DECEMBER 1984

# IEEE GRID

MONTHLY NEWSMAGAZINE of the BAY AREA COUNCIL of the INSTITUTE of ELECTRICAL and ELECTRONICS ENGINEERS, INC.

An IEEE Short Course

**Sponsor: SCV Chapter, CHMT**

# Digital Motion Control Systems

Motion-control systems are used in avionics, robotics, computer peripherals (disk drives, printers), and in a host of other applications. Historically, motion control has used analog designs; now, microprocessors and inexpensive, compact motors allow the designer more flexibility in the design, lower cost, improved reliability, and often better performance. This course covers the various motor types and discusses their features and applications. The two main design approaches—the open-loop control of stepper motors, and the closed-loop control of DC and brushless motors—are described. In later sessions, the focus is on the digital control of DC motors using microprocessors.

The emphasis will be on practical approaches and useful results, with mathematical discussions reduced to the minimum required. No previous knowledge of digital control or Z-transforms is assumed.

The material continues from information covered in last year's course, but the previous course is not a prerequisite.

## WHO SHOULD ATTEND?

The objective of this Short Course, held on 5 consecutive Tuesdays, is to introduce the practicing circuit or system design engineer to the practical applications and some of the new developments in the area of motion control and small motors.

This course will also be of benefit to electrical and mechanical engineers, project leaders, managers, and technicians who are involved in motion-control systems or have a need to understand and work with them.

**LECTURE 1: MOTORS:** Elements of motion and control systems; Types of motors; DC motors—features and modelling; Step-motor operation; Brushless DC motors.

**LECTURE 2: MOTOR CONTROL:** Brushless motor modelling and commutation; Step-motor open-loop control; Resonance modes; Damping step motors; Microstepping.

**LECTURE 3: CONTROL SYSTEMS:** Analog and digital control; Motor selection, evaluation, and comparison; features and analysis of control methods.

**LECTURE 4: CONTROL SYSTEM ANALYSIS:** Compensation methods; Stability analysis; Analog, dual-mode, and digital control; modelling of digital systems.

**LECTURE 5: DIGITAL CONTROL SYSTEMS:** Design and analysis techniques; Frequency response of the digital system; Implementation using a microprocessor; Compensation using digital filters.

The lecturer is Dr. Jacob Tal, who has done research and teaching in the area of motion control systems for the past 16 years and has published over 60 articles in the field. He is known for his informal approach to teaching and his ability to explain concepts in simple terms. Dr. Tal was the instructor for last winter's acclaimed IEEE Short Course on Motion Control Systems, which was fully subscribed before classes began.

The sessions are Tuesdays, January 15 - February 12, 7-9:30 p.m., at the Terman Engineering Center, Stanford University. To register, use coupon, or call the Council Office (415-327-6622) for course flyer and map. You will be notified only if we are *not* able to accommodate you in the class.

The fee covers preprints of all viewgraphs, plus beverages and hors d'oeuvres at the 20-minute intermission each night.

## Digital Motion Control Systems: Registration

COURSE REGISTRATION:
IEEE MEMBER .....$45
(Member #:_____)
NON-MEMBER.....$60
STUDENT (full-time).....$25

- Tuesdays, January 15 - February 12
- Terman Engineering Center, Stanford
- 7-9:30 PM

Make check out to "IEEE" and mail with this form to:
IEEE COUNCIL OFFICE
701 Welch Road, Suite 2205
Palo Alto, CA 94304

Space will be reserved when payment is received; seating is limited.

NAME _____ TITLE _____

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Piscataway, NJ 08854

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1884 1984
A CENTURY OF ELECTRICAL PROGRESS

# IEEE GRID

Vol. 38, No. 11 December 1984

## The Chairman's Corner

*Frank Lord*
*Council Chairman*

# Happy Holidays

Thanksgiving has come and gone and the Christmas Holidays are upon us. From some reports I've received, year end may be very close as you receive and read this issue. Late delivery of third class material seems to be a perpetual problem. Be that as it may, this is a season for good wishes and the Council certainly wishes Happy Holidays to all our Institute colleagues and their families.

Holidays are special events and their presence brings to mind our own special events. On October 8 we received the IEEE Centennial satellite broadcast—The Second Century Begins. Featuring an array of prominent speakers, the broadcast originated from the Franklin Institute in Philidelphia where our predecessor organization, the American Institute of Electrical Engineers (AIEE), had its beginnings. Rene Marxheimer of the San Francisco Section arranged a pleasant viewing environment at San Francisco State College which many members enjoyed. Late in the evening the same two hour affair was aired on public television. It was also repeated later in the month.

WESCON took place in Anaheim this year, October 30-November 3. Many of our local members are members of WESCON committees and being part owner of WESCON, the Council has representatives on the WESCON board of directors as well as the board of directors of Electronic Conventions Inc. (ECI). It was noted that a career-oriented session, Improving Your QPI—"Quality Professional Life"—was held this year at WESCON featuring well-known contributors in this area of activity. WESCON 85 will be back in San Francisco, and planning is already under way.

