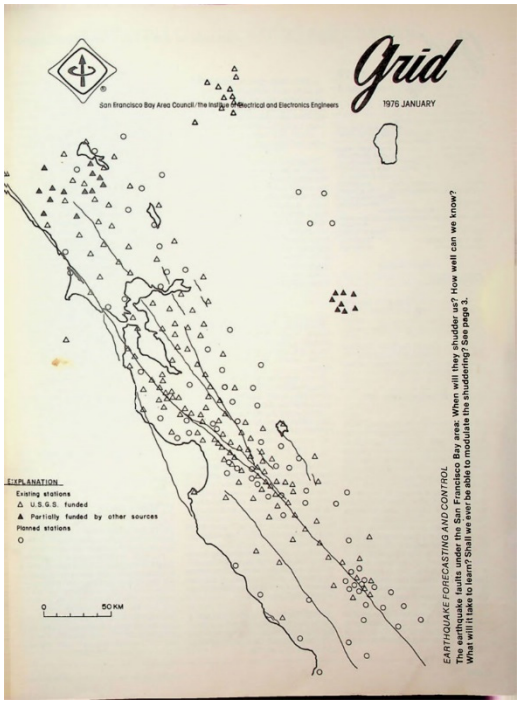
EDITOR'S PROFILE of this issue

from a historical perspective …

with Paul Wesling, SF Bay Area Council GRID editor (2004-2014)

December, 1975:

Cover: The figure is a familiar one to Californians – a plot of earthquake-monitoring locations along the various faults. Striking is the cluster of measurement facilities in the center-right, representing the Mammoth Mountain area and its great caldera, remnants of an ancient volcano that dispersed material over the western states eons ago. More on pages 3-4.



Archive of available SF Bay Area GRID Magazines is at this location:
https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History

At time of scanning, the bound volumes are held by Paul Wesling. April, 2025 Contact p.wesling@ieee.org

San Francisco Bay Area Council/the Institute of Electrical and Electronics Engineers

Grid

1976 JANUARY

EARTHQUAKE FORECASTING AND CONTROL

The earthquake faults under the San Francisco Bay area: When will they shudder us? How well can we know? What will it take to learn? Shall we ever be able to modulate the shuddering? **See page 3.**

Grid

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Deadlines

Copy for the February *Grid* must be in by noon Friday, January 2, except for items to appear in the Calendar only. The latter can come in no later than noon Monday, January 5.

Articles to appear in the March *Grid* must be in by noon Monday, February 2. Copy for use only in the Calendar can come in no later than noon Tuesday, February 3.

Fellow Nominations

Your nominations for award of Fellow Status in IEEE is hereby solicited. The San Francisco Bay Area Council Fellow Committee is beginning the process of selecting names to propose for election as Fellows next year. Assistance of all members, especially present Fellows, and Group/Society chapters is welcome.

Award of Fellow status is on the basis of "outstanding and extraordinary qualifications and experience". Any nominee for Fellow must presently be a Senior Member and must have been a Member of IEEE for five years. The SFBAC Office has a list of San Francisco Bay Area Senior Members and Fellows for you to consult in planning nominations.

Nominations will be processed for submission to IEEE headquarters in April, 1976. Your nominations should be in the Council office by February 15. Jean Helmke, in the SFBAC Office (address above), has forms and instruction packets.

You can send preliminary information to the Fellow Committee by letter. Chairman of the Fellow Committee for the SCV section, is Dr. J. W. Goodman, at Stanford University; (415) 497-3304

MAJOR IEEE APPOINTIVE OFFICERS should be more representative of the membership of the Institute. This, in brief, is the point of a resolution passed unanimously at the November meeting of the Santa Clara Valley Section Executive Committee and sent to national IEEE headquarters. It originated within the Professional Activities Committee.

The specific problem that this resolution addresses is the disproportionate number of these officers who are educators rather than engineers in industry. By way of "whereas", the resolution discusses the current oversupply of engineers and contrasts it with earlier predictions of massive shortages. It states that academia rarely rewards familiarity with current industrial needs and practises, but instead bases advancement on publication of books and papers. It calls for quality, rather than quantity, as the guiding principle in engineering education.

Other sections have sent or will send similar letters to IEEE headquarters.

THE PAC MEETING will start at 7:30 p.m., monday, January 19, at ISS Building 2 (south entrance) 10435 North Tantau, Cupertino. This is the general business meeting and working session; all IEEE members are welcome.

Among topics we shall discuss are: current PAC and IEEE projects on behalf of patent agreements; current legislation directly affecting engineers as professional people; employment contracts; pension programs; the local IEEE-PAC employment service, and professional registration.

THE EMPLOYMENT REFERRAL SERVICE is shifting into high gear with the beginning of the new year. A significant amount of money is allocated to this program.

An IEEE member who is unemployed, under-employed, or seeking new employment can get current, updated lists of job openings by sending a stamped (13c), self-addressed business envelope to the Employment Referral Service at the SFBAC office (address in masthead).

Employers: Fill your engineering needs through the service. A fee of $35 per job listing covers all your costs. Send a written discription of your job opening and the necessary education and experience to the Service at the Council office.

A *SPECTRUM* STUDENT SECTION? If you are a student member of IEEE and would like to see a specific part of *Spectrum* devoted to students, contact Dave Hanttula, (408) 257-6620 x 2742 or 2738.

AGE DISCRIMINATION in employment advertisements, especially against the over-40 engineer, was a major topic of discussion at the November PAC meeting.

Spectrum, in response to a letter in "Forum", has adopted a new policy on employment advertisements. They can no longer imply age discrimination by, for example, specifying a "recent graduate". They must instead carry a straightforward statement of the years of experience, if any, necessary in a particular area or specialty.

The only thing surprising about this is that it took a letter to the editor to bring it about: this kind of advertising copy is banned under the Federal Age Discrimination in Employment Act. Guidelines issued by the New York Office of the Department of Labor, Wage and Hour Division, gives these examples of phrases that violate the law: "recent college graduate", "maximum 2-5 years experience", and "college evening student". On the other hand, the following phrases are legal: "college graduate", "not under 21", and "middle-aged or elderly".

A STANDARD IEEE PATENT agreement is an objective that the PAC continues to stress. If you feel that some of the various agreements now in use in industry fail to protect your rights as the developer, you will be interested in this project. For further information, call Gerry Parsons. (415) 433-4150.

THE QUICK REACTION NETWORK, which has been relatively quiet for the past few months, will be highly active during the next six. The Network functions as a means of quick notification and rapid response to emergency situations affecting the professional status of IEEE members, with special emphasis on local and national legislation suddenly introduced or unexpectedly amended.

The California Sections, through their PACs, are subscribing, as a four-months experiment, to a legislative alert service run by the California Society of Professional Engineers and covering the next session of the California Legislature, which begins this month. If the legislature operates in its usual fashion, the Network will have plenty to do.

