

An antic Story: EGRET Released from Atlantis

NASA GETS HELP FROM SLAC

by Steve St. Lorant

WHAT IS THE CONNECTION between an elegant white shore bird, a mythical continent hidden beneath the ocean waves, and SLAC? Plenty of photons is what, and thereon hangs a tale.

It started way back, when hydrogen bubble chambers were state-of-the-art particle detectors, and Roger Gearhart and Joe Murray, both of EFD, among others developed the back-scattered laser beam for the 82-inch bubble chamber.

The years go by, and one day someone wants to measure the photon flux and spectrum of pulsars and of other heavenly bodies, and the various interactions taking place between cosmic gas and the cosmic rays emitted by galaxies. You build a telescope for the job, a photon (gamma ray) telescope to be exact, and you plan to use the SLAC resources to calibrate it. That is exactly what Bob Hofstadter and Barrie Hughes of Stanford's High Energy Physics Laboratory proposed for NASA to do. After a suitably extended period of administrative gestation, a photon detector was built of sodium iodide crystals (which light up when they meet a photon), surrounded by a complex array of photomultipliers. One can only surmise that the reason for a cylindrical detector was simply to upstage an earlier SLAC detector shaped like a sphere, the Crystal Ball.



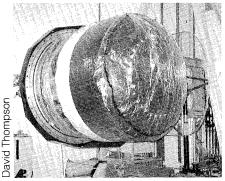
The space shuttle Atlantis and its crew of five take off from the Cape Canaveral on the first shuttle mission of the year. The space telescope is stowed in the cargo bay.

The telescope was built, and it had to be calibrated—and that is when SLAC truly entered the picture. The monochromatic gamma rays from Joe and Roger's gadget, tunable from 60 MeV to more than 19 GeV were ideal for the purpose. NASA's team arrived with the telescope, beg your pardon, EGRET, complete with stunning logo and trailers full of equipment of exquisite technical perfection. After about four months of using SLAC's test beam, the telescope (ironically

housed in an old bubble chamber building) was duly calibrated pronounced flight ready (1986) and then mothballed.

EGRET's day came in the morning of April 5, 1991 at 9:23 EST precisely, and "only 5 minutes behind schedule," when in the hold of SDS-17 the telescope finally lifted off the pad and headed into space. EGRET was deployed on station—and EGRET rebelled. After all these years of comfort in air conditioned

(cont'd. on pg. 2)



On Sunday, April 7, 1991 this \$600 million 17-ton telescope was placed in orbit. It will scan the sky for the most powerful radiation in the electromagnetic spectrum. Two of the shuttle astronauts, Jerome Apt, a physicist, and Jerry Ross of the Air Force went into space to help extend the balky antenna on the satellite.

humidity controlled quarters, who wants to be tossed out into the inhospitable environment of space? EGRET refused to cooperate, that is EGRET's antenna balked. Of course it had to be fixed, so in NASA's parlance, an "unscheduled EVA" was scheduled, and when it was all over, EGRET could speak and be heard.

It is now taking its first look, away from the center of our galaxy, at the Crab Nebula and Geminga source in the Gemini Constellation. For the technically minded, it is looking at gamma rays in the 100 MeV range, with an angular resolution of 5 minutes of arc and a 20 percent energy resolution.

And so once again the SLAC community played a key role in a most unlikely play: the marriage of an earth-bound experiment to a daring contact with the stars. The principal actors too, were not forgotten: Roger and Joe were formally invited by NASA to participate in the pre-launch and launch ceremonies for SDS-17, a.k.a. the Space Shuttle Atlantis.

Oh, and for those curious enough to inquire, EGRET is really the Energetic Gamma Ray Exploratory Telescope, an acronym and not a shore bird; Atlantis is the new space shuttle; and EVA whether scheduled or not is "Extra-Vehicular Activity," something that NASA's space fixit team does admirably well.