On November 30, the last of a series of Centennial celebrations which have occurred across the nation, was held here in the Bay Area at the Red Lion Inn in San Jose. Members of the IEEE Board of Directors and prominent local government leaders and representatives were on hand along with a large turnout of local members, to hear the featured speaker, Gordon Moore, Chairman of the Board of Intel. There was a full evening of events including awards to outstanding young engineers and even an appearance by Benjamin Franklin.

It is ironic to note that while we are celebrating 100 years of electrical and electronic progress, it is still illegal in California for most of our members to call themselves Electrical Engineers. The subject of who an engineer is will receive attention in a future column.

Dennis Leitterman, Santa Clara Valley Section Chairman, assembled and led a sizeable Centennial Committee. He deserves a great deal of credit for the success of this event.

At about the same time the U.S. presidential election took place, the results of our national IEEE election were released. This is an important matter that influences the direction of the Institute in the future, but it is a matter that is difficult to study properly for the purpose of making suitable choices.

The first major local engineering event in 1985 will be Engineers' Week in February. The IEEE is always a strong participant along with many other societies in the activities that occur during that week. Be looking for an announcement. You'll be sure to find something appealing during Engineers' Week.

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# THE PENINSULA ELECTRONICS STORY

by Emmet G. Cameron

This marvelous historical article was prepared by Emmet Cameron, a Life Senior Member of the IEEE and a Director of Electronic Conventions, Inc. (ECI), the management company that operates WESCON. Mr. Cameron was ECI's first chairman of the board and has been involved with the show since its inception. This article was prepared for special presentation at WESCON/84 as a part of the Centennial celebration. Because of its relevant nature and historical note, we will run the article in its entirety in serialized form. The first installment follows.

—Ed.

Sixty years ago the San Francisco Peninsula was a pleasant, sleepy rural area of farms and orchards, studded with the fabulous estates of the wealthy few who had exploited the gold and silver booms and the railroad developments of California's early years. Today the Peninsula is still pleasant, but a humming interurban community of over a million people, living in modern housing developments near bustling shopping centers and working over a thousand business and manufacturing concerns, many located in attractive industrial parks.

This transformation has occurred all over the country in the last half century, but on the Peninsula more than in any other area the basis of the change can be traced to a single industry — electronics. This industry forms the backbone of Peninsula economics, with over 1000 manufacturing and research firms, doing an annual business in the neighborhood of $1 billion, furnishing the livelihood for almost a million of the area's young families. Many national leaders in the field have established branch laboratories in the area to get in on the exciting local developments.

How did all this come about? Why should this small area have been the birthplace of so many basic electronic inventions, and be today a world-leading center of electronics research? The story, as are most stories of human accomplishment, is one of a relatively few men; men of vision and courage.

There are many actions and events which make up the story — but of all these there are three that stand out because of the unusual impact they had on the future.

The first of these occurred in Palo Alto on October 1, 1891, at the ceremony marking the institution of Stanford University and the inauguration of its first president. David Starr Jordan said in his inaugural address "Strong men make universities strong. A great man never fails to leave a great mark on every youth with which he comes in contact. A professor to whom original investigation is unknown should have no place in a university." Later in the same address he said "The Golden Age of California begins when its gold is used for purposes like this. From such deeds must rise the new California of the coming century."

David Starr Jordan probably never heard the word "electronics". But in his principles and the actions he took subsequently to staff the university, he brought about the founding of the electronics industry in the area.

The second great event took place some twenty years later, in the summer of 1912, in a little house at 913 Emerson Street in Palo Alto. Three men named de Forest, Van Etten and Logwood leaned over a table watching a housefly walk across a sheet of drawing paper, and listened to the fly's footsteps, tremendously amplified. The significance? It was the first time anywhere on earth that a vacuum-tube had amplified a signal, and more than any other single event represented the birth of electronics.

From that day to this the laboratories of the Peninsula area have retained world leadership in vacuum tube development.

The third event also happened in Palo Alto, in the Physics Labs of Stanford University, in July of 1937. A young physicist named Russell Varian was classifying ideas he had been considering for development of a tube to work at centimeter wave lengths, for use in what was later called radar. Suddenly he thought of a control principle which did not fit any of his categories — the principle of velocity modulation of electrons.

This scheme made possible the invention within a few more days of the klystron tube, and was basic in the development of the microwave industry. Today the area remains a world leader in development of microwave equipment and instruments.

Let's return to the beginning of our story. David Starr Jordan, the distinguished president of Stanford University at the turn of the century, had a dream of bringing the gifts of science to the still rough and tumble West, and this led him to lure to Stanford a group of outstanding science and engineering teachers, many from Cornell. These men included Harris Ryan, gifted teacher and researcher whose name lives on in the Ryan High-Voltage Laboratory in the Stanford Hills; Charles Marx, father of Palo Alto's municipal utilities services; and William Durand, who died at 99 after being active in his profession even into his tenth decade.

