(Continued on page 3)



A schematic of the thin film solar collector design applied to domestic hot water heating.

BNL Research Brings Down Cost

Bill Wilhelm has been working on innovative solar collectors for the past four years. The Bulletin last reported on his collectors just over a year ago. Since then, Wilhelm, now head of the Solar and Thermal Applications Division in DAS, has developed a more durable version which he says has the potential to bring the price down to one-sixth the cost of conventional solar heating systems.

Basically, the collector's low cost comes from the use of thin materials, assembled with unique construction methods. The collector is built like an airplane wing, in that an outer thin plastic film window and back are stressed against a rigid plastic foam core. A special frame design permits a construction similar to a box beam. This ultra-light design, about one-half pound per square foot, saves material and insures rapid, easy installation. In spite of their light weight, the collectors are strong enough to support the weight of two large men. They are also capable of producing temperatures as high as 200°F, even in the winter.

This past June, to test the latest collector model in the field, panels were installed on the roof of the Arkansas House, a house in the apartment area used for research. Technician Dave Hansen put up five hinged panels in less than fifteen minutes. Hansen estimates the job would take five minutes done by an experienced installer.

In addition to the collector, the Solar Division is studying ways to reduce costs for the rest of the system — distribution piping, storage tank, pump and controls. This will be done by using new materials and construction methods.

At the Arkansas House, Wilhelm has already set up a system of plastic pipes and an unusual hot water tank, all connected to the rooftop collectors.

Low cost, high performance and good aesthetics are Wilhelm's design rules. And while he has brought the collector cost down to an estimated $6 per square foot installed, he thinks the price can be as low as $4 with new fabrication methods and materials.

"There is still a tremendous opportunity for research in this field," says Wilhelm, whose work is supported by the Active Building Systems Branch of DOE's Office of Solar Applications for Buildings. "It is our function to bring enough credibility to new technologies like this to give the industry enough confidence to carry on its share of the development."

Dyson to Lecture at BNL

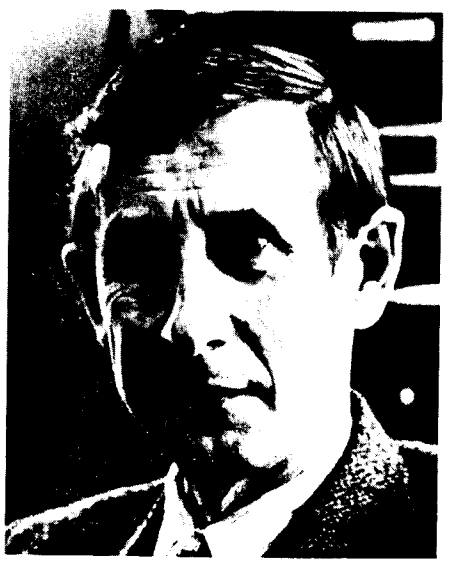
Freeman J. Dyson, noted mathematical physicist and astrophysicist, will discuss the "Origins of Life" in the 28th AUI Distinguished Lecture on Wednesday, October 5, at 8:30 p.m., in Berkner Hall. The lecture is open to the public.

In his talk, Professor Dyson has indicated that he will describe "a simple abstract model which is supposed to represent the transition from disorder to order in a population of chemically active molecules. The model raises a number of questions which may be accessible to experiment. It also raises questions which may be relevant to the nature of early biological evolution."

Dyson has been awarded many honors for his outstanding work in theoretical physics. His most recent award, the Wolf Prize in physics, was given to him in 1981 for his "major contributions to many different areas of physics and technology, in which he made effective use of his deep knowledge of mathematics."

He received his B.A. in mathematics from the University of Cambridge in 1945. From 1943-45 his studies were interrupted while he did operations research for the R.A.F. Bomber Command. In his book, "Disturbing the Universe," he reflects on this experience and the doctrine of strategic bombing which held that "all governments would be deterred from starting wars if they knew that the consequence would be certain and ruinous bombardment." He noted that "in spite of the clear evidence of history, the strategic bombing doctrine flourished in Bomber Command throughout the Second World War. And it flourishes still, in bigger countries, with bigger bombs."

Dyson came to America in 1947 with a Commonwealth Fellowship at Cornell University. By the time he was 28, he had been made a professor of physics at that university. In 1953 he accepted an appointment as professor of physics at the Institute for Advanced Study, a position he still holds.



Freeman Dyson

His numerous other honors include the J. Robert Oppenheimer Memorial Prize, the Max Planck Medal, and seven honorary degrees from American and British universities.

Fighting Fire With Training

A firefighter emerges from the small building carrying a rescued cone.

Randolph Philips reflects on the smokehouse session he has just completed.

Smoke billows out as a team of firefighters opens a fire escape door to enter a smokehouse building at the Suffolk County Fire Training School. —photos by Horton

"All right, Willy!"
"Nice going, Stan."

Outside of the smokehouse for only a few seconds, Stan Rhodes and Bill Leigh-Manuell were too busy removing gear to acknowledge the accolades of their peers. The August day was very hot, and the blue sky was darkened by smoke. But the smokehouse course at the Suffolk County Fire Training School had been much hotter and much darker. Veteran firefighters Rhodes and Leigh-Manuell were the first of four BNL teams to complete the course that day.

The Fire Training School has been in operation since 1942 and is constantly in use, said Don Manning, chief of the school, with volunteer fire departments training every night and on weekends, and private groups during the day. BNL firefighters trained there on three consecutive Thursdays last month, refining methods for search and rescue in a burning building. Because it allows the firefighters to experience the reality of a fire in a controlled setting, Chief Manning said the training helps to point out any psychological and physiological limitations the firefighters may have, while giving them a sense of security in their equipment.