Benefits Office News

THE BENEFITS OFFICE IS TRYING a new approach to make information about benefits readily available. Each month Benefits will dedicate that month to a particular carrier. California Casualty, is the carrier for May. Valerie Cregan, the field representative for California Casualty will be in the lobby between the cafeteria and the auditorium during the hours of 11:30 a.m. - 1:00 p.m. on the following dates, May 8, 15, 22 and 29th. Check the benefits bulletin board for more information on dates, times and specific items each month. Any questions, please contact Betty, in the Benefits office, ext. 2356.

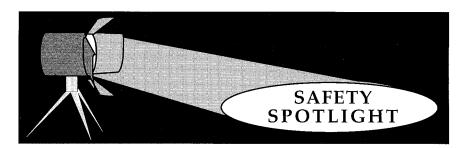
As you know, California Casualty is sponsored by SLAC for your auto insurance needs. What you may not be aware of is that California Casualty also provides Home, Condominium and Renters insurance to provide financial protection from fire, theft and other loss.

The type of home policy you need depends on the type of property you own. The policy types and coverages that are available are outline in the box below.

POLICY TYPE	TYPE OF PROPERTY	COVERAGES PROVIDED
Homeowner	A dwelling you own & occupy as your principal residence.	Dwelling Other Structures Personal Property Loss of Use Personal Liability Medical Payments
	A condominium unit you own and occupy as your principal residence.	Personal Property Loss of Use Loss Assessments Additions & Alterations Personal Liability Medical Payments
	Personal Property you own in a rented dwelling or apartment	Personal Property Loss of Use Additions & Alterations Personal Liability Medical Payments
Secondary Dwelling	Type of dwelling or condominium you own and use as a vacation home or that you rent to others.	Dwelling Personal Property Other Structures Loss of Use

With California Casualty both auto and home insurance policies are available through payroll deduction. To find out more about our homeowners or our auto insurance (where we are now offering a good driver discount that's 20% lower than the already low SLAC rate), call our San Jose office at 1-800-852-6655.

-Betty Strickland



SAFETY CAN BE A COMPLICATED BUSINESS, so the ES&H Division has installed a new HotLine to help you deal with ways and means of meeting safety objectives. Have you seen a physical hazard recently and wondered to whom it should be reported, or have the usual reporting channels been unresponsive? Is there a condition in your work area that needs professional evaluation, and you don't know who the appropriate professional is? Is there an institutional action (training, communication, coordination) that you feel ought to be included in our ES&H self-assessment?

The ES&H HotLine at ext. 4641 can put you in touch with the responsible person you seek, and can provide information to help you get a clearer picture about how to resolve problems correctly. It can also provide you an opportunity to get your concerns "on record."

RADIATION BADGES - WHO AND WHERE

WITH THE RECENT ORGANIZATION of the ES&H Division, many safety resource people have been relocated to the Electronics Building, # 024. If you have business relating to quarterly radiation badges, you need to see Terry Ash in Rm. 224 (ext. 4569). Annual badges are processed by Clair Stevens in Rm. 180 (ext. 2388).

–Judith Nowag

SLAC Hosts Transportation Show



SLAC WILL BE CELEBRATING an important environmental event: Clean Air Week on Thursday, May 9, 1991 from 11:30 a.m. to 1:00 p.m. in the Auditorium/Cafeteria breezeway. A transportation show will be held featuring free on-the-spot computer print-outs to match employees with commuters who work and live nearby. The Transportation Show will be conducted by RIDES for Bay Area Commuters. Each person completing a ride share application will receive a free coffee mug from RIDES.

Clean Air Week, sponsored by the American Lung Association, is an annual event dedicated to improving the quality of the air we breathe. The relationship between driving alone and the pollution we breathe is well known. Explore alternative ways of getting to work by attending this special event. RIDES will be demonstrating their new commutemobile — the futuristic answer to the commuting public.