In the opening years of the twentieth century these men were among the giants of their time. Their presence brought outstanding young men to Stanford for study, and their leadership inspired the young men to strike out on their own. Cyril Elwell was one of these young men, and he was destined to be the actual founder of the industry in the area.

Elwell, an American raised in Australia, arrived in Palo Alto in 1902 to study at Stanford. In addition to his Stanford work, he became one of the very first U.S. radio "hams" along with James Arthur Miller and Doug Perham, also of Palo Alto.

In 1908, Elwell was persuaded by Dr. Ryan to work on a damped-wave radio system invented by Ignatius McCarty of San Francisco. McCarty was killed in an automobile accident that year after having operated one of the first wireless telephone installations in the world, just prior to the 1906 San Francisco fire. After a year of work on the McCarty system, Elwell saw that only continuous-wave radio would provide adequate quality, and moved to acquire the U.S. rights to the Poulsen arc system, invented in Denmark by Valdemar Poulsen in 1903. With these rights Elwell founded in Palo Alto the Poulsen Wireless Telephone and Telegraph Company, which became the Federal Telegraph Company and is today the American manufacturing arm of the I.T.T. system.

*Continued on page 10*

SCV/CHMT

## Components Engineering Workshop Offered in January

Components engineers will meet for an afternoon workshop on January 17. The workshop is in response to a questionnaire which appeared in the September issue of the GRID. The format is a discussion led by a moderator. There will be no lecture. Participants will be asked to share examples of how components engineering functions at their own companies. Topics include:

- Component documentation systems
- Qualification tests
- Test fixturing
- Alternate source strategy
- Sole source strategy
- Working with design engineers
- Working with sales reps

This seminar is planned to meet the needs of components engineers, however, component sales engineers are welcome. See the calendar of events for location and other details.

SCV/AES

## Digital Signal Processing Subject of January Meeting

In the evolution from analog to digital processing, along with the developing optical technology, a new horizon has been opened to the signal processing engineer. Myles Berg, of Lockheed, will address this subject at the January 17 meeting of the Santa Clara Valley Aerospace and Electronic Systems Society.

In his presentation, Mr. Berg will give a survey of digital signal techniques from both hardware and software perspectives. A few examples of present techniques and future growth areas will be discussed. The major emphasis will be on signal processing architecture with dedicated processing. Techniques for determining applications for associated processors and general purpose computers will also be covered.

See the calendar of events for dinner and meeting details.

SF/IAS

## Chapter Holds Fifth Annual Holiday Event

Why not kick off the holiday celebrations with a pleasant social evening with the San Francisco Industry Applications Society. The chapter's fifth annual Christmas Gathering will be held on Monday December 17 at Gino's Restaurant in San Francisco. All chapter members, nonmembers, spouses and friends are cordially invited. Technical discussions are suspended for the evening, and the organizers promise a good social time for all. For more details, see the calendar of events. There is reduced parking available adjacent to the restaurant.

SCV/CS/MC

## Physiological Monitors for Space Flight

SRI International has developed several physiological monitory systems for NASA, which will be used during coming space shuttle flights. Included is a system that will be used to study space sickness, one that will measure body fluid shifts due to weightlessness, and one that make hemodynamic measurements during re-entry. There is also a general purpose physiological monitory that will be used in a number of life science experiments.

Charles Weaver, SRI, will describe these systems and other work in his presentation to the December 19 meeting of the Santa Clara Valley Control Systems/Man and Cybernetics Society. There will be a description of some of the specialized digital signal processing that is performed by microprocessors which are contained in the systems. The general purpose monitor can accurately measure blood pressure during heavy exercise, and the processor that is required to pick the weak blood pressure pulses (Koratkon sounds) out of strong noise will be discussed in detail.

See the calendar of events for meeting details.

SCV/Magnetics

## Modern Permanent Magnet Materials

Permanent magnet development has made great strides in the last twenty years. Best energy densities quadrupled, and highest coercive forces increased tenfold. The availability of such outstanding properties in the new rare-earth magnets on the premium end, and of improved low-cost ferrites, have made many new applications possible. These developments have begun to revolutionize machine and drive system design.

Karl J. Strnat, Magnetics Society Distinguished Lecturer from Dayton University, will be the featured speaker at the December 4 meeting of the Santa Clara Valley Magnetics Society. His lecture will review progress in PM materials development with emphasis on the properties of new magnet types, their present and potential applications, and prospects for further material improvements. The effective use of these materials, supply limitations and other economic questions will be discussed.

Dr. Strnat is a senior member of IEEE, member of the American Physical Society, and a member of the National Materials Board study committee on magnetic materials in 1984. Meeting details are contained in the calendar of events.