The basis of an emergency reaction network like this is people. If you have an interest in protecting yourself and your profession, call Ping Chen, (415) 494-7400 x 5303.

ANY QUESTIONS on this column and the issues and programs it discusses? Like to find out more about PAC and what it is doing in your professional interest? Call Michael Ward, (408) 246-4300 x 2316

EARTHQUAKE FORECASTING AND CONTROL

On Thanksgiving Day, 1974, an earthquake shook Hollister that had been forecast the day before in Menlo Park. Yet reliable earthquake forecasts are probably at least a decade away. Why?

The answer to that question lies partly in the present understanding of earthquake generation, partly in the nature of knowing precursor signals and our access to them, and partly in the level of effort now devoted to study of earthquake forecasting.

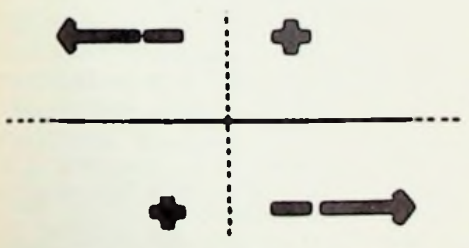
Earthquake Generation

According to today's seismologists, some 12 to 20 huge *tectonic plates* underly the earth's continents and oceans. They are in constant slow motion relative to one another. The stresses resulting from this motion generate earthquakes.

Two plates can move toward each other, causing up Himalayas and making one plate override the other. Or one can move laterally relative to the other. Along the San Andreas Fault, for example, San Francisco is moving southeast, or Los Angeles northwest— depending on your viewpoint.

Whether the motion be vertical or horizontal, the rock masses in the two tectonic plates fuse at *stress points* dispersed along a system of fault lines between them. The rock between adjacent stress points undergoes elastic deformation as the plates move. When a point is stressed beyond its ultimate strength, it breaks, causing a microquake; and the stress is transferred to adjacent stress points.

So the seismic activity preceeding a major earthquake begins with a diffuse distribution of microquakes along the fault. They become progressively fewer and larger, and the remaining stress in the rock gets organized into two major patterns around the two final stress points. In a plane normal to the fault plane, the pattern looks like this:



Here the arrows indicate direction of relative motion. The plus signs (+) indicate quadrants of maximum stress; the minus signs (-), quadrants of minimum stress.

The dominent current model of rock failure is the *dilatancy* model. According to it, a rock mass under high static pressure and additional directional stress begins to *increase* in volume at about one-half of its eventual failure stress. This happens because, although the rock may shorten in the direction of maximum compression, it expands at right angles to that direction. So an embedded volume that was orignially cylindrical becomes barrel-shaped.

As this dilation occurs, minute voids open in the volume of the rock. With further increase in stress, these voids multiply and migrate toward the final failure plane. This plane makes an angle of 30 degrees with the direction of maximum stress.

Precursor Signals

Nearby microquakes, larger, more remote quakes, and human activity generate a continual succession of sound waves observable with a seismometer. These waves are of two kinds; a longitudinal compressive wave, analogous to sound in air, called the P wave; and a transverse shear wave, roughly analogous to ripples on a lake, called the S wave. The two waves differ in velocity, so a seismologist can tell how far away a seismic event is by the difference in arrival time of the two waves.

But, prior to an earthquake, there is an empirically observed decrease in the velocity of P waves. This appears to be due to the voids created by dilation: P waves do not travel so fast in a mixture of rock and vacuum as they do in solid rock.

Later, but still prior to the earthquake, the P-wave velocity rises about to its undisturbed value. According to the diffusion theory dominant in American thought, this increase is due to water's diffusing into the dilatancy voids.

Dilatancy explains other observed precursor phenomena: emission of radon gas into well water, tilt on the earth's surface or at depth, and changes in the electrical resistivity of the rocks and in the geomagnetic field within them. Tilt at the earth's surface may result in the apparent rise in a lake's level on one shore and its lowering on the opposite shore. Tilt at depth can cause apparent change in the relative water levels in unpumped wells. pumped wells.

Still other phenomena have been adduced as possible precursor signals: temperature and turbidity of well water, telluric currents at depth, and even animal behavior. But major investigative effort in the United States now goes into dilatancy-induced phenomena.

The decrease in P-wave velocity, between 4 and 5 percent, is of the same order of magnitude as the uncertainty of an individual velocity measurement. It occurs quite rapidly —apparently within a day or so.

Call the time between initial decrease in velocity and the earthquake "T"; at first, of course, T is unknown. But after a passage of 0.9 T, the P-wave velocity returns to normal. At that instant, the earthquake is 0.1 T further into the future.

The value of T depends on the magnitude of the ensuing earthquake. For a quake of magnitude 4, it is of the order of two weeks; of magnitude 6, a year; of magnitude 8, fifty years.

(The Richter magnitude scale, in common use in this country, turns out to be an inverse frequency scale: magnitude 5 earthquakes are ten times as frequent as magnitude 6, and a hundred times as frequent as magnitude 7. But the total energy released in temblors changes more rapidly than their frequency with Richter number: a magnitude 6 earthquake releases fifteen times as much energy as a magnitude 5, and a magnitude 7 fifteen times as much as a magnitude 6.)

Other anomalies that begin at about the same time as the P-wave anomaly include radon emission, tilt, resistivity, and geomagnetic field. Each of these is at or near the level of current instrumental sensitivities. The tilts involved, for instance, are of the order of 0.1 microradian, or 0.1 mm per km. Changes in geomagnetism are of the order of 0.1 gamma in an ambient field of the order of 50,000 gamma.

Current Studies

The geological Survey is the lead agency for U.S. research into earthquake forecasting. Headquarters for its efforts are in Menlo Park, and about three-fourths of the work goes on there. The rest is carried on through contract.

The major study effort goes into seismology, with significant effort also devoted to studies of tilt, triangulation, and geomagnetism. There are about 180 seismic stations in Centeral California (see cover). Each consists of an electromechanical seismic sensor, amplifier, and associated circuits. The entire unit is encapsulated in a cyulinder about 10cm in diameter and 30 cm long. It typically gets "planted" with a posthole digger.

The sensor consists of a mass and coil spring with a resonant frequency of about 1 Hz. A magnet moving with the mass induces an emf in a pickup coil. The spring and mass are damped, and the coil is resonated, to yield a useful response down to 0.1 Hz and peaking at 25 Hz.

Coil output is amplified 60 dB by integrated circuits and frequency modulated on a voiceband subcarrier. Most subcarriers are multiplexed into a telephone channel and go to Menlo Park by leased telephone lines. A few, in inaccessible locations, modulate a VHF transmitter feeding a Yagi antenna aimed at another feeding a receiver in an accessible location. At the bandwidths required, 80mW is enough to transmit to the radio horizon.

Each station periodically transmits identification and calibration data in the telemetering channel. On the telephone lines, the band below 680 Hz is used for digital transmission of the other data, such as geomagnetic field or tilt.