This was the first time Lab firefighters trained at the Yaphank school and John Deitz, supervisor of the Fire & Rescue Group, said participation will continue on a regular basis. The training is broken up into three parts: classroom instruction, the maze and the smokehouse.

It is totally dark in the maze, a series of hallways with offshoots of closets, doors to nowhere, ramps and rafters. Trainees enter the maze alone, in full gear, using their compressed air tanks which are rated for thirty minutes. To get safely out of the maze before their air runs out, the trainees rely on the techniques they have learned to guide themselves along the walls and floors.

Manning said the County maze, which opened about two years ago, is the largest one of its kind and is electronically controlled. Through a system of infrared lights and microphones, control console operators can monitor each trainee's progress.

While the maze tests a trainee's ability to endure and overcome the darkness of a burning structure, the smokehouse adds two new factors: smoke and heat. For this exercise, barrels of oil placed throughout two interconnected buildings are set aflame, creating a situation that closely approximates the real thing. The trainees must not only complete the complicated course in nine minutes or less, but they must also rescue two "people." The cones used in this exercise might be placed anywhere, so they are often harder to find than real people, who have a tendency to crawl under something to escape the heat and smoke.

Rhodes and Leigh-Manuell were the first team through the smokehouse on the last day of BNL training. They began at 1:25 p.m., entering through the basement of a small one story building. The air outside thickened with smoke and silence as the other firefighters listened for sounds indicating that all was well within. Suddenly a side door opened and Rhodes stepped out with a rescued cone. Three minutes had elapsed.

Accompanied by encouraging cheers, the team propped a ladder against the building, climbed to the roof, crossed a catwalk to a second three-story building, climbed a fire escape to the next floor and entered the building. The time was 1:29 p.m.

Again silence reigned outside. But this time, those listening could hear the steady breathing of the firefighters using their compressed air tanks. At 1:32 Rhodes and Leigh-Manuell stepped out of the building with another rescued cone, having spent seven minutes completing the course.

— Anita Cohen

Cooling: A Hot Topic Down South

Everyone wants a home that is comfortable and efficient. Those in northern climes try to achieve this goal by concentrating on heating systems, while in the south, the focus is on cooling. At the Florida Solar Energy Center (FSEC), the focus is on passive cooling, specifically the development of techniques for conserving energy in residential and small commercial constructions in a warm, humid climate.

What do the programs of the southern-based FSEC have to do with northern-based BNL? According to architect Ralph Jones of DAS' Architectural and Building Systems Division, present trends indicate that 50% of the population increase projected for this country by the year 2000 will take place in this sunbelt area. And much of the present and projected populations will consist of the elderly, who are not only on fixed incomes, but who also have a more difficult time adapting to excessive heat and humidity than to cold. For these reasons, says Jones, increasing cooling efficiency while cutting costs is much more than a local concern. The DOE agrees and is supporting a collaboration between Jones' group and the FSEC to perform field validation and analysis of passive cooling concepts developed in the FSEC laboratory.

As explained in its proposal to BNL, the FSEC, which is part of the University of Central Florida, sought the partnership because, "Brookhaven National Laboratory has a long-distinquished history in energy research, and, in the last few years, has published a considerable amount of valuable information on building performance evaluation. Brookhaven case-study publications have been of great value to those in the design and construction industry looking for impartial analysis of various energy savings techniques in actual field applications....A cooperative effort between BNL and FSEC would be very productive in combining the talent and expertise of two experienced organizations to produce well-documented information on energy conservation for the southern tier with their rapidly expanding population."

Although considerable research has been conducted on passive cooling for arid climates, like that of Arizona, relatively little was done for humid areas until the FSEC began investigations in 1979. One of their recent efforts has been to provide consultation services to the builder of the Rangewood Villas Townhouse Project, built on Merritt Island, not far from FSEC headquarters at Cape Canaveral, Florida. Field validation analysis by BNL and FSEC will center on this complex, one of the first commercially constructed residential projects to utilize FSEC-advocated passive cooling techniques, including:

• Vent skin walls and roofs — Cool air enters a space between the building's inner masonry wall and the outer wall sheathing through vents located near the foundation and the soffit (underside of the roof eave). As the air gets warmer and less dense, it rises and flows by convection out of vents near the soffit and roof. With cool air always passing around the house, cooling the masonry, which is also shielded from solar gain by a reflective film radiation barrier, cool temperatures are maintained in the interior of the house. While this is a novel application, the idea is not new; it's the same method used many years ago to keep ice houses cold.

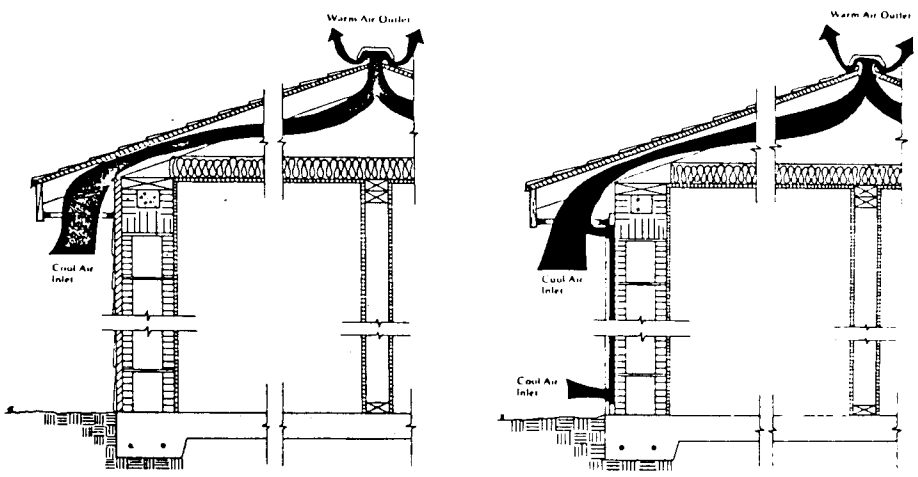
• Radiant foil heat barriers — Lining the vent skin walls and the underside of the roof construction, these barriers are coated on both sides with aluminized reflective film, to prevent exterior radiant heat from being transferred into the living area. Monitoring the occurrences of both convection and radiation, BNL's dynamic field performance analysis will also validate studies of reflective radiation barriers being conducted at Oak Ridge National Laboratory.