—Bernie Lighthouse, SLAC Transportation Coordinator

Assessing On-site Traffic Safety

IF, IN THE PAST FEW WEEKS, you felt that you were being watched, you were right. During March, representatives from Patterson & Associates, a San Mateo traffic safety analysis firm, began collecting data on traffic patterns at SLAC. The representatives observed traffic flow at intersections, stop signs, and pedestrian walkways during peak hours.

The SLAC Operating Safety Committee (OSC), together with SLAC Management, will use the information from the Patterson & Associates survey, to help them evaluate existing traffic conditions and determine whether those conditions meet safety and vehicle codes. The OSC, made up of about 25 members, representing several major divisions, meets monthly about issues of on-site safety. According to their charter, their purpose is "to prevent accidents by discovering, analyzing, and proposing solutions to hazardous situations in fields other than those involving radiation, earthquake, microwaves, and hazardous experiments." The OSC hopes that the findings from the traffic flow survey will help determine whether on-site traffic has become an issue for their charter.

—Evelyn Eldridge-Diaz

SLAC Welcomes Guests and New Employees:

Wanda Gorecki, Mechanical Design; Juergen Lauer, Theory; Fuminiko Suekane, Group B; Gennadi Smirnov, SSRL; Sabine Schroeder, Library; Hartmut Preissner, Library; Pantaleo Raimondi, Group C; Alexander Bondar, SSRL; Anatoly Vorobiov, SSRL; Hideaki Aoyama, Theory, Sergey Shuvalov, SSRL;

Twenty-Eight Year Veteran Bill Clayton Retires



IF YOU WERE IN the central lab Machine Shop on the afternoon of March 15, you were one of the many who attended the St. Patrick's Day celebration hosted by the World's Tallest Leprechaun, Bill Clayton. It was the last of such parties, because GOB — he was also known as Good Old Bill to some — has retired from SLAC in his familiar costume of green vest, top hat, and curly-tipped shoes.

This last party was one of the countless gatherings Bill has organized over the years; they all involved good cheer, good friends, good food (do you remember the fine aroma of barbecued ribs around the 4th of July?). They often also involved Sally, the 1931 Model A Ford that he lovingly restored to glory from a rusted shell, and whose birthday we celebrate every year.

Bill was one of SLAC's longest service employees, although he is himself still reasonably young. He was hired by Project M on November 7, 1963, joining the small group of people on the Stanford Campus who were devising the foundations of the SLAC we know today. Although a nominal member of the Craft Shop plumber crew, he was immediately assigned to the Research Division, where he made his home for 28 years, and where he became famous and respected for skills above and beyond anything ever written in his job description.

From tubing of all sizes bent into intricate coils, to contraptions brazed together from the most unlikely metals, to great panels of interconnected valves and gauges, to emergency faucet repairs — no matter how simple or complicated, Bill was there to save the day. His work graces many of SLAC's experimental installations, but more importantly, his interest, inventiveness, and dedication are remembered with pleasure by the

experimenters with whom he collaborated.

Somewhere in Palo Alto, a bald, twinkly-eyed, bearded gentleman is now restoring Studebakers, doctoring old Cadillacs, building model airplanes, enjoying his garden, and, we hope, will occasionally prevail upon Sally to bring him over here to visit and have lunch.

—Tony Roder

Security Head Retires



Jim Hamm, shown here in normal SLAC attire, plans for a more relaxed retirement.

JAMES HAMM was well known throughout SLAC as he made his daily rounds as "Mr. Security." He covered the entire plant checking fences, buildings, and storage areas while keeping an eye on any unusual happening that might require further investigation. He was always very helpful to those needing assistance in locating

people or places and willing to give a helping hand to correct safety hazards in the field.

Jim first became acquainted with SLAC as a contract guard many years ago. He eventually left for other work assignments then returned in 1979 as an employee reporting to Chuck Hale in Plant Engineering's laboratory protection group. Jim supervised the Radiation Gate guards and directed the efforts of the contract guard service currently provided by Burns International Security Services.