(please turn the page)

Energy required for telephone transmission for a year is supplied by dry cells in the buried capsule. External batteries are required to run a VHF transmitter for a year.

In Menlo Park, data from 16 to 18 stations are recorded on a single microfilm, automatically developed and fixed, and displayed under magnification with a time lag of ten minutes. The USGS currently has thirteen such viewing stations in operation. Six key remote seismographs are recorded "in real time" on revolving paper drums.

The incoming data go simultaneously onto magnetic tape for computer analysis. Available computer facilities are not enough by at least an order of magnitude, to digest all data now coming in.

As in other situations in which a wanted, non-repetitive signal is "buried" in noise, automated procedures are not capable of discerning a "significant" signal as well as a trained human being can. So seismologists now scan data and explore ways of specifying how to select and edit "significant" portions for computer analysis.

With a variety of precursers each buried in its own brand of "noise", the ideal solution would be to base an estimate on a weighted combination of indications from all available precursor signals. But the statistical analysis necessary to determine appropriate weighting facotrs would require more data than are now available. (A succession of major earthquakes would serve excellently for determining the weighting factors, but they ae not desirable from a humane viewpoint!)

Forecasting and/or Control?

Perhaps one or two dozen earthquakes have so far been successfully predicted; perhaps half as many have been predicted erroneously. The USGS is now routinely "post-dicting" earthquakes, i.e., comparing preceding precursor records with earthquake magnitudes, locations, and times. But data and understanding are not yet extensive enought to allow forecasting with confidence.

Even in Central California, where instrumentation is more extensive than anywhere else in the western hemisphere, about three times as much would be necessary for adequate forecasting. Data from each station could profitably get at least three times as much analysis as it now gets. So the U.S. could rationally spend at least ten times as the current $4 million per year on earthquake forecasting.

Even under optimum funding conditions, reliable earthquake forecasts with quantitative confidence measures are at least a decade away. Nevertheless, the costs involved (of the order of $400 million) would be small in comparison with what might be saved in the event of a major (say Richter magnitude 7 or 8) earthquake in a populated California region. According to seismologists, such a quake is likely within this century, perhaps within the next decade.

A byproduct of experimentally verified forecasting of earthquakes will be more complete understanding of quake formation. That in turn might make earthquake modification feasible. There is some experimental evidence, for instance, that injection of water into faults lubricates the stress points, making slippage easier. So stresses that might otherwise build up into a major earthquake might be dissipated gradually as they arise.

But no one would induce an earthquake in a populated area unless he were sure, on the basis of empirical evidence, that he is not going to induce a major earthquake and that none is imminent. If a major quake were to follow his intervention, he might have some difficulty making people believe he didn't start it.

For further reading, see:
Scientific American, 1975/5, pp. 14ff.
Time, 1975/9/1, pp. 36ff.
Science Year, 1976, pp. 153 ff.

San Francisco

Four IEEE Student Members presented papers as part of the WESCON technical program at the San Francisco Civic Auditorium September 16-19. Each student contestant in the Region contest was a first-place winner in his Area contest. Publication of the contest papers in the *WESCON Conference Record* lends recognition and prestige to the Student Paper Contest and attests to the excellent quality of the students' work.

Richard Brown, an undergraduate student in Electrical Engineering and Computer Science at Brigham Young University, won first place with his paper, "A Digital Memory Scope for Logic Systems Analysis". The paper describes the theory and design of a new test instrument with the following advantages: simultaneous data recording on eight channels (expandable) at sample speeds to 30 MH_z, easily understood binary- or timing-diagram-formulated display, combinational triggering with pretrigger memory, and a "glitch catcher" to detect spikes shorter than the sample period.

Hardware design and testing of this instrument was complete. The instrument was displayed during the presentation.

Chuck Olsefsky, Region 6 Treasurer, presented the first-place awards: a $200 cash prize from IEEE's Life Members, and HP 25 calculator, and a plaque.

Richard is 24, married, and living in Provo. He was to have graduated last month, and plans to begin work on a Ph.D. next fall. He is colounder of DYON, a small engineering company. His wife Brenda was also slated to complete work on a degree in music performance at BYU last month.

Second-place awards of $200 from IEEE Life members and a plaque went to Don Knuil for his paper, "A TV/Computer System for Automatic Cine-Angiogram Analysis". Don received his BSEE from the University of Washington last spring and now works as an engineer in the University's Department of Cardiovascular Research.

Edward Geiger, who recently graduated from the University of Santa Clara with a BSEECS, received a $50 third place prize for his paper, "A Modern Elevator Control System". A $25 fourth place prize went to Brent Teeter, U.C.-Irvine, for his paper, "Thermodynamic Analysis of Steam-Electric Power Plants".

Judges for the 1975 Region Six Student Paper Contest were W.J. Lindbind, PG&E, San Francisco; Fred Hilsenrath, Lockheed, Palo Alto; Gene Warrington, HP, Colorado Springs, CO; John Alstatt, California Microwaves, Sunnyvale; and Bruce Farley, HP, Colorado Springs; Alternate judge was Andrew F. Arley, PG&E, San Francisco.

SECTION NEWS

Santa Clara Valley

The One-Day Short Course November 14 on simplified test and measurement systems proved to be a winner. More than 100 engineers attended: most came away enthusiastic about the possibilities of new test methods. Deserving of thanks from the Section are Jane Eveans, Educational Activities Chairman, who planned and organized the course, and the guest speakers, who made a complex subject a usable tool for working engineers.

The Executive Committee met jointly with Students Chapter Chairmen in the Section and their faculty advisors. Out of the meeting came new ideas about how the Section can support student activities.

The Section needs a volunteer to work on activities related to Engineers Week, next month. If you are interested, please contact Clint Gilliland, Chairman SCV Section.

SFS

Tour of the City's New Telephone Switching Center

Sponsored by the San Francisco Section, this tour of PT&T's new switching center at 611 Folsum Street at Second Street will include features of a successful similar tour in late 1973 and new additions. It will last from 6 to 8 p.m. January 21 and is limited to 50 people.

The center is a nine-story structure built to house switching and transmission equipment meeting downtown San Francisco's communication demands for the next twenty years. It represents an investment of more than $20 million in building and equipment.

The tour will include observation and description of two of the latest types of telephone switching equipment: a stored-program-controlled electronic switching system serving more than 10,000 local customers, and an electromechanical long-distance trunk switching machine with computerized adjuncts. These two switching machines occupy several floors of the windowless building. The tour will also include gas-turbine emergency power, a computer-controlled call intercept system, and other telephone equipment of the latest types.

Reservations are necessary by January 15. Call Jaye Choy, (415) 542-7739.

Oakland - East Bay

The Section is showing unmistakable signs of life; Group/Society organizational efforts have already produced three new East Bay chapters: Industrial Applications, Power Engineering, and Engineering in Medicine and Biology. Other Group/Societies that look promising are Acoustics Speech and Signal Processing, Circuits and Systems, Computer, Nuclear and Plasma Sciences, and Systems Man and Cybernetics. Perhaps five or six chapters will be in operation by next month.