• Clerestory heat venting — Pronounced "clear story," these rows of small windows rise above the roof at the top of the unit's cathedral ceiling to provide a means of venting stratified heated interior air as it warms and rises.

Other innovative approaches to energy conservation incorporated into the townhouses include a stack effect heat reservoir for the hot water heat pump, which also serves as dehumidifier; direct gain solar heating designed for winter sun angles; optimized roof overhangs; double glazed windows and insulated doors.

Since the spring, Jones and mechanical engineer Dan Hagan have been designing and testing sensors, thermostats and other portable monitoring devices. This data acquisition system was recently shipped to Florida. Jones and Hagan will follow the equipment at the end of this month to oversee its installation in an occupied unit. For one year, as the family goes about its everyday life, the equipment will quietly verify their housing unit's thermal performance, evaluating its heat loss and heat gain, energy input and solar gain. Then, to complete the 18-month project, the BNL team will analyze their data and prepare a report on the effectiveness of the passive cooling techniques used in the complex.

— Anita Cohen



These diagrams of the wall construction of the townhouses at Rangewood Villas show how cool air circulates through the vent skin wall (right) insulated from exterior radiant heat by radiant foil heat barriers (left).

BROOKHAVEN BULLETIN

Published weekly
for the employees of
BROOKHAVEN NATIONAL LABORATORY

BERNICE PETERSEN, Editor
MONA S. ROWE, Assistant Editor
ANITA COHEN, Reporter

35 BROOKHAVEN AVE., UPTON, N.Y. 11973
Telephone (516)282-2345

Solar

(Cont'd)

down? Even though there is finally a trend that way as researchers have become more sensitive to the marketplace, it's not easy to design cheap systems, says Andrews. While sunlight is certainly abundant, it's also spread out. That means inherent design constraints.

"Miniaturization is a common way to bring down costs, but for solar systems, you can't miniaturize in all directions," he says. "Because there is a limited amount of sunlight that strikes each square foot, the collector area has to be very wide."

He says one way to bring down costs is to use cheaper materials. Since that usually means thinner, lightweight materials, the design of a collector becomes a tough engineering challenge.

Innovative engineering, however, is a trademark of the BNL solar group. As a result, BNL researchers have made pioneering efforts to make solar more economical. "We have always thought it was possible to bring the costs down. It's just a question of how much," says Andrews.

One member of the group, Bill Wilhelm, set out to develop a solar collector that costs $5 a square foot. With that price tag, the collector could make a solar heating system competitive with alternatives like oil and gas.

Until the collector is marketed by industry, however, the final cost will not be known. Also, it's never been tested at great length in the field. Still, industry has shown interest in it, and some companies are incorporating certain features of the collector into their own products.

"Solar appeals to more people than poets and backpackers," says Andrews. "It's a generally popular cause. All of us would like to make use of free energy from the sun." Toward that end, Brookhaven researchers will continue developing ideas that make solar energy affordable. —Mona S. Rowe

CREF Values

August	47.05	September	47.32
October	52.59	November	54.78
December	55.73	January	57.59
February	58.93	March	$60.75
April	$65.12	May	$65.07
June	$67.12	July	$65.43

August $66.13

Bowling

Red & Green League

High games were bowled by L. Jacobson 222/605 scratch, R. Larsen 225/220, J. Medaris 235, E. Sperry 217, J. Morris 213, J. Petro 213, A. Pinelli 204, H. Marshall 202.

Pink League

M-G Meier rolled a 190, S. Moore 170, M. Apelskog 170, K. Kissel 180.

White League

M. Austin had a 181, M. Scheidet 181, R. Scheidet 217, V. Manzella 198/213/561 scratch, B. Jacobs 181 and also converted the 3/7/10.

Purple League

S. Smith bowled a 198, B. Benson 226, B. Belligan 204/203, J. Ferrante converted the 5/7 and the 4/7/10, G. Hassell the 3/7/10.

Hockey Tickets

Tickets for the 1983-84 hockey season will go on sale at the BERA Sales Office in Berkner Hall on Wednesday, October 5, at 8 a.m. Copies of the games schedule should be ready for distribution at the BERA store the middle of next week.

BERA's eight seats for the Islanders home games to be played at the Nassau Coliseum are located in Sections 319J and 321A. Tickets are priced at $17.50 each.

During the initial sale only, a maximum of eight tickets may be purchased; i.e., either two tickets for each of four games, or four tickets for each of two games. Then the employee may go to the end of the line and await another turn, at which time as many tickets as desired may be bought.

The BERA Sales Office will give no refunds or make any ticket exchanges after a sale is made.

Assuming the Islanders will again be in the NHL playoff and championship race next spring, only those employees who support the BERA Ticket Service Program by purchasing hockey tickets during the season, will be eligible for entry in the special drawing for game tickets.