Jim was a member of the Ham Radio Club and was often involved in discussions on improved equipment and techniques in the world of ham radio. Jim's many friends all wish him the very best in retirement and hope he keeps in touch with us.

—Bill Lusebrink

Editor's Note:

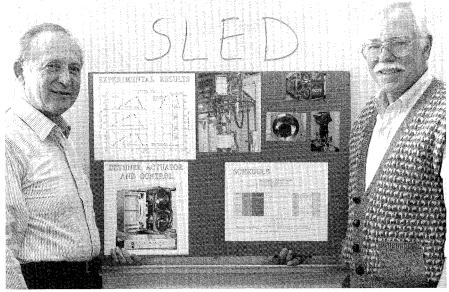
IT IS THE INTENTION OF THE INTERACTION POINT to provide the SLAC staff with both the news of the retirement of a long service stafffer and also a glimpse' of their retirement plans. We hope to continue these entertaining stories. The recent staff reductions have caused some affected employees to also opt to retire. For some they had been thinking about retirement for some time and never got around to doing it. The layoff was the shove they needed. But others retired to lock in their post-retirement benefits and have actively participated in SLAC's programs to help in their job search.

We wish the following employees well as official retirees who have given many

years of dedicated service to the laboratory:

John Bernstein, Alfred Shinn, Ed Stephenson, Celik Guracar, Ed Austin, Howard Martin, Frank Generali, Bernie Tice, Keith Henderson, Jozef Zabdyr, Danny Ibrisimovic, Jim Ewing, James Styles, Robert Johnson, Paul Arechiga, Russ Matheson.

SLED INVENTORS AWARDED 1991 IEEE PARTICLE ACCELERATOR TECHNOLOGY PRIZE



IEEE Particle Accelerator Technology prize winners David Farkas, left, and Perry Wilson pose before a poster on SLED.

DAVID Z. FARKAS AND PERRY B. WILSON ARE RECIPIENTS of one of two 1991 IEEE Particle Accelerator Technology prizes. The two share the award for their invention and implementation of the SLAC Energy Development (SLED) radiofrequency pulse compression system. SLED boosts the current klystron peak power from 65 MW to 165 MW, which is the peak power required to provide the 50 billion electron-volts of energy to the SLC electrons and positrons. In answer to a question posed by WKH Panofsky to Greg Loew in 1973, SLED was invented to increase the accelerator gradient. The development of SLED was carried out

during 1973-1975 under the direction of Loew.

According to Perry Wilson, "In developing the first working highpower prototype, many tricky engineering problems had to be solved, and most of the credit for successfully overcoming these obstacles goes to Harry Hoag." Others contributed as well: Hank Deruyter worked with Hoag on extensive microwave measurements and RF tests, and Al Lisin engineered the overall mechanical design. Fabrication of some 240 SLED cavity assemblies proceeded smoothly over the next three years under the capable management of Herm Zaiss.

In 1976, under the supervision of

Ernie Frei, installation of production cavities on the linac began. By 1979, SLED had increased the linac energy by about 60% at a relatively modest cost of approximately four million dollars. It was then realized that if, in addition, the klystron power could also be boosted to a higher level, the dream of a 50-GeV electron-positron collider was within reach.

David Farkas recalls some thrilling moments during the evolution of SLED, such as when he realized that reversing the phase instead of turning off the power resulted in substantial beam energy gain. Equally exciting was when he put together a primitive SLED and observed the predicted waveform for the first time.

SLED has been successful in improving the energy gain for electrons and positrons at other accelerators as well. CERN (Switzerland), DESY (Germany), KEK (Japan), IHEP (China), and INP (USSR) all have benefited from the SLED concept.