Section officers were hosts to officers and advisors of the University of California Student Branch at a get-acquainted dinner November 21. The students were glad for the opportunity to improve their interface with working engineers. The Section will benefit from student participation in the new chapters now forming.

Two upcoming Section meetings have planned topics of broad general interest: Registration in January and the Nuclear Initiative in March. The November Section meeting was the most successful to date: 80 attended. As Group/Society Chapters form, Section meetings will become less frequent and will emphasize topics of broad interest.

Please let the Executive Committee know of your desires. Its monthly meetings are open and you are welcome to attend. Contact the SFBAC office (address in masthead, Page 2) or any Executive Committee member for information on date and place.

EMB(OEB)

Educating Engineers For a Better Interface With Biomedicine

Biomedical engineering has not kept pace with the general advance of science and technology. So this first meeting January 22 of the Engineering in Medicine and Biology East Bay chapter is significant. Dr. S.P. Chaudhuri, a Bechtel control systems engineer, will discuss biological systems, models, instrumentation, and measurement.

Despite the impressive advances in the healing arts in the last century, they still face unsolved problems. Heart failure is our number one killer. Cancer and arthritis are uncontrolled. Diabetes is incurable. The physically handicapped need more highly sophisticated prosthetic devices.

Many physicians and biomedical research workers lack knowledge of engineering resources and techniques applicable to their problems in diagnosing and curing disease, improving medical service, and reducing costs. Engineers, on the other hand, are ignorant of medicine and biology.

Systems theory, for example, including modeling, estimation, identification, optimization, and adaptive control, might well be applicable to living biological systems if the systems engineer understood them. And anyone trying to design artificial limbs must understand the structure and function of the skeletal system.

For reservations call Leora Sharp, (415) 835-8500 x 312.

OEBS

Current, Future Directions for Engineering Registration in California

At its joint meeting with the Livermore Valley Chapter, California Society of Professional Engineers January 20, the Oakland - East Bay section will hear two experts on engineering registration: Donald R. Wright, Executive Secretary, and Dr. Charles Nelson, Member, California Board of Registration for Professional Engineers.

Careful study of California Assembly Bill 2166, introduced last April, indicates it may put IEEE, its members, and others using the title *engineer* in California in violation of the law unless they are registered. EE's working in the "communications industry" (whatever that is) can continue their work provided they do not call themselves *engineers*.

Also discussed at the meeting will be other new topics of interest such as the controversial new registration specialties. The speakers will give their views on where we are and where we are headed in California engineering registration.

For the dinner, go west on Crow Canyon Road one block from Interstate 680 to San Ramon Valley Blvd. and north one block to the Brass Door. For the meeting, go east on Crow Canyon Road to the PG&E Engineering Research Center. For further information and dinner reservations, call Terry Rossow, (415) 447-1100 x 4784 by January 16.

See CALENDAR for program arrangements

grid leak

regeneration

These columns to continue

For now at least, this column by the editor and your letters in *regeneration* will continue. The first item on our agenda, one that will be with us for some time, is defining editorial policy. We'll have to do it inductively, starting at full gallop and finding out where we're headed as we go along.

Whether or not IEEE as such or any of its councils, sections, groups or societies should take stands on controversial issues, through their elected officials or by vote of their members, is not our primary concern. The *Grid* is not an advocate. I'll try to cover controversies fairly; if I fail, let me know.

As Michael Neubauer points out in his letter, I did not make myself clear in my unsigned October article on the nuclear power initiative. What I meant was, the electorate is not *now* qualified to assess realistically the meanings of the probabilities and relative magnitudes involved. We as engineers have to educate them. The Initiave confronts us.

What is an engineering policy decision? To me, it is precisely one involving both engineering judgements and political judgements, e.g., judgments about how much you are willing to spend to be how safe. And Neubauer is right: engineers only make recommendations. It takes politics to decide policy.

• We've got more letters on the Iniative than we can use. So I omit unsigned letters and letters from non-members, and give preference to letters expressing an idea new to us. I can't, of course, vouch for the accuracy of the letters' contents.

I'm glad to get letters on subjects other than advertising or the initiative. I'd be especially glad if you'd type your letters and limit them to no more than 100 words.

One step at a time

Turns out the Editorial Board never did abolish advertising in the *Grid*; it just restricted it to case-by-case acceptance of advertising matter deemed useful to members and not constraining on the editor. Your responses on the auto insurance ad, for example, continue to be voluminous enough to encourage the advertiser to pay for his ad and to convince us it's useful to members.

Now we'll take another step. We'll accept one-column-inch "calling cards", like those in *Spectrum*, at $20 per insertion. They'll be published in order of receipt, on a space-available basis. If yours is published and you want it published again, in rotation, submit it again.

You can get about 50 words of copy in a column inch, with type this size; but then there's no blank space left for emphasis. Resist the urge to squeeze in many words by using fine print.

That Initiative

Editor: The section correspondence relating the IEEE position on the California Nuclear Power Iniative arrived just at the time the news media were carrying an item on a Washington state nuclear power plant. It seems the radioactive waste storage was designed with such care that the local rabbits had little trouble accessing, ingesting, and dispensing an undetermined amount of the stuff over an undetermined area of the Washington countryside (with the gracious help of the local birds of prey). You may draw your own conclusions about the quality of planning and construction under current legislative controls. I've drawn mine.

Geoffrey Meyer

Editor: Regarding the letters in the November *Grid*, I think that both Paul Hernday and Lance Goddard are too optimistic that the public —or the legislature—will be able to distinguish between scare tactics and sound reasoning and "reach an intelligent decision".

I think both men have inintentionally overlooked a vital point. The coal and oil fueled power industry is much more dangerous to life and health, wasteful of vital resources, polluting, and destructive of the environment than is the nuclear industry. Our being used to the dangers of coal and oil does not lessen those dangers. In simple justice, the structures of the Nuclear Safeguards Act should also be applied to coal and oil fueled power systems.

If we act promptly, by 1982 we could have all of California reduced to using flashlight batteries.

James M. Lomasnew

Editor: I object to your statement in the October *Grid* "This initiative now involves the electorate in engineering policy making. The electorate is not qualified to assess rationally the meanings of the probabilities and relative magnitudes involved."

The storage of radioactive wastes is not an engineering policy decision because it affects many generations and the strength of our institutions. We are now learning how ineffecitve we are at controlling pollutants.

Most decisions come down to the economic one. How much do you want to pay to take the sulfur out of our fuels or the lead out of our exhausts? So let's not kid ourselves. As engineers we only make recommendations. The decisions are made in the political arena.

The PES statement is not based on cold, unemotional logic, either. "If, as a consequence, other states subsequently adopt similar measures, the results will be disastrous to the well-being, livelihood, and existence of the people of the United States." That is a simple scare tactic. Some proponents have been accused of making the same statement.