OEB Section

## Annual Holiday Get Together

Members and spouses of the Oakland/East Bay Section will get together for an evening of dining and entertainment on December 13. To celebrate the IEEE Centennial, members and guests will see the premiere Bay Area showing of the IEEE presentation, "A Century of Electrical Engineering."

Dick Mangum, well known for his colorful travelogues, will be on hand to take the audience on a tour of the Caribbean with several ports of call, including the Leeward Islands and some coastal ports of South America.

Please see the calendar of events for reservation information.



SCV/Magnetics

## Revolution in Magnetic Materials

Discoveries of new magnetic materials over the past few years promise to greatly improve the performance of devices employing such materials. Entirely new applications could be forthcoming. For example, new boron-based ternary compounds for permanent magnets make new compact motor designs practical. New amorphous materials show greatly reduced losses at high frequencies.

Robert M. White, featured speaker at the January 22 meeting of the Santa Clara Valley Magnetics Society, says that despite all this activity, the U.S. has shown an alarming disinterest in these new applications. Ferrites, for example, are used in a variety of applications from permanent magnets to recording heads. Yet at a recent Ferrite Conference in San Francisco, the U.S. presented only 13% of the papers or posters.

Dr. White is currently vice president of engineering and technology at Control Data Corporation. He chaired the National Materials Advisory Board study on which his presentation is based.

SCV/AES

## Dry Etching Applications for VLSI Technology

The design trend in VLSI technology is to shrink minimum feature and individual component sizes to increase device performance and packing density. Wet etching techniques traditionally used in wafer fabrication limit the degree of scaling which can be achieved and, in fact, are incapable of providing dimensions in conformance to many VLSI design rules.

Dr. David Wang, director of the advanced technology division of Applied Materials, will talk about dry etching for VLSI design at the December 20 meeting of the Santa Clara Valley Aerospace and Electronic Systems Society.

Anistropic reactive ion etching yields high fidelity mask replication in films used for semiconductor fabrication, while maintaining other critical etching requirements such as selectivity, uniformity and throughput.

The applications for low pressure reactive ion etching are as diverse as the range of films deployed in wafer processing; i.e. thermal oxide, CVD and plasma oxides and nitrade, single crystal silicon, doped polysilicon, silicides, aluminum alloys, and barrier metals. With the advent of ULSI and VHSIC and one magabit memory technologies, reactive ion etching is fast becoming an integral part of the entire wafer fabrication process.

SF/IAS

## January Short Course Offered

The San Francisco Industry Applications Society will offer a short course beginning on January 30, 1985, on Electrical Power System Load and Voltage Control. This course is a sequel to the very popular course offered by SF/IAS last year on Short Circuit Calculations and Protective Device Sensitivity.

Again, Thomas J. Brogan, PE, and Glyn J. Lewis, PE, partners of Applied Power, will be the instructors. Applied Power is a consulting electrical engineering company that specializes in all aspects of power system studies, analysis and design. Together Brogan and Lewis have over 40 years of experience with commercial and light industrial electrical system applications.

If you liked last year's course, you will enjoy the practical approach Brogan and Lewis use in presenting each topic area. Although this course assumes that you have a fundamental understanding of three phase power circuits, the first of five sessions will introduce you to the concepts of heat and temperature, and reactive power control of medium and low voltage power systems.

Session number two will continue with reactive power control in order to be prepared for a complete discussion of power factor improvements in session number three. The remaining sessions will cover the topics of voltage control and load study procedures to give the student an excellent coverage of electrical system load and voltage control.

More details on this course will be contained in the January issue of the GRID.

SCV/Section

## Nominations Sought for Fellow Grade

If a Senior Member of the IEEE is to be nominated for election to Fellow grade in 1984, the IEEE headquarters must receive the completed nomination and reference forms by April 30, 1985. Endorsement by the Section can strengthen a nomination.

The grade of Fellow is conferred only by invitation from the Board of Directors. Applicant must be a person of outstanding and extraordinary qualifications and experience in the fields of electrical engineering, electronics and allied branches of science, and one who has made important individual contributions to one or more of these fields.

To apply for endorsement from the SCV Section, the nominating party must send six copies of the completed Fellow nomination form (B-27), before March 16, 1985, to the chairman of the Fellow committee. Nomination forms can be obtained from the Council Office. When completed, send to:

George Scentirmai
1535 Sarita Way
Santa Clara, CA 95051
408-554-1469

## SWE Announces 1984 Awards

The Society of Women Engineers will present its three highest honors—the Technical Excellence Award, the Outstanding Member Award, and the Outstanding New Member Award—at its December 12 Awards Banquet at the San Jose Hyatt.

Receiving the Technical Excellence Award is . . . (to be announced)

The Outstanding Member Award goes to Helen Morris, a database management technical consultant at Lockheed, Missile System Division.

Receiving the Outstanding New Member Award will be Mariste Thomson, a process engineer with Synertek.