Concert Reminder

The Tokyo String Quartet will give their fourth concert at Berkner Hall on Wednesday, September 28, at 8:30 p.m. General admission $7; students and senior citizens $4; and those under 18, $3. Block tickets for a minimum of five tickets at $5 each, also available at the door.

Arrivals & Departures

Arrivals

Christopher Weilandics ..... S&EP
Vale P. Myles ..... Director's Ofc.
Robert G. Fitzpatrick ..... DNE

Departures

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

Ravindra L. Arudi ..... Chemistry
David U. Fluckiger ..... DAS
Mario Puglisi ..... Accelerator
Wu-Tsung W. Weng ..... Accelerator

Diners Note

The Cafeteria will be closed on Saturday, September 24. On that day, snack bar service will be available from 9:00 a.m. to 2:00 p.m. at the Brookhaven Center.

Cafeteria Menu

Week Ending September 30, 1983

Monday, September 26		
Cheese & spinach soup	(cup)	.65
	(bowl)	.75
Hunan chicken & 1 veg.		1.90
Scrambled ham omelet & fries		1.85
Hot Deli — Monte Cristo		1.90
Tuesday, September 27		
Creamy chicken vegetable soup	(cup)	.65
	(bowl)	.75
Fillet of fish Florentine & 1 veg.		1.85
Spaghetti & sausages		2.00
Hot Deli — Sandwich steak w/peppers & onions	(bread)	1.95
	(roll)	2.10
Wednesday, September 28		
Lentil soup	(cup)	.65
	(bowl)	.75
Salisbury steak & 1 veg.		1.85
Chicken breast fricassee & stuffing		2.10
Hot Deli — Corned beef	(bread)	1.85
	(roll)	2.00
Thursday, September 29		
Beef noodle soup	(cup)	.65
	(bowl)	.75
BBQ spareribs & 1 veg.		1.95
Shrimp & fries		2.10
Hot Deli — Chicken patty club	(bread)	2.15
	(roll)	2.30
Friday, September 30		
Manhattan clam chowder	(cup)	.65
	(bowl)	.75
Beef stroganoff on egg noodles		1.95
Macaroni and cheese w/1 veg.		1.85
Hot Deli — Italian meatball hero		1.95

An evening of modern dance will be presented by the Joyce Trisler Danscompany on Tuesday, October 4, at 8:30 p.m. in Berkner Hall. The performance at Brookhaven is scheduled between two prestigious engagements for the company. Danscompany will be coming directly from performing at the Kennedy Center in Washington, D.C., and after appearing at BNL, the company will go on to the International Dance Festival in Paris. Danscompany is one of only two companies from America selected to dance in the Festival, the other company being the New York City Ballet. Tickets for the Brookhaven performance are $9 each, one price only. They will be sold at the door as well as through the mail. To order tickets by mail, send a check, payable to BERA, to E. Gail Williams, Bldg. 460 or to Blanche Laskee, Bldg. 185. Be sure to include your name, address and number of tickets requested.

NYC Train Trip

The Hospitality Committee is planning a group railroad trip to New York City on Wednesday, October 5. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is $3.50; children under five years ride free.

Reserve a ticket by sending your fare through the U.S mail to BNL, P.O. Box 322, Upton, New York 11973. Please do not send cash. Checks or money orders, payable to BNL, must be received by Thursday, September 29. Put the date of the trip, your BNL life number and your phone number on the back of your check or money order. Your tickets will be given to you at the railroad station on the day of the trip. Refunds will be made only if cancellations are received by the Monday morning preceding the trip.

Cast Call

The BERA Theater Group is considering "Steam Bath" by Bruce Jay Friedman for its fall production. The casting includes seven men and one or two women. Casting auditions will be held in the North Room of the Brookhaven Center at 7:30 p.m. on September 27, 28 and 29. Persons interested in other aspects of this production (crew, lights, publicity, etc.) are invited to attend the auditions, or to call Karl Swyler, Ext. 7171.

Cooking Exchange

Jacqueline Newman, Assistant Professor at Queens College, will be the guest chef at the next meeting of the Cooking Exchange on Wednesday, September 28. Prof. Newman teaches ethnic food and is an expert on Chinese and other Asian foods. Join us for what should be an interesting and informative demonstration entitled, "The Chinese and the Italians Have Ways with Eggplants."

The Cooking Exchange is open to all BNL employees, visitors and their families. Meetings are held on the second and fourth Wednesdays of each month from 12:30 to 2:30 p.m. at the Recreation Bldg. For the $1 admission fee, those present receive copies of the recipes prepared and a sample of each dish, along with coffee and tea. Babysitting is provided at 50¢ per child.

For more information, call Nancy Nagy, 924-8160, or Dee Polychronakos, 744-3578.

Rifle & Pistol Club

A special meeting will be held on Wednesday, September 28, at 5:15 p.m. in Bldg. 490 Conference Room, to discuss the budget. All members and other interested persons are urged to attend.

On The Menu

Half the fun of a Dinner-Theater evening is, of course, the dinner. The Dinner-Theater planned by the BERA Special Events Committee for Friday, October 14 and Saturday, October 15, will be no exception. Diners may choose their main course from either side of this enticing menu:

Fruit Cup

Prime Rib	*Chicken Cordon Bleu*
Baked Potato	*Rice Pilaf*
Stringbeans Amandine	*Candied Carrots*

Red and White Wine
Tossed Salad
Assorted Italian Pastries
Coffee or Tea

Dinner choices must be specified when tickets are purchased. Tickets are available, through October 5, in the Cafeteria from 11:30 a.m. to 1 p.m., and from the following ticket sellers:

Blanche Laskee, Ext. 2873, Bldg. 185
Betty Pergan, Ext. 2937, Bldg. 179A
Rosalie Piccione, Ext. 3160, Bldg. 355
Marge Stoeckel, Ext. 2459, Bldg. 134A

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. 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 Personnel Placement Supervisor, Ext. 2882.