A vote for the initiative puts more presssure on the nuclear industry to solve their problems of safety and waste management *prior* to committing our entire country to nuclear electric power generation.

Michael Neubauer

Advertising

Editor: I do not understand the reason for the no-advertising policy. Surely, "position wanted" and "position available" ads would be of considerable service to the members. Daily newspapers are not really a good meeting place for professional employment, and *Spectrum* has too wide a geographic scope.

I personally would like to be able to have a consultant's card in each issue. I use other advertising, but the *Grid* most nearly reaches the audience that I want to reach.

The policy is especially strange since the *Grid* has accepted advertising in the past. Why was the policy changed? You regularly carry ads for auto insurance.

(name withheld)

Deceptive practices?

Editor: I'd like to express my concern over alleged deceptive practices by management in their use of employment agencies. The alleged practices summarized below seem to be common knowledge; a summary might help uninitiated engineers avoid pitfalls.

• Management uses agencies to check on employees' attitudes. Critical remarks made in a so-called confidential discussion are reported to management.

• Management informs agencies of those to be laid off. A call from an agency may be the "handwriting on the wall".

• Management looks to an agency to provide background information on persons of interest. It provides this ingratiating service.

• A self-initiated contact "in confidence" somehow becomes public knowledge. Occasionally your supervisor is the first to know.

I use "management" in the broadest sense, including all levels and even your personnel department. Not all engage in these practices; but apparently enough do to jeapordize your career.

I would like PAC to address this area of activity.

Michael J. Licata

GROUP AND SOCIETY MEETINGS

The Grid Centerfold

EMB

Problems and Progress in Fetal Monitoring

The chapter will hear Svein B. Rasmussen, Berkeley Bio-Engineering, Inc., discuss fetal monitoring on January 22. This fairly recent procedure is oriented toward preventing death or brain injury to the fetus in late pregnancy and especially during birth.

The procedure consists primarily in the continuous, simultaneous recording of fetal heart rate and intrauterine pressure. Usefulness of these procedures has proved to be quite dependent on instantaneous, beat-to-beat recording of the fetal heart action. In many instances, though, full achieving this recording objective constitutes an unresolved engineering problem.

Several detection means are now in use: both internal and external electrodes, contact microphones, and ultrasonic doppler detectors. Rasmussen will describe essential design features of the several detection and electronic processing methods and discuss their relative merits.

Rasmussen obtained his M.S. in engineering at UCLA in 1953. His entire career has been devoted to the design of scientific and medical instruments.

As Engineering Manager, Dupont/Sorvall Instruments, Norwalk, CT, and as Manager of Development, Beckman/Spinco Division, Palo Alto, Rasmussen participated first-hand in the growth of medical instrumentation into the major industry it is today.

The chapter will meet in the Hayward area. For further information call, (415) 327-6622.

AP

Spatial Filtering Apertures and Remote Probing Applications

Using an antenna or array of antennas as a spatial filter can yield some selectivity on signal fluctuations caused by transmission through a non-homogeneous atmosphere. Prof. A. T. Waterman, Jr., Radio Science Laboratory, Stanford University, will discuss principles and applications of such spatial filters at the Antennas and Propagation chapter meeting January 8 in Palo Alto.

In line-of-sight propagation, atmospheric turbulance generally causes enough inhomogeneity in the refractive index to produce weak scattering and consequent fluctuation of the received signal. Passing the wave through appropriate spatial filters can make the observed signal fluctuations sensitive to one position along the path and to one wave number in the spectrum of atmospheric turbulance at that position.

Tuning the spatial filter can yield the profile of conditions along the path. Such quantities as transverse wind and turbulence structure constants are measurable. The speaker will give examples for a 28-km path at Ghz and a 100-m path at optical wavelengths.

Prof. Waterman holds an A.B. from Princeton, a B.S. from Cal. Tech., and an M.S. and Ph.D. from Harvard. He has served as Chairman of URSI Commission II, of USNC/URSI and of IEEE APS (1965-66). He is an IEEE Fellow.

Technical meeting will be at Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto, at 8:30; preceding cocktails and dinner at Rick's Swiss Chalet. Reservations are unnecessary.

IAS

State of the Art Safety Systems

On January 27, the Industrial Applications, Society will tour the new Standard Oil Building at 575 Market Street. This building incorporates the state of the art in life safety systems. The tour will include the building control-room.

After the tour, the Society will meet for dinner and a technical presentation at a nearby restaurant. Speaker will be Dennis Gruszynski of Johnson Controls, Inc.

For reservations call Bill Kononetz, (415) 768-2320.

C

A New Portable Computer With High-Level Language Capability

At the Computer Society meeting January 14, D.A. Robertson will present the IBM 5100. This personal portable computer was introduced last September. The presentation will view this versitile new computer from three levels:

- An overview of the machine, including the history and philosophy of its development, its physical characteristics, and its functional capabilities.
- The microprocessor-based architecture of the IBM 5100.
- The technologies it involves.

Presentation of the second and third levels will involve a description of the interrelationships between technology and architecture in the solution of the total design problem.

An IBM 5100 will be available at the meeting for personal hands-on demonstration.

Robertson holds a B.S. in engineering and physics from Washington State University and an M.S.E.E. from Stanford. His work at IBM for the last five years, in Los Gatos and in Rochester, MN, has been primarily on the IBM 5100.

The meeting will be at the University of Santa Clara. For further information and dinner reservations, call(415) 327-6622.

CAS

New Advances in Bipolar LSI

Dr. Alan Grebene, Vice President in charge of engineering, Exar Integrated Exar Integrated Systems, Inc., Sunnyvale, will be the featured speaker at the Computer and Systems Society meeting January 7.

Advances in integrated injector logic (I^2L) have greatly extended the capabilities of bipolar integrated-circuit technology. A unique feature of I^2L technology is its ability to combine complex analog and high density digital circuits on the same chip.

Dr. Grebene will present the key features of I^2L technology, its capabilities, applications, and limitations. For further information, call Ken Jenkins, (415) 493-4411 x 45031.

See CALENDAR for program arrangements

Career Management for Engineers

A one-day workshop sponsored as a feature of Engineers Week, 1976. ***Saturday, February 21***

Co-sponsored by Continuing Education in Engineering, University Extension, Berkeley, and the San Francisco Bay Area Engineering Council, the American Society for Engineering Education (Pacific Southwest Section), the Institute of Electrical and Electronics Engineers (San Francisco Bay Area Council), California Society of Professional Engineers, American Society of Mechanical Engineers, and a number of other professional organizations.

How rewarding is your career at this time in your life? You can allow your career to "just happen" and hope you'll progress according to your talents and abilities—or you can decide to "organize your luck" through career/life planning.

This one-day seminar for experienced engineers will focus on enabling you to multiply personal effectiveness in your present position and plan for alternatives to make your career and life aspirations a reality.