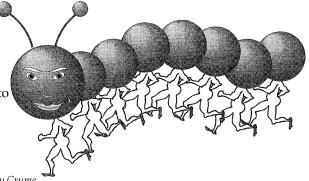
Each year, IEEE presents the award in recognition of outstanding contributions to the development of particle accelerator technology. The recipients are chosen by members of the IEEE Nuclear and Plasma Sciences Society. This year, the awards will be presented at the annual Particle

Accelerator Conference in San Francisco, on the of evening of May 8.

—Andrea Higashi

Attention Fun Runners

THE RECENT RAINS have made all of us a little buggy, so lets make another SLAC centipede for this years Bay to Breakers run on May 19. We already have the bus transportation provided for the race. We are trying to keep the costume simple, so we promise you won't have to paint any boxes to run in (unless there is an overwhelming demand)! The costume is still flexible, so if you have any ideas or if you just want to run with the SLAC centipede call Mary Crume at 2164 or Ken Witthaus at 2468.



—Mary Crume

SLAC and The History of The J/psi Discovery

by Robin Chandler

"On the morning of Monday, 11 November 1974, members of the Program Advisory Committee at SLAC were assembling for one of their regular meetings. When one of the committee members, Sam Ting from the Brookhaven National Laboratory, met Burt Richter, a leading experimenter at SLAC, he said, 'Burt, I have some interesting physics to tell you about.' Richter responded immediately, 'Sam, I have some interesting physics to tell you about."

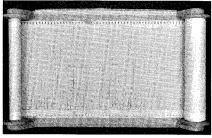
Recently, the SLAC Archives and History Office acquired some of the important research files of Experimental Group C concerning the development of the SPEAR storage ring and the experimental work leading to and including the psi discovery. The records include group leader Burton Richter's files concerning the proposal, design, and construction of the storage ring; development of the Mark I and Mark II detectors; and technical notes and memoranda from experiment SP-17. In addition, the acquisition included the experimental logbooks for SP-1, SP-2, and SP-17, and Group C's SPEAR notes. The photographs accompanying this article illustrate some of the kinds of records in the Group C files.

The SLAC Archives and History Office was established to evaluate, select, and preserve the documentary heritage of the laboratory. The mission of the Archives is to preserve the records of historical significance created at SLAC. Archival records are materials of enduring historical, legal, financial, or administrative use that will be of interest to future laboratory staff, scholars, and the general public. Such materials include a variety of formats and media including correspondence, research notebooks, logbooks, technical memoranda, photographs, engineering drawings, and data summary tapes.

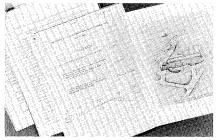
The research files of Experimental Group C will be essential for the completion of the J/psi study, a historic documentation of the Nobel Prize winning discovery. Peter Galison, Historian of Science at Stanford, is directing the study of this discovery. The J/psi study is one phase of a project sponsored by the American Institute of Physics (AIP) Center for the History of Physics to study the complex issues facing the historical documentation of multi-institutional collaborations in high-energy physics.

The AIP Multi-Institutional Collaboration Study is focusing on twenty experiments carried out from the early 1970s to the mid 1980s at the four major American accelerator laboratories: Brookhaven, Cornell, Fermilab, and SLAC. Studies of the J/psi and the Upsilon experiments form a major component of the program. The project also includes interviews with physicists, graduate students, engineers, computer programmers, and technicians engaged in collaborations. The project will identify patterns of collaboration and pinpoint documentation to preserve. These efforts will produce concrete guidelines to assist archivists preserving the history of high-energy physics.

Since the beginning of the AIP project, SLAC has been an active supporter and participant in the study through the contributions of Louise Addis, Robin Chandler, Bill Kirk and Roxanne Nilan. SLAC's contributions have included creation of the collaboration database for the project; interviews with experiment collaborators from SLAC, LBL, and UC Santa Cruz; and assisting Peter Galison's research into the J/psi discovery. (cont'd. on pg. 7)



The scroll, pictured here, was constructed by members of the SP-17 experiment to illustrate the energies that were scanned in the search for new particles. The energies were increased gradually over time to pinpoint where the particles were lurking. This photo illustrates the range between 1.830 Gev and 1.920 Gev, with the "bump" indicating the discovery of the psi prime particle at a single beam energy of about 1.847 Gev (mass of about 3.69 Gev).