OPEN RECRUITMENT: Opportunities for present Laboratory employees and outside applicants.

1943. TECHNICAL POSITION - Requires an AAS degree in electronics technology or equivalent and significant prior experience, including equipment development, familiarity with intergrated circuits and modern semiconductors. Will assist in the construction/debugging of primarily digital electronics, although some analog and linear work will be required. Capabilities in mechanical and pc layout and interpretation of schematics are required as well as standard benchwork techniques. Electronics drafting capability desirable. Physics Department. (Reposting of Job No. 1844.)

1944. CLERICAL POSITION - Requires AAS degree or equivalent work experience and typing skills to support the circulation section of the Research Library. Familiarity with standard library procedures and practices is desirable. Technical Information Division.

1945. P&GA SPECIALIST - Requires 1-2 years' experience with Daconics or other shared logic word processing systems. Photography and Graphic Arts Division.

Autos & Auto Supplies

74 CHEV IMPALA - runs well, $700. Returning to Europe. Tim Hering, Ext. 4581 or 3089 eves.

77 AMC HORNET - a/t, p/s, a/c, am/fm stereo, $1,500. Olav, Ext. 3927 or 3811 eves.

SOFT TOP FOR BLAZER - excel. cond. w/hardware, $135. Ken, Ext. 2350 or 732-7944.

68 CAMARO - 6 cyl, auto, excel. cond., new rims and tires. Ext. 4313 or 929-4551.

76 FORD TORINO STATION WAGON - available beginning of Oct., $1,000. Isaac, Ext. 7179 or 3032 eves.

79 PLYM VOLARE - 6 cyl., 55,000 mi., excel. cond., $2,450. Tsuchiya, Ext. 3531.

73 CHEVELLE STATION WAGON - auto, $250. 981-2899.

68 TRIUMPH - single year model TR250, roll bar, wire wheels, 6 cyl., $1,500. Call 929-8475 between 6 and 11 p.m.

79 FORD FAIRMONT - 2 dr., 3 speed manual trans., 8 track, stereo, sun roof, high mi.,$2,500. 399-5316.

63 FORD GALAXIE 500 - new tires, exh. sys., 289 V8 manual trans. v.g. cond. Mike, Ext. 4988.

74 FORD - F-350 wrecker with 1979 Holmes Back 4-wheel drive camper pkg. 744-5224.

67 DODGE CORONET - $450. Ext. 4821 or 727-1412.

81 FORD E150 VAN - 6 cyl. 4 speed, top running cond., must sell, $5,300. Mike, 212-209-0507.

74 GREMLIN - asking $300. Ext. 7707.

POP-UP CAMPER - hard top, sleeps 6, weighs 900 lbs., so no brakes needed. $450. Dave, Ext. 4289 or 288-3011 eves.

75 CHEVELLE - $800. 588-1464.

67 TOYOTA - land cruiser, 4-wheel drive, restored, new wide track tires, 2 tops, $2,500. Joe, 744-3509.

MANLEY PISTONS - 327.+030 .043 rings, $150; alum. super rods w/L.W. pins, $100. Bill S., Ext. 4434 or 399-6168.

72 FIAT - 128, runs well, looks o.k., needs minor repairs, $600. 929-8513.

75 BUICK - 85,000 mi., good cond., $950. Ext. 7110 or 3186.

80 BMW MOTORCYCLE - R65, 1,000 mi., new battery, $2,750. John, Ext. 4973 or 781-3715.

83 BUICK SKYHAWK - am/fm, quad, cassette, sunroof, warranty, $8,300. Ext. 5138 or 473-5095 eves.

69 BUICK SPORTWAGON - runs well, good second car, $500. Dave, Ext. 4289 or 288-3011 eves.

72 FORD PINTO - $400. Mike, Ext. 4293 or 567-9362.

76 COX POP-UP CAMPER - sleeps 6, w/sink, stove, heater. $1,600. John, 473-8338 after 6 p.m.

77 GRANADA - immaculate, $2,800 or best offer. Lou, 283-6338 eves.

74 VW - semi-auto, $1,500 firm. Ext. 2951 or 281-5827.

78 HONDA M/C - Hondamatic, low mi., new battery, custom seat, $600. John, Ext. 2172 or 744-4386.

61 BUG - good cond., no rust, spare parts, $325. 65 Mustang, as is, $300. Erik or Ken, 281-5565.

70 CHEVY PICKUP - 3/4 ton, v.g. cond., $1,400. Mike, Ext. 3050 or 369-1062.

VW PARTS - new, call for needs. Augie, Ext. 2419 or 289-4211 eves.

70 CUTLASS SUPREME - excel. mechanical cond., dependable transportation w/v.g. gas mi. 351-1017 after 7 p.m.

67 DODGE DART - runs well, $125. Dave, Ext. 3861 or 286-1975.

81 HORIZON - 4 speed, a/c, excel. cond., orig. owner. 698-7428.

71 OLDS 98 - 4 drs., a/c, $500; Camper trailer, 27', sleeps 8, a/c, $4,500. 732-2778.

USABLE PARTS FOR ENGINE - elec., 1970 VW Sq. Back. 473-9223.

TIRE - J78-15, Firestone, Sup-R-Belted, new, $30. Ext. 2967 or 924-0565 after 6 p.m.