Career/life planning teaches a logical, step-by-step process of discovering your present strengths, needs, and life situation, then putting the pieces together in a more fulfilling pattern.

The format of the workshop will be a combination of lecture, experiential exercises, small groups (varying from 5 to 50), and individualized sessions. The workshop will introduce techniques that will help to place each participant on the path toward answering four basic questions:

I. **What Do You Want to Do?**
Motivating skills and strengths are identified and recognized as part of individual professional resources. The techniques of Bolles, Crystal and Haldane will demonstrate how to use these motivators as building blocks in career/life planning.

II. **Where Do You Want to Practice Your Profession?**
John Holland's research on work environment will be utilized to determine your optimum combination of people, places, and things for career satisfaction.

III. **How Do Engineers Block Their Careers?**
Through transactional analysis and other strategies some of the ways engineers have experienced blocks to career advancement will be examined and means to get through such blocks described.

IV. **How Do You Manage Development of Your Career Path?**
Strategies outlined by Bolles, Fadiman, and O'Neill will be presented to enable you to deal more effectively with rapid social and technological change, through personal goal setting and directed career management.

Location: College of San Mateo, Student Center

Fee: $50

To enroll: By mail—fill out and return the form provided. By telephone—if you use BankAmericard; telephone 642-4111 in Berkeley or 861-6833 in San Francisco. If you enroll and then cannot attend, a refund, less $5 service charge, will be granted if requested in writing prior to the program date.

For further information write or call Continuing Education in Engineering, University Extension, University of California, Berkeley, California 94720; telephone (415) 642-4151.

Workshop Directors

MARGARET ANSTIN, Coordinator of the Career Center at De Anza College, Cupertino, California. Trained to teach the process of career/life planning by Richard Bolles and John Crystal, she has conducted career/life planning classes and workshops, and served as a private consultant both locally and nationally.

WILLIAM KELLY utilizes Bolles's and Crystal's ideas in career and life counseling. He is a credentialed community college instructor and has taught courses in counseling and the behavioral sciences, including career development courses, at Monterey Peninsula College.

Program

8:30-9 a.m.	Registration
9-12	What Do I Want To Do? (lecture and group exercises)
12-1 p.m.	Lunch
1-2:30	Ideal Work Environments—Where and with Whom?
2:30-3:30	Removing Roadblocks to Career Satisfaction
3:30-4:30	Strategies for Dealing with Change and Maintaining Career Vitality

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Application for Enrollment
(Advance enrollment is required)

Please mail to: Department B, University Extension, University of California, 2223 Fulton Street, Berkeley, California 94720

Enclosed is $..... to cover ..... enrollment(s) in edp 303206 **Career Management for Engineers** $50

Name.....

Employed by.....

Company address.....
street

.....
city state Zip

Daytime telephone and extension.....

Technical society affiliation (if any).....

Please make check payable to The Regents of the University of California; if using BankAmericard, give:

.....
your account number date card expires

.....
your home address city state Zip

.....
your signature to authorize charge

If enrolling for more than one person, please supply above information for each additional enrollment.

TECHNICAL COURSES

UC Extension

Other Continuing Education In Engineering Courses

In the series inaugurated with "Career Management for Engineers" described on the opposite page, UC is also offering the following courses in 1976:

"Integrated Injection Logic"
March 22, San Francisco

"Geotechnical Factors in Mining"
March 29-April 1, Berkeley

"Dynamics of Structures"
June 14-18, Berkeley

"Recent Advances in Earthquake-Resistant Design of Structures"
June 21-25, Berkeley

AP

Principles of Radar Part II

The IEEE Antennas and Propagation Society will present a one-day tutorial lecture series entitled "Principles of Radar, Part II" at SRI Building 44, Radio Physics Laboratory, Main Conference Room, Laurel Street, Menlo Park, from 9:00to 4:00 Saturday, February 21. This course is a continuation of last year's Radar Lecture Series sponsored by IEEE AP.

Speakers and topics are:

- "A Radar Overview" — Dr. G.R. Branner, ESL, Inc.
- "Radar Signal Propagation" — Dr. Nicholas Clanos, SRI
- "RCS Theory and Measurement" — L.A. Robinson, SRI
- "Radar Signal Processing" — Richard B. Nelson, ESL, Inc.

Fee for the course includes lunch, coffee and doughnuts, and course notes. To enroll, mail the coupon below with your check, made out to IEEE Antennas and Propagation Society, to Dr. Tom Wang, SRI Building 44, Menlo Park, CA 94025.

Registration deadline is February 13.

Fees are:

- Pre-registration: Students, $8
  IEEE Members, $16
- Non-members and late registration: $21

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Enclosed is my check for $_____.

Please register me for the lecture series "Principles of Radar, Part II", February 21.

Name_____

Address_____

_____

(415)_____

IEEE Member No._____

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UC Davis

Extension Course In Wind Energy

Included in this course are the following topics: energy generation, water pumping, and miscellaneous uses; remote installations; community-scale use and electricity generation for electric utility networks on a large scale; instrumentation and wind survay work; engineering, economic, and environmentall aspects; systems applications; and storage.

Prof. M.F Merriam, Material Science department, offers this no-credit course meeting Saturday, February 7, 9-5, in the Orchard Room, Mini-center, Hutchison Drive. For further information contact Garret B. Jones, UC-Davis Extension, Davis 95616; (916) 752-3108; by January 30.

DE Anza

EIT Review of Engineering Fundamentals

Beginning January 6, this highly successful course is offered for the fourth time. Classes meet in Ortega Junior High School, Sunnyvale, from 6:00 to 8:00 each Tuesday and Thursday evening through March 25. Fee is $8.

Aim of the course is to prepare engineers and students for the April Engineer-In-Training examination. In the past, five-sixths of those who have taken the course have then passed this examination. But many enrollees seek only to refurbish their engineering skills.

The course typically covers such topics as statics, dynamics, electricity, fluids, thermodynamics, heat transfer, nuclear theory, and engineering economics. But course content is highly individualized to the needs of the specific student.

For further information, contact Michael R. Lindeberg, (415) 593-9731.

UC Extension

Intro to Microprocessors and Microcomputers

Beginning February 5 and meeting each Thursday evening, 7:00 to 9:30, until April 9 in two locations, this course is entitled "Introduction to Microprocessors/Microcomputors with Applications X400". Its intention is to provide the practicing engineer with the basic knowledge and required design techniques for using microprocessors as components in digital systems designs.

The course emphasized treating microprocessors as LSI devices and using sequential logic design procedures. Areas covered in detail include device features, timing, buss structures, support devices available, types of sensory devices, types of I/O devices, interrupt and programmed I/O, software support, putting a system together, flowcharting, and converting a real-world problem into a systems design problem.

Enrollment is limited. Prerequisites include in-depth familiarity with logic design and digital systems design. Fee for the course is $80.

The two sections will meet in Barrows Hall, UC, Berkeley, and at Applied Technology, Sunnyvale. For further information, or to get a Spring Class Catalog, call Continuing Education in Engineering, UC, Berkeley 94720; (415) 642-4151.