Members wishing to attend the Awards Banquet may contact Sandra Mandawe at 408-943-7696.

# Calendar of Events

## December 1984

**SATURDAY DECEMBER 1**
**SCV Power Engineering Society**
Subject: Tour of Stanford Linear Accelerator
Time: Tour begins at 10:00 a.m.
Location: Stanford Linear Accelerator Center, 2575 Sand Hill Rd., Menlo Park
Reservations: John Carruthers, 408-225-9450 X289

**TUESDAY DECEMBER 4**
**SCV Magnetics Society**
Subject: Modern Permanent Magnet Materials
Speaker: Karl J. Strnat (University of Dayton)
Time: Coffee and conversation at 7:30 p.m., presentation at 8:00
Location: Hewlett-Packard auditorium, Stevens Creek and Lawrence Expressway, Santa Clara
Reservations: Not required
Article: Page 6

**TUESDAY DECEMBER 4**
**SCV/CHMT**
Subject: Satellite Course, "Integrated Manufacturing Systems"
Source: IEEE Activities Board
Time: 7:30 a.m. - 1:30 p.m.
Location: KTEH (Channel 54) Studio, 100 Skyport Drive (near San Jose Airport), San Jose
Reservations: On-site registration should be available at 7:30 a.m. at KTEH. Call the Council Office for status, 415-327-6622. Fee: members-$75, non-members-$90

**MONDAY DECEMBER 10**
**SF Power Engineering Society**
Subject: Electric Traction Power Design: A System Approach
Speaker: Anthony Daniels (IECO)
Time: Lunch (available at cafeteria) at 11:30 am, presentation at 12:00 noon
Location: Bechtel, 2nd floor, Room E, 50 Beale Street, San Francisco
Reservations: Not required
Article: Page 9

**TUESDAY DECEMBER 11**
**SCV Electromagnetic Compatibility Society**
Subject: Predicting Electromagnetic Emissions With a Personal Computer
Speaker: Granz Gisin (Rolm Telecommunications)
Time: Cocktails at 5:30 p.m., dinner at 6:00, presentation at 7:30
Location: Dinner at Palo Alto Joe's, Fabian Way, Palo Alto, presentation at Ford Aerospace, Bldg. 3 Auditorium, 3939 Fabian Way, Palo Alto
Reservations: Darryl Ray, 408-738-2888 X5006
Article: Page 9

**WEDNESDAY DECEMBER 12**
**SCV Engineering Management Society**
Subject: A New Management Skill: Firing
Speaker: Mort Bryson (Bryson Associates)
Time: Cocktails at 6:00 p.m., dinner ($14) at 6:45, presentation at 7:45
Location: The Bold Knight, 769 N. Mathilda Avenue, Sunnyvale
Reservations: (By 12/10) Council Office 415-327-6622

**THURSDAY DECEMBER 13**
**Oakland/East Bay Section**
Subject: Holiday Dinner Meeting-IEEE Centennial Program plus Caribbean Travelogue
Speakers: Husam Ovunc and Richard Mangum
Time: Cocktails at 6:30 p.m., dinner ($12-$15) at 7:00, presentation at 8:00
Location: Vince's Restaurant, 410 Hegenberger Road, Oakland
Reservations: Barry Wood, 415-820-5666
Article: Page 6

**FRIDAY DECEMBER 14**
**SF Communications Society**
Subject: Cellular Radio—Something Old and Something New
Speaker: Jim Proffitt (Pacific Telesis)
Time: Lunch (you may bring your own) at 11:45, presentation at 12:00 noon
Location: PG&E Cafeteria luncheon room, 77 Beale Street, San Francisco
Reservations: Not required

**MONDAY DECEMBER 17**
**SF Industry Applications Society**
Subject: Fifth Annual Christmas Gathering
Time: Cocktails at 6:30 p.m., dinner ($19) at 7:30
Location: Gino's Restaurant, 7 Spring Street (between Sacramento and California Streets), San Francisco
Reservations: Elizabeth Wilson, 415-428-4666
Article: Page 6

**WEDNESDAY DECEMBER 19**
**SCV Sonics and Ultrasonics**
Subject: Acousto-optic Deflectors
Speaker: Masaharu Amano (Crystal Technology)
Time: Presentation at 8:00 p.m.
Location: Crystal Technology, 1040 East Meadow Circle, Palo Alto
Reservations: Not required
Article: Page 9

**WEDNESDAY DECEMBER 19**
**SCV Control Systems/Man & Cybernetics**
Subject: Physiological Monitors for Space Flight
Speaker: Charles Weaver (SRI)
Time: Cocktails at 6:30 p.m., dinner ($11) at 7:00, presentation at 8:00
Location: Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto
Reservations: (By 12/18) Council Office, 415-327-6622
Article: Page 6