72 CHEV PICKUP - fair cond., p/s, p/b, auto, high mi., extras, $700. Greg, 289-1568.

77 GRANADA - immaculate, $2,600 or best offer. Lou, 283-6338 eves.

TIRES - 14" radials, all weather, P196/75R14 (2), Gillette Coloen Bear, $15/each. Sandra, Ext. 4933 or 369-2065.

78 TOYOTA CORONA - new tires, tuned up, clean, $4,000 firm. George, 3262.

76 TOYOTA COROLLA - 4 door, 5 spd., mint cond. $3,000. 979-0956 eves.

77 FORD PINTO - asking $1,300. Fred, Ext. 3155.

72 CAPRI - 4 cyl rebuilt engine, rebuilt tranny, partly restored overall, $550. Tim, Ext. 3496 or 281-7873.

74 AUDI FOX - 4 cyl., 30 mpg, radials, am/fm radio, $1,195. Ext. 4976 or 929-3061.

83 HONDA INTERCEPTOR - blue and white, solo seat, engine guards, mint cond. Lisa, 744-1847.

SLIDE ON CAMPER - for 8' bed pickup, stove, sink, lights, dinette, cabinets, $500. 928-8709.

67 JEEP WAGONEER - 4WD, rebuilt 327 V8, auto, p/sb, a/c, stereo, cb, $1,500. Joe, Ext. 2897 or 281-7683.

57 PLYM FURY STATION WAGON - V8, air shock RD HTR, 68,000 mi., new tires, auto, $2,000. 878-1572.

75 PLYMOUTH VALIANT - Ext. 4134.

77 HONDA XL75 - good cond., $200. Bob, Ext. 4672 or 929-4753.

79 OLDS CUTLASS SALON - cruise, tilt wheel, am/fm, 4 drs., white, asking $3,800. Ext. 4242.

73 MUSTANG - V-6, auto, orig, owner, well maint., snows w/rims incld. 444-3047, 10 a.m. to 5 p.m., Mon. to Fri.

78 YAMAHA SPECIAL - 750cc, asking $1,600. 289-2864.

Boats & Marine Supplies

21' FIBERGLASS T-CRAFT - 1972, 245 h.p., cuddy cabin, sleeps 4, trailer, elec. winch. 744-9802 or 369-3068 before 5:00.

18' THOMPSON - lapstrake, 1964 with 60 h.p. Evinrude, trailer, vinyl top, many extras, $1500. Ann, Ext. 7611.

28' ZOBEL SPORTS FISHERMEN - 220 h.p. Palmer, f.w.c., many extras, in water, asking $2600. 878-0242 or 878-9462.

LATE 1950's EVINRUDE-JOHNSON - 35-40 h.p. eng. for parts, $100 for 3 eng. Ext. 2018 or 928-3568.

16' EVINRUDE - 115 H.P. JOHNSON - 82 dilly galv. trailer, $2,000; 81 Evinrude, 6 h.p., $500. Arthur, Ext. 2705 or 298-9581.

15' SILERLINE - glass runabout w/steering, controls, windshield; 33 h.p. Johnson recent rebuilt; Little Dude tilt trailer, all $900. Tirre, 281-0360.

26' CABIN CRUISER - 105 h.p., f.w.c., sleeps 4, fully equipped, $3,600. 286-1192.

24' 1974 STAMAS - cuddy cabin, o.m.c., 225 h.p., i.o. v.h.f., depth finder, extras, excel, $10,500. 928-6150 eves.

Yard Sales

SHIRLEY - Sat. & Sun., Oct. 1 & 2, 16 St. George Dr. 1/2 mi. from Smith's Point Bridge, off Wm. Floyd Pkwy., raindate 10/8.

WADING RIVER - Sept. 24, 10 a.m. - 4 p.m., clothes books, toys, collectibles, off 25A, Zophar Mills Rd., rain or shine. 929-6442.

CENTER MORICHES - + baked goods, Sept. 24, corner Main St. & R.R. Ave. Raindate Oct. 1.

Free

GUINEA PIG - male adult, long hair, with cage. Ext. 2926.

Miscellaneous

WATER PUMP - Burks shallow well, 1/2 h.p., $150. Ray, Ext. 4479.

CAST IRON RADIATORS - with covers, assorted piping, etc., boiler, burner, make offers. 751-8240 eves.

SMOKE DETECTORS - brand new, battery incl., $8. Call Ext. 7160.

FREEZER - G.E., good cond., $150; G.E. washing machine, 14 lb, excel cond.; $200. Dave, Ext. 7922 or 298-9581.

SLIDE-ON CAMPER - for 8 ft bed pickup, stove, sink, lights, dinette, cabinets, $500. 928-8709.

FULL BOXSPRING MATTRESS - $75, boxspring mattress, full $20, twin foam mattress $20 ea. Ext. 4618. 928-5737 after 4.

30" WESTINGHOUSE ELECTRIC RANGE - coppertone, new broil, glass door, timer, $175. Bill, 698-4882 after 5.

BLACK/WHITE TV - 13" Sanyo, $40; fan, $15. Ext. 3927.

FORMICA DINING ROOM SET - 60" table (opens to 84"), pads, 4 chairs, china closet, like new, $350. 727-2167.

SOLID WOOD CORNER DESK - needs refinishing, $15; Sears portable dishwasher, works well, $50. Linda, 736-3098.

BEDSPRING - king size, 2 pr. drapes, blue/green, $50. Ext. 2461

DIRT MOTORCYCLE - "Enduro" RS 175, 1980, like new cond., $700. Ron, Ext 7696 or 289-1003.