Cal Poly

Power System Protection Workshop

The Cal Poly Electric Power Institute will present a two-day workshop on "power System Protection" for professional engineers in the field of electrical engineering at California Polytechnic State University, San Luis Obispo, April 29 and 30. The workshop will present a coordinated program of lectures and panel discussions. The lecturers will be well qualified engineers, and panel discussion will provide feedback and interaction between speakers and audience.

Coordinators of the workshop, Dr. William F. Morton and Dr. Saul Goldberg, have organized the worship around the following four topics: industrial system protection, utility system protection, utility equipment protection, and protection hardware.

For further information, write Dr. William F. Norton, Electric Power Institute, California Polytechnic State University, San Luis Obispo, Ca 93407.

See CALENDAR for program arrangements

CONFERENCES AND AWARDS

MTT

International Microwave Symposium Scheduled In New Jersey

The 1976 International Microwave Symposium sponsored by IEEE/MTT will take place at the Cherry hill Inn June 14-16 Choice of the site (in suburban Philadelphia) and date are to make this the bicentennial symposium.

The symposium will try to attain A Realistic Presentation in Microwaves'. With this objective, the conference will use tutorial as well as contributed papers.

Closing date for paper submission is January 2. Martin Caulton, RCA Laboratories, Princeton, NJ 08540, is Chairman of the Program Committee.

An innovated exhibit area will be close to the meeting rooms. Exhibit Chairman is Bertram Aaron, 55 Northern Blvd., Greenvale, L.I., NY 11548.

for further information, contact Louis F. Moose, Bell Laboratories, Allentown, PA 17103.

USAF

Highest Civilian Award Goes to O.G. Villard, Jr.

Major General Alton Slay presented the Meritorious Civilian Service Award to "Mike" Villard at SRI, where he is a senior scientific advisor. Villard is a professor on the staff of Stanford's Radioscience Laboratory.

Villard received the award for his fifteen years' service as amember of the Geophysics' Panel of the AF Scientific Advisory Board and for his advice and assistance on technologicalproblems over that period. His best known work has been on the physics of the ionosphere and its use in radio communication. He was primary contributor to the development of over-the-horizon radar.

The author of more than thirty technical articles and the holder of six patents, Villard has received numerous awards, including IEEE's Morris Liebmann Memorial Prize. He is a Fellow of IEEE.

EEEI

Therault New Special Activities Manager

In this newly-created position, Helen M. Therault will serve as the staff support executive for distributors and manufacturers' representatives, attending to registration and visitors' services, convention and hotel liaison, and other special activities for electro and WESCON. The two conventions are produced by the professional staff of Electrical and Electronics Exhibitions, Inc., a nonprofit California corporation with offices in Los Angeles and Boston.

William C. Weber, Jr., manager of both events, announced Mrs. Therault's appointment. A member of the show-organizing staff for more than fifteen years, she has most recently served as assistant exhibit manager.

WESCON

Edson, Del Bucchia New Members of Board of Directors

William A. Edson Ray Del Bucchia have been appointed to four-year terms as members of the WESCON Board of Directors. They replace Stanley F. Kaisel and Jack Logan on the expiration of their terms.

Edson is assistant director of the SRI Radio Physics Laboratory, Menlo Park. Del Bucchia heads his own manufacturers' representative firm, R. Del Bucchia and Associates, Daly City.

Northern and Southern California elements of IEEE and the Electronic Representatives Association jointly sponsor WESCON. The two sponsors and the two regions have equal representation of the Board of Directors.

WESCON, the Western Electronic Show and Convention, takes place annually, alternating between the Bay Area and Los Angeles. In San Francisco last year, it attracted more than 31,000 people to its four-day technical convention and exposition.

For last Year's WESCON, Kaisel served as chairman of the executive committee. Logan, who is president of Jack Logan and Associates, was chairman of the board.

Com/IT

Joint Meeting On Experimental Packet Radio Network

At the joint Communications and Information Theory meeting January 13, Dr. Stanley C. Fralick will discuss some of the theoretical and technological aspects of an experimental radio network utilizing the concept of packet-switched communication systems. A group of ARPA contractors is developing the network to demonstrate the concept.

Packet-switched communication systems offer an efficient solution to many digital communication problems. They make new computer network applications possible, because they provide a unique capability for interconnecting a large number of mobile users in an efficient, flexible area-coverage system.

Dr. Fralick is President and cofounder of the Binary Corporation, Mountain View. Until May of last year, he was a staff scientist at SRI responsible for the Packet Radio Project. He received his Ph.D. in electrical engineering from Stanford in 1963.

For further information and reservations call Susan Detro, (415) 592-4120 x 278.

PES

Utilization of Gas Turbines In the Electric Power Industry

The Power Engineering Society's January 13 luncheon meeting will feature a presentation on gas turbine-power generation plants. The presentation will include *simple cycle* peaking plants, *combined cycle* base load plants, and *combined energy* plants. The plant charcteristics and the manner in which these plants fit into utilities' generation allocation schedules will be reviewed and discussed.

Richard B. Myers, Mechanical Engineer, PG&E, will make the presentation. He is a University of California graduate in mechanical engineering. His earlier engineering positions were with Pratt & Whitney Aircraft Corporation and with Turbo Power and Marine Systems.

For further information and reservations call Carol Franke, (415) 781-4211 x 1442.

ED

Solid-State Devices for Automotive Electronics

With the increasing emphasis on pollution control and energy conservation in automobiles, one of the most rapidly expanding areas for application of solid-state devices is in the automotive electronics market. David Long will make the featured presentation of this market to the Electron Devices Group at its meeting January 13 in Palo Alto.

Long will tell who the automotive electronics customers are, what they want, what they really need, and what they have been getting. He will point out the differences between the device requirements for this market and more traditional markets such as in consumer and computer applications.

The speaker has been active in automotive electronics since 1971. He is now manager of the Linear Automotive Circuits Group at National Semiconductor.

For further information and dinner reservations, call the IEEE SFBAC office, (415) 327-6622.

M

Chapter Review of Philadelphia Conference

The January 8 meeting of the Magnetics chapter will feature a review of last month's Philadelphia conference on Magnetism and Magnetic Materials. A panel of three or four chapter members who attended that conference will cover such topics as magnetic bubble technology, new magnetic materials and their properties, advances in theory, and application of magnetic materials. Call Dick Clover, (415) 494-1444 x 257 for further information.

MTT

National Lecture on Automatic Network Measuring Systems

On January 29, the Microwave Theory and Techniques chapter will hear Dr. Robert Beatty discuss "The Development of Modern Automatic Systems for the Measurement of Network Parameters". Computer-controlled measurement gives the microwave engineer an unprecedented tool for designing and testing components and systems.