**THURSDAY DECEMBER 20**
**SCV Aerospace & Electronic Systems**
Subject: Dry Etching Applications for VLSI Technology
Speaker: Dr. David N. K. Wang (Applied Materials, Inc.)
Time: Dinner ($15) at 6:00 p.m., presentation at 8:00
Location: Dinner at Charlie Brown's, 1116 N. Mathilda Avenue, Sunnyvale, presentation at Lockheed, Bldg. 160, Mathilda and 3rd Avenue, Sunnyvale
Reservations: Bill Robertson or Ann Shen, 408-988-6100 X5153
Article: Page 7

**TUESDAYS JANUARY 15-FEBRUARY 12**
**SCV/CHMT**
Subject: Short Course—Digital Motion Control Systems
Speaker: Dr. Jacob Tal
Time: 5 consecutive Tuesday evenings, 7:00-9:30 p.m.
Location: Termin Engineering Center, Stanford campus
Reservations: Council Office, 415-327-6622
Fees: Members: $45, non-members: $60, Students: $25
Article: (With registration coupon) Page 2

**THURSDAY JANUARY 17**
**SCV/CHMT**
Subject: Components Engineering Workshop
Moderator: Terry Chappell (Plantronics)
Time: 1:30 p.m. to 5:00 p.m.
Location: Amdahl World Headquarters, 1270 East Arques, Sunnyvale
Reservations: Terry Chappell, 408-426-5858 X220
Article: Page 6

**THURSDAY JANUARY 17**
**SCV Aerospace & Electronic Systems**
Subject: Digital Signal Processing: Past, Present and Future
Speaker: Myles Berg (Lockheed)
Time: Dinner ($15) at 6:00 pm, presentation at 8:00
Location: Dinner at Charlie Brown's, 1116 N. Mathilda, Sunnyvale, presentation at Lockheed, Bldg. 160, Mathilda and 3rd Avenue, Sunnyvale
Reservations: Bill Robertson, 408-988-6100 X5153
Article: Page 6

**TUESDAY JANUARY 22**
**SCV Magnetics Society**
Subject: Revolution in Magnetic Materials—Will U.S. Be Left Behind?
Speaker: Robert M. White (Control Data Corporation)
Time: Coffee and conversation at 7:30 p.m., presentation at 8:00
Location: Hewlett-Packard Auditorium, Stevens Creek and Lawrence Expressway, Santa Clara
Reservations: Not required
Article: Page 6



SCV/S&U

## Acousto-optic Deflectors

Mr. Masaharu Amano, Crystal Technology, will be the featured speaker at the December 19 meeting of the Santa Clara Valley Sonics and Ultrasonics Society. The entire title of his presentation is, "Wide Bandwidth Acousto-optic Deflectors Utilizing Birefringent Phase matching in $TeO_2$."

In the presentation, he will review the principles of on-axis and off-axis modes for acousto-optic deflectors. Special applications such as multicolor laser projection deflectors, will be addressed to illustrate design guidelines and to emphasize the importance of CAD for such sophisticated devices.

See the calendar of events for meeting details.

USAB

## Congressional Fellowships Competition

Each year the IEEE/USAB sponsors a Congressional Fellows program competition. The results of this competition is the award of fellowships for a one-year term on the personal staff of a U.S. Senator or U.S. Representative, or on the professional staff of a U.S. Congressional Committee. The program provides an unique opportunity for members of IEEE to serve in an exciting capacity that benefits the individual, the Institute, the engineering profession and society as a whole.

The IEEE plans to award two Congressional Fellowships for the 1985-1986 term, however, additional funding sources may permit expansion of these awards.

The criteria as published by USAB requires that Fellows shall be selected based on technical competence, on ability to serve in a public environment and on evidence of service to the Institute and the profession. Specifically excluded as selection criteria shall be age, sex, creed, race, ethnic background, and partisan political affiliations. However, the Fellow must be a U.S. citizen at the time of selection and must have been in the IEEE at member grade or higher for at least four years. Additional criteria may be established by the selection committee.

For further information and application forms, call W. Thomas Suttle at 202-785-0017 at the IEEE Washington D.C. Office, or write:

Secretary, Congressional Fellows Program
IEEE
1111 Nineteenth Street, N.W.
Suite 608
Washington, D.C. 20036

University of Santa Clara

## Institute for Information Storage Technology Formed

An institute has been established by the University of Santa Clara to address the educational and engineering research needs in mass storage, a high technology area that is absolutely critical to the current and future evolution of information processing systems. The mainstream technology, magnetic recording, has been effectively ignored to date by the U.S. academic community.

The new Institute is located in the heart of the magnetic data storage industry and thus is able to take advantage of the innovate environment and expertise of this region and in turn play a direct contributing role to meeting the continuing educational needs of the technical community, as well as create an ongoing supply of highly trained students.

The Institute, placed in the School of Engineering at SCU, is specifically organized to provide an interdisciplinary focus on storage technologies. The key technical areas are set by the key challenges faced in meeting the demands placed on storage systems. Studies will focus on the head-medium interface for submicron spacings, precision positioning mechanics and control, magnetic media and their manufacturing processes, read/write transducer structures, recording channels and processes including vertical and optical modes.