G.E. REFRIG FREEZER - 2 yrs. old, perfect cond., energy efficiency, sacrifice, $300. Gerhard, 286-9510.

BED - single folding, $25; single conv. sofa, $35; desk, 3 drawer, $25. 399-2931.

GERMAN VIOLIN - 3/4 size by Schrotter, w/bow & case, good tone, cond., $150. R. Kehl, 744-9861 after 5 p.m.

HAM OPER. - Heath c.w. transceiver HW 16, with V.F.O., ant. tuner, SWR meter, coax switch, $200. 589-2648.

GAS HEATER - 75,000 BTU thermostat controlled excel. cond. Hugh, Ext. 4669, 924-3522 after 5.

LLOYD'S FM-AM STEREO - multiplex receiver, cassette recorder, automatic turntable, speakers, $125. Ext. 2434 or 589-4407.

HUMIDIFIER - console, wood grain, $25. Fern, Ext. 3969.

PORTABLE DISHWASHER - G.E. potscrubber, avocado green w/butcher block top, good cond. $125. 744-9677.

GIRL SCOUT UNIFORM - pants, jumper, shorts, blouse, size 10-12, $12. 581-7656.

FUR COAT - muskrat, $200, Kirby vacuum w/parts, $20, ladies ice skates, new, $10. John, 929-4540.

SKI EQUIPMENT - Lange skis (175 cm), Tyrolia bindings, (ladies - 8 w/tree), poles (123 cm), $135 all. Jane, 473-0961.

MIGHTY MAC WINTER JACKET - boy's size 7, $20, hiking boots, size 2-1/2, $5. 473-6546.

LOBSTER POT - good for nautical decor, excel. cond., $25. Norm, Ext. 7160.

BED ROOM SET AND 21" COLOR TV. Call Matt, Ext. 3464 or 4048.

OIL BURNER RETENTION HEAD - used 1 mo., $100. Ext. 7626.

PROPANE HEATER - 55,000 BTU, $100; Vogel Zebra skis, $50. Ed, Ext. 7160.

LADIES WINTER COAT - $20, baby carousel crib mobile, $5. Chandra, 924-0582.

COUCH - $175; dresser with pull down desk, $15; antique vanity with mirror, $20, dynaco speakers, $45/pr. 751-8240 eves.

1956 BRITANNICA JUNIOR - with misc. yearbooks thru 1973, $20. Ext. 2673 or 744-8632 after 6 p.m.

SOFA & CHAIR - pine wood colonial, set $100. Roy, Ext. 4664 or 744-8779.

8 TRACK AUTO STEREO TAPE PLAYER - $15; microscope, $15; bullworker, $5. Ext. 2898 or 363-7620.

HORIZONTAL SHAFT LAWN MOWER ENGINE -$15. 924-8213 after 5:30.

12" TV - b/w Sanyo, $40; fan, $15; steam iron, $15; roaster, $5. Olav, Ext. 3927.

POOL COVER - 16x32 mesh type, 1 yr. old, $15. Dick, Ext. 3273.

ANTIQUE FURNITURE - dinner set for 12, glassware, lamps and mink coat. Call 472-0509.

AIR COND. - Emerson, 8,000 Btu, good cond. $100. 265-0501 after 6 p.m.

SMALL WHEELBARROW - $15; soldering iron, $5; coffee table with removable glass top, $30. Ext. 2733.

OXYGEN "E" TANK, - carry case, all controls used once, $150. Saxon, 929-4701.

BASF BLANK CASSETTE TAPES - C-90, CrO_2, Pro II, $2.75 each. Ext. 2521.

SIMMONS BEAUTYREST MATTRESS - king size, springs, frame; beautiful 5x4 ft. mirror. Sam, Ext 3453, 736-3674 after 5.

NORDICO SKI BOOTS - ladies size 6, $20; tree climbing deer stand, $15. Ext 4312.

BOWLING BALL - man's 16 lb, bag, shoes 8-1/2, $15; National Geographics, 1965 to 1979. Lois, Ext 2959.

GOLF CLUBS - complete set of confidence irons 2 thru pw. & sw., D2-stainless, excel. cond., $150. 666-5573 eves.

COLEMAN STOVE - $10, lantern, $10; camping fly 8x10, $25; Sears Pak A Potti, $25. Ext. 4846.

MET OPERA TICKETS La Traviata, Nov. 26; Macbeth, Feb. 4, $35 ea.; SUNY Concert Tickets, Soviet Emigre Orchestra, Dec. 3, $12.50 ea. Manny, Ext. 4470 or 363-6787.

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

STUART FLORIDA - 1 bdrm, 1½ baths, condo, furn., 2nd fl., screened porch, in 2 story complex, clubhouse & pool, near ocean & shopping. Maint. fee $68.92 incl. water and cable TV. Resident owner qualifies for $25,000 R.E. Exemption on purchase, $41,900. Call collect 1-305-287-9252.

RIDGE - 1 acre bldg. plot, approx. 100'x400' on quiet estab. neighborhood, fully wooded, level, $13,900. 924-3236.

MIDDLE ISLAND - co-op, 2 bdrm., lr, eik, 1½ bath, laundry rm., mint cond, $40,000. 924-5159.

LIBERTY TRAILER - 12'x55' (1970), 2 bdrm. on 20'x80' lot. 744-9611.

MOBIL HOME - Riverhead area, 12'x60' w/10'x15' extension, ww carpeting, a/c, major appl., diswasher, washer, dryer, shed, family park, $18,000. 727-5475.