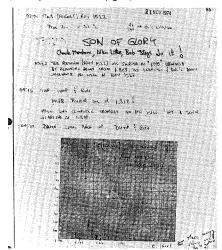
In the late 1950s, 500 Mev storage rings for electrons had been built at the High Energy Physics Laboratory on the Stanford campus as a joint Stanford-Princeton University project. SLAC planning for SPEAR, a storage ring to collide electrons and positrons, culminated in 1964 with the first formal construction proposal. The SPEAR construction proposal was revised and resubmitted numerous times, but never formally approved. Instead in 1970, SLAC received permission from the AEC to use funds from the lab's regular budget to construct SPEAR. Records developed in the 1966 proposal and planning phase of SPEAR are illustrated in the above photo.



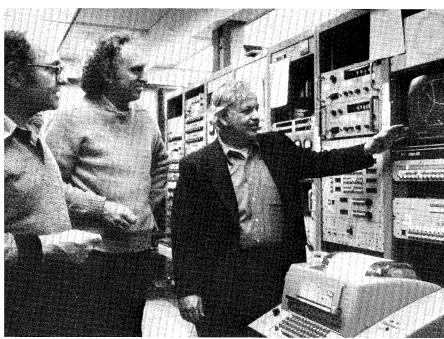
Experiment SP-17 collaboration memo by Vera Luth. This document illustrates some of the initial analysis for the Psi particle data collected by the LBL-SLAC collaboration at SPEAR.

¹ Close, Martin, & Sutton, "Charmonium," *The Particle Explosion*, p.178

(History cont'd. from pg. 6)



SP-17 logbook page for the early hours of November 21st, 1974. At 3:20 AM with Robert Sterge operating the storage ring and Charles Morehouse and Alan Litke running the experiment, the second psi particle was discovered on the first scan of the 3.69 Gevenergy region. This logbook is currently on display at the Smithsonian Institution.



Burt Richter, Martin Perl, and Gerson Goldhaber (right to left) in the SPEAR control room looking at the computer display showing the decay products of the psi particle in the Mark I detector.

Did anyone out there happen to video tape the three minute segment that featured SLAC and SLC and the search for the Z particle that aired last month on CNN? If so, the SLAC history office would like to get your copy for their historical records. Contact Robin Chandler, ext. 3091, if you happen to have a tape of this news program.

Paging System Mysteries Solved

PRESENTLY SLAC HAS three kinds of pocket pagers: a voice pager that covers the immediate Menlo Park/Palo Alto area, a digital pager covering the same area, and a 6-county pager that comes in two flavors: one for the wider 6-county area, and one that reaches the SLAC tunnels.

The voice pagers are SLACowned and were acquired starting before 1988.

The digital pagers were acquired in 1988 and later. The 6-county pagers are leased from Pac*Tel and Pagenet starting in 1989, when the need for wide-area coverage and the accelerator tunnels became crucial.

The telephone directory reference section, (which you can print with the VM command PHONLIST or display online with the VM command HELP PHONE MENU) describes how to use these three kinds of pagers. Basically, the paging instructions for the voice pager

require you to dial 1-1 and then listen for the voice saying "enter pager number." You then enter the three digit number and listen for the voice that instructs you to "speak after tone." You have fifteen seconds to state your message slowly and clearly. You cannot converse with the person you are paging.

The other types of pagers only allow you have your phone number or extension to be displayed on a digital readout. With the digital pager, you dial 1-2 and proceed as above and a voice will ask you to "enter function digit." Always enter "5." A voice will ask you to "enter number to be displayed." Here you enter the phone number or extension at which you want to be called, and hang up.