Data storage will be explored in both rigid and flexible media configurations. A major commitment has been made to the development and dissemination of teaching material and course offerings in the fields of magnetic recording and mass storage devices, an area where the University of Santa Clara has been the pioneer and intends to remain the leader. For more information, call 408-984-4294.

SF/PES

## Electric Traction Power Design

The San Francisco Power Engineering Society is sponsoring a luncheon meeting on Monday December 10. The topic to be presented by Anthony Daniels of International Engineering, Inc., is Electric Traction Power Design.

Presented will be the current approach and methodology for the design of an integrated traction power supply for AC and DC transit and railroad electrification schemes.

Mr. Daniels is the chief engineer of the Railroad & Electrification division of IECO, a subsidiary of Morrison-Knudson Co. He also served for over twenty years with British Rail in England.

SCV/EMC

## PCs Can Predict Electromagnetic Emissions

Predicting emissions can help reduce testing time and equipment modifications when complying devices to FCC, VDC or MIL Std requirements. Franz Gisin, senior member of the technical staff at Rolm Telecommunications, will speak on this subject at the December 11 meeting of the Santa Clara Valley Electromagnetic Compatibility Society.

In his presentation, Gisin states that although detailed and accurate EMC predictions are quite complex, there are many first-order approximations that take only a few minutes to compute and still provide a good insight into how a device or a proposed modification will ultimately perform.

The presentation will describe several useful mathematical models for predicting the frequency spectrum of time domain wave forms, cross-talk in cables and printed circuit boards, shielding effectiveness of different materials, and radiation from cable and printed circuit boards.

## Peninsula continued

Elwell's new company boomed and in its first three years built a chain of sixteen high-power radio stations over the U.S. In 1912, guided by a belief in the practical value of research which still dominates the Peninsula industry today, Elwell hired a group of men almost all of whom are revered today as true pioneers of the industry. These included Lee de Forest, Charles Logwood, Herb Van Etten, Doug Perham, Leonard Fuller, Ed Pridham and Peter Jensen.

Lee de Forest had invented the triode vacuum tube in 1906. In 1912, de Forest, Logwood and Van Etten, working in the house at 913 Emerson Street, Palo Alto, which is now a shrine of the industry, developed the first successful vacuum tube amplifier and the first oscillator. The importance of this invention cannot be exaggerated. Every facet of human history since then has been affected by the tools and instruments made possible by the invention of the vacuum-tube.

## NEXT MONTH

NEXT MONTH — Perham, deForest, Fuller, Termin, Hewlett and Packard and many more. The movers and shakers of the peninsula.

## IEEE GRID Publication Office Moves . . . Again

By the time you receive this issue of the GRID, the publication office will have once again been moved. This time should be permanent. Your editor, Doug Davolt, in real life, heads up the public relations division of Ebey, Utley and Company, Silicon Valley-based high tech advertising and PR agency. The company has just occupied its own brand new headquarters building just off the Bayshore Freeway in Mountain View, taking the GRID along with it.

The new address is:

IEEE GRID
1685 Plymouth Street
Mountain View, CA 94041

The phone number remains the same, 415-968-7768. For those of you who occasionally drop by the office to deliver meeting notices and other material, the location is easy to find. The office is located on Plymouth street between Rengstorff and Stierlin Roads. Coming north on 101, exit at Stierlin (toward the Bay) and turn left on Plymouth and proceed to the end of the street. The building is on the left on the corner. Coming south on 101, get off at the Rengstorff exit (Bay side) and turn right on Charleston, then right again on Alta to the end of the street. You will be heading straight toward the building on the corner of Alta and Plymouth.

## Industry Events at Moscone

The Western Design Engineering Show and its accompanying A.S.M.E. Western Design Engineering Conference will take place at Moscone Center in San Francisco, December 4-6. At the same time, the Center will host the Plant Engineering & Maintenance Show/West and its concurrent conference.

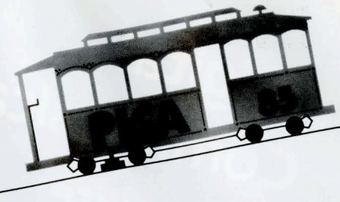
The ASME conference program considers such contemporary subjects as thermal design, robotics and integrated assembly, printed circuit board design, stress analysis and photochemical machining, and updates some familiar topics such as project management and value engineering.

The Plant Engineering & Maintenance Show provides an overview of what is new in the field of improving plant efficiency, increasing productivity, conserving energy, controlling pollution, maintaining security, and training employees to use and maintain newly emerging electronic equipment.