For Rent

VERMONT - reasonable vacation, 3 bdrm. house, f/p, fully equipt., apple picking, foliage, x-country & downhill skiing, beautiful view, family oriented, avail. weekly or weekends. 732-6499 after 6 p.m.

ROCKY POINT - 7 mi. to Lab, 2 bdrm. house, very pretty inside & out, quiet neighborhood for single or couple, no pets, $550 + util + security. 473-4948 eves & wkends.

VERMONT CHALET - on pond, beautiful, stony f/p, woodstove, woodland trails, pond, lake boating, nearby antiquing, tennis, golf. Rent Fall wkends or wks. 757-5599 after 3 p.m.

BELLPORT VILLAGE - house, immed. occup., 3 bdrm., lr., eik, den, waster + dryer, fenced yard, quite area, $625 + util. 286-2266 or 286-8005.

LA BON VIE APTS - 1 bdrm. apt. to sublet. Roseann, 475-3104.

MT. SINAI - luxury 1 bdrm. apt., water view, private deck, $600/mo. incl. util. Ext. 3811 or 331-1306.

HAMPTON BAYS - waterfront, 2 bdrm. house, no pets, avail. now to May 1, 1984, $300/mo. 728-2104 eves.

CENTER MORICHES SO. - 3½ lg. rms. apt., 1 bdrm., full bath, carpet, own zone heating, prov. entr., no children, $500/mo. pays all, 1 mo. security, avail. Nov. 1. 878-0480 after 5:30 p.m.

MASTIC - beautiful Mother/Daughter house, 3 bdrm. house w/lg. basement, 1 bdrm. apt. (near Lab) has many extras. Apply now. Kathleen, 281-5605.

WADING RIVER - waterfront, L.I. Sound, 3 rm. apt., newly furn., lr w/fp, eik, secluded private beach, entrance. $550 incl. all util. 929-4113.

WADING RIVER - 1 bdrm. w/house privileges, male, non-smoker. $225/mo. 929-6078 or 929-4688.

Car Pool

COMMACK - would like to join car pool, 8:00-4:30. Don, Ext. 2043.

RIDE OR CAR POOL - from Bellmore, Wantagh, Seaford or Massapequa. Will pay for ride. Walter, Ext. 3397.

Lost and Found

FOUND - 2 jackets at Tennis Court. Ext. 2873.

Wanted

PIANO - used, below $500. Richard Jaung, Ext. 7912 or 751-7180.

VENDORS - for Kreamer St. PTO crafts fair. Sat. Nov. 19, $15/table at Bellport school. 286-1539 or 286-1306.

MICROSCOPE - for 10 yr. old child, reasonable. Henry, 724-6497 eves.

SINGERS - to audition for famous L.I. choir, all voices. For info call 751-1203 or 941-4278.

SNOW BLOWER - heavy duty, good cond., to handle 200' driveway. Roger, Ext. 5292.

HOUSE FOR SALE - or info of for newly married couple, 3 bdrm. near L.I.E. Bob, Ext. 4028.

CHILD CARE — person on site or near Lab, 1/2 nights/wk., so parents can attend Adult Ed. 282-3130.

ROTOTILLER - ride on lawn mower, good cond. Jack, Ext. 4411 or 929-8287.

2 BDRM HOUSE - Rocky Point, Mastic, Wading River, Miller Pl. for Oct. 1, reasonable. John, 744-0049.

TRUCK TO RENT - suitable for furniture moving. Hsing, Ext. 4501 or 924-3792 eves.

TREE REMOVAL - take wood as payment. Pearl, 744-3807.

ROOMMATE - female, $200/mo. incl. all, Holbrook. 467-8520.

BABYSITTER - part-time, 2 days, my home, 8:15-5:15, 4 yr. old girl. Marie, Ext. 4207 or 744-4047.

EXPERIENCED YACHTSMAN - seeks opportunity to sail south this fall/winter. Ken, Ext. 7959 or 581-1169 eves.

OLD BICYCLE PARTS - to practice working on and experiment with. Ext. 4030 or 878-2484.

ROTOTILLING - of garden about 1/6 acre. Ext. 4333.

INFORMATION - on removal of Health Physics purple Eurotour bicycle from street sign in apt. area. Elvira, Ext. 4224.

WEIGHT BENCH - w/leg lifts, reasonable, Dennis, Ext. 4100 or 654-2076.

Classified Ad Policy

Deadline is 4:30 p.m. Friday for publication Friday of the following week.

1. The Brookhaven Bulletin's classified section may be used only by active and retired Laboratory employees.
2. All items for sale or rent must be the advertiser's property.
3. Ads for material acquired for resale in association with a full or part-time business cannot be accepted.
4. Ads for the sale or trade of firearms will not be accepted.
5. Ads not carried because of space restrictions will be held for publication in the next issue.
6. Ads are run only once and must be resubmitted if they are to be repeated. One ad per person per week.
7. **Property for sale or rent cannot be accepted on this form. Special Real Estate Ad Forms are available at the office of the Brookhaven Bulletin, Building 134.**

☐ For Sale: Autos & Auto Supplies
☐ For Sale: Boats & Marine Supplies
☐ For Sale: Miscellaneous
☐ Car Pools
☐ Wanted
☐ Free
☐ Lost & Found

Please print your ad below in 15 words or less using one word per block. Include name and phone number to call.

Note: The following must be completed for your ad to appear.

NAME (Please Print) .....

Employee's Signature ..... Life No. ..... Ext. .....

Send to: Brookhaven Bulletin, Building 134 (Ext. 2345).

Classified Ad Policy Deadline is 4:30 p.m. Friday for publication Friday of the next week.