The newest pagers require calling a seven-digit page/phone number, and you have to dial "9" first to get an outside line. No one

will answer, however, and all that you will hear is three beeps. Here,

 you enter the number you wish displayed and hang up. The pager stores up to five callers' numbers.

From offsite these pagers may be called directly. To access the previous two pagers systems from offsite, the "1-1" system can be reached by calling 926-3100; the "1-2" system by calling 926-3200 and following the same instructions.

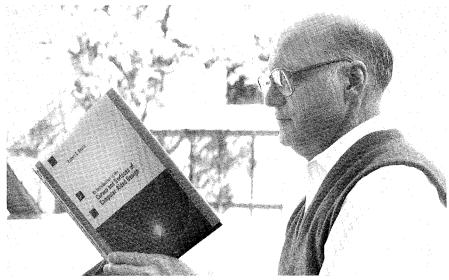
The acquisition and repair of pagers through the appropriate vendors has recently been taken over by the Telecommunications group. Telecommunications is actively investigating ways to streamline the administration and service of these different pocket paging systems to provide better and more cost-effective service to SLAC users.

---Ilsa Vinson

BEACH'S BOOK PUBLISHED

BOB BEACH is the Computation Research Group's programmer extraordinaire who single-handedly developed SLAC's 'Unified Graphics' system. Unified Graphics, or 'UG' as it's popularly known, is found today on over 150 Vax and IBM computers at institutions in 15 countries, and also underlies such best selling applications as 'Top Drawer' and 'HandyPak.'

UG was the first 'device-independent' graphics system for the high-energy physics community (Device independence means that you don't have to make extensive changes to a program every time a new graphics device appears). It's long been the mainstay of physics data analysis displays at SLAC and is renowned for its reliability as a virtually bugless program whose author demands (and supplies) perfection.



Bob Beach - the man who Unified Graphics, displays his new book

Bob has now turned his talents to another kind of writing and his new book is:

AN INTRODUCTION TO THE CURVES AND SURFACES OF COMPUTER-AIDED DESIGN by Robert C. Beach. N.Y., Van Nostrand Reinhold, 1991. 306p. (\$39.95).

It's aimed at a wide audience of mathematicians, computer scientists, and engineers who'd like to understand what's going on behind the scenes in CAD systems.

Copies are available in the library and at your local technical book store.

—Louise Addis

It's Time to Join Garden Club

SPRING HAS ARRIVED, which means it's that time of the year to start planting your summer crops. Garden Club renewal notices were sent out at the beginning of the month to all current members. The renewal fee this year is \$5.00 per plot which includes a \$3.00 charge for freeze damage repair work that has already been completed. Please be sure to renew by May 1, 1991 otherwise your plot will be considered new and the fee will be \$7.00. Checks should be made payable to SLAC/Addison-Wesley Garden Club and returned to Roxanne Contaoi at Bin 79.

Overseeing the Garden Club this year is Walt Inman ext. 2828 (message) and Roxanne Contaoi ext. 3735.

Garden Club members should be reminded to please use water wisely. We are also checking into seeing what can be done about the squirrel situation which has certainly frustrated many Garden Club



Springtime came to the SLAC Community Garden

members. If you have any questions or comments, or if you did not receive a renewal notice please contact Walt or Roxanne.

New Members Welcome: Is water conservation so tight at

home that your grass is brown and your plants dead? Do you need to release some of that office tension? Then why not join SLAC's Garden Club where for a \$7.00 membership fee per plot you are provided with water, compost, and the use of assorted garden tools and equipment. By being a member of the Garden Club you can let out some of your aggressions by swinging a hoe, in addition to getting some fresh air and a little exercise. Garden Club plots measure 10' by 20' and are located just across from SLAC's General Services Building.

New members can sign up after April 15. Please contact Walt Inman or Roxanne Contaoi for details.

—Roxanne Contaoi

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