# ADVANCE ANNOUNCEMENT



**PICA 85**
Fourteenth Annual Power Industry Computer Applications Conference
San Francisco, California
May 6–10, 1985

## COMPUTERS AND CHALLENGES IN THE POWER INDUSTRY

**Technical Program**

The 1985 Power Industry Computer Applications (PICA) Conference provides a forum for state-of-the-art applications of computers in electric power systems. The conference scope is being expanded to include an additional day with a variety of tutorial and special sessions.

Technical sessions and exhibits will be included on NEW developments in power system planning, operation, and control. Emphasis will be on documented testing using systems of practical interest, and on actual implementation and operating experience.

**Technical Program Summary**

**Power System Planning Software**
- Resource Planning
- Reliability
- Investment Allocation
- Load Management

**Power System Control**
- Communication Systems
- SCADA
- Performance
- Integration

**Power System Operation**
- Digital Control
- Relaying
- Power Plant
- Simulation

**Computers**
- Analysis
- Data Base
- Implementation
- Monitoring

**Tours**

Several tours are planned including one of the world's largest wind farms as well as a major fuel cell installation.

**Spouse Program**

Fascinating activities involving, among others, deluxe city tours, a Muir Woods visit, shopping in Sausalito and a Chinatown walking tour are planned.

**Want More Information?**

Just fill out the coupon below and send it in. A detailed program brochure with registration information will be mailed to you.

cut here

**Fourteenth Power Industry Computer Application Conference**

☐ Please send me a detailed Program Brochure as soon as it is available.

☐ I would like information on Exhibit Space.

☐ I am interested in submitting a paper.

Name _____

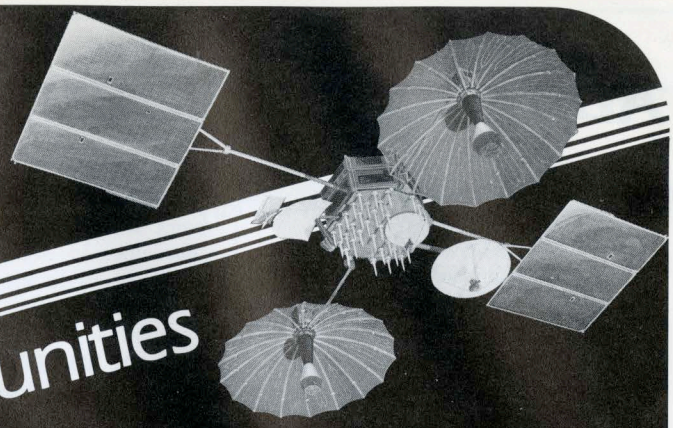
Firm _____

Address _____

_____ Zip Code _____

Mail to Lenore Bartyzel, Electric Power Research Institute, P.O. Box 10412, Palo Alto, California 94303

# Digital Communications By Satellite



## Career Opportunities

Stanford Telecommunications, Inc. was formed in 1973 to apply advanced communications theory, computer science, and digital signal processing to the development and manufacture of sophisticated electronic systems operating with communications, navigation, and surveillance satellites. Our leadership in these technologies has resulted in an average annual growth rate of over 44% over the last 6 years.

We are leaders in MFTDMA™ multiple access satellite communications systems • high performance secure satellite communications systems • computer systems for control of satellite communication networks • secure data communications networks • satellite navigation systems for time synchronization, precise surveying, and navigation • advanced satellite telemetry, tracking and control • development of advanced signal processing semiconductor chips • systems engineering for complex spacecraft networks • and air traffic control systems. Our headquarters facility is in Santa Clara, California in the Silicon Valley, and we have an additional engineering facility in McLean, Virginia near Washington, D.C.

We offer several good reasons for joining Stanford Telecommunications, Inc.: career growth consistent with our high growth rate; stock participation; profit sharing among all employees; a people-oriented atmosphere; beautiful nearby cities — San Francisco, California, and Washington, D.C. respectively; major nearby universities — Stanford University and University of California, Berkeley; nationally renowned symphonies, opera, ballet; and major league sports.

Communication Systems Engineers
Software Engineers
Real-Time Software Systems Engineers
Microprocessor Software Engineers
Advanced Digital Circuit Designers
RF Circuit Designers
LSI/VLSI Gate Array Chip Designers
Program Managers
Senior Engineering Managers

Each of the above positions requires a BSEE or BSCS (MS, PhD preferred).

For more information, please send your resume to: Mr. Walter Melton, Vice President, Navigation and Tracking Systems; Dr. John Ohlson, Vice President, Telecommunications Systems; Mr. Wayne Zachow, Vice President, Computer Communications Systems; Stanford Telecommunications, Inc., Dept. 9095, 2421 Mission College Blvd., Santa Clara, CA 95050; or Mr. Leonard Schuchman, Senior Vice President, Systems Engineering, Stanford Telecommunications, Inc., 6888 Elm St., McLean, VA 22101; or contact Ms. Mimi V. Reyes at (408) 748-1010.

U.S. citizenship required. EOE/M/F/H/V. Principals only, please.

**Stanford Telecommunications, Inc.**