The speaker will survey the principles and ideas that led to the development of these systems and automation of portions of the measurement process. He will highlight developments promising improved accuracy and the problems associated with them. He will assess (cautiously) future developments he can anticipate.

Dr. Beatty was a Staff Aide at the MIT Radar School and performed research on radar fire control at NRL. The author of numerous technical papers and monographs, he has served as Chairman of URSI, on the G-MTT Administrative Committee, and as Editor of *MTT Transactions*. He is now a private consultant in Boulder.

For further informaion and reserations (by January 27) call Don Chambers, (415) 493-1501 x 3262.

AES

Tour of Air Route Traffic Control Center

On January 15, the Aerospace Electronics and Engineering Society will tour the Air Route Traffic Control Center, 5125 Central Avenue, Fremont. Since the society last toured the facility in 1972, the FAA has installed many innovative devices and techniques. This is your opportunity to learn about them.

Reservations are necessary. Call Jim Welch, (415) 7400 x 5231.

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IEEE CALENDAR

CIRCUITS & SYSTEMS
JAN. 7
See Page 7
ADVANCES OF INTEGRATED INJECTION LOGIC (I^2L) TECHNOLOGY
Dr. Alan Grebene, VA Engineering, EXAR Integrated Systems, Inc.

(Wednesday) 8:00 p.m., Lockheed Auditorium, Bldg. 202 Lobby, 3251 Hanover St., Palo Alto (across from Hewlett-Packard). No dinner.

ANTENNAS & PROPAGATION
JAN. 8
See Page 7
SPATIAL FILTERING APERTURES AND REMOTE PROBING APPLICATIONS
Alan T. Waterman, Jr., Radio Sciences Lab, Stanford

(Thursday) 8:30 p.m., Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto. Cocktails at 5:30 and dinner at 6:15 p.m., Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. No reservations required.

MAGNETICS
JAN. 8
See Page 11
PANEL DISCUSSION: CONFERENCE ON MAGNETISM AND MAGNETIC MATERIALS held in Philadelphia, Dec. 9 - 12

(Thursday) 7:30 p.m., Hewlett-Packard Auditorium, 5301 Stevens Creek Blvd., Santa Clara. No dinner.

COMMUNICATIONS & INFORMATION THEORY
JAN. 13
See Page 11
JOINT MEETING AN EXPERIMENTAL PACKET RADIO NETWORK
Dr. Stanley C. Fralick, Pres., Binary Corp.

(Tuesday) 8:30 p.m., SRI Conference Room B, Bldg. 1, 333 Ravenswood Ave., Menlo Park. Dinner 6:00 p.m., Golden Acorn, 1120 Crane, Menlo Park. Reservations; Mrs. Susan Detro, (415) 592-4120, x 278 before Jan. 13. Cost of dinner $5 - $7.

ELECTRON DEVICES
JAN. 13
See Page 11
DEVICES FOR AUTOMOTIVE ELECTRONICS
David Long, National Semiconductor

(Tuesday) 8:00 p.m., Rickey's Hyatt House, N. Patio Room, 4219 El Camino Real, Palo Alto. Cocktails at 6 and dinner at 7 p.m. Cost of dinner $6.50. Reservations Council Office (415) 327-6622

POWER ENGINEERING SOCIETY
JAN. 13
See Page 11
GAS TURBINES, UTILIZATION IN THE ELECTRIC POWER INDUSTRY
Richard B. Meyers, PG&E Co.

(Tuesday) 12:00 NOON, PG&E Cafeteria (3rd floor), 77 Beale St., SF. Luncheon at 11:30 a.m., (bring your own lunch or buy lunch at the cafeteria). Reservations: Carol Franke, 781-4211 x 1442.

COMPUTER SOCIETY
JAN. 14
See Page 7
PORTABLE, HIGH LEVEL LANGUAGE COMPUTER: THE IBM 5100
A presentation

(Wednesday) 8:00 p.m. University of Santa Clara Daly Science Bldg. Room 207. Dinner at 6:15 p.m. Mariani's Restaurant, 2500 El Camino, Santa Clara. Reservations; (415) 327-6622.

AEROSPACE & ELECTRONICS SYSTEMS
JAN. 15
See Page 11
TOUR of FAA ARTCC

(Thursday) 8:00 p.m., FAA Air Route Traffic Control Center, 5125 Central Ave., Fremont. Registration: Jim Welch (415) 494-7400 x 5231.

SANTA CLARA VALLEY PAC
JAN. 19
See Page 2
General business meeting and working session of the Santa Clara Valley Section Professional Activities Committee. See PAC column for details.

(Monday) 7:30 p.m., ISS, Bldg. 2 (south entrance) 10435 N. Tantau, Cupertino. No reservations required.

OAKLAND-EAST BAY SECTION
See Page 5
CURRENT AND FUTURE DIRECTIONS for ENGINEERING REGISTRATION IN CALIFORNIA
JAN. 20
Donald R. Wright and Dr. Charles Nelson, Board of registration.

(Tuesday) 8:00 p.m., PG&E Engineering Research Center, San Ramon. Dinner: 6:00 p.m., Brass Door Restaurant, San Ramon Valley Blvd., San Ramon. Reservations for dinner are required by Jan. 16: Terry Rossow, (415) 447-1100 x 4784.

SAN FRANCISCO SECTION
JAN. 21
See Page 4
TOUR OF NEW PACIFIC TELEPHONE SWITCHING CENTER,
San Francisco. Charles Ostrofe, Pacific Telephone.

(Wednesday) 6:00 p.m., PTT, 611 Folsom St., S.F. Reservations: Jaye Choy, (415) 542-7739.

RELIABILITY
JAN. 21
COMPONENT LEVEL SCREENING FOR RELIABILITY
Gene Hnatek, DCA Reliability Labs.

(Wednesday) 8:00 p.m., Physics 101, Physics Lecture Hall, Stanford. Dinner; 6:00 p.m. Stickney's, El Camino & Embarcadero, Palo Alto. reservations: Council office (415) 327-6622

ENGINEERING IN MEDICINE & BIOLOGY (OAKLAND-EAST BAY)
JAN. 22
See Page 3
EDUCATING ENGINEERS IN BIOMEDICAL ENGINEERING FOR A BETTER TOMORROW
Dr. S.P. Chaudhuri, Control Systems Engineer, Bechtel Corp.

(Thursday) 7:00 p.m., Art's Buffet, 4031 Broadway, Oakland. Dinner: 6:15 p.m. Reservations for dinner and/or meeting: Mrs. Leora Sharp, 835-8500 x 312.

ENGINEERING IN MEDICINE & BIOLOGY (SANTA CLARA VALLEY)
JAN. 22
See Page 7
PROBLEMS AND PROGRESS IN FETAL MONITORING
Svein B. Rasmussen, Berkeley Bio-Engineering, Inc.

(Thursday) 8:00 p.m. Please call the Council office (415) 327-6622 for location and reservations. (It will be in the Hayward area).

INDUSTRY APPLICATIONS
JAN. 27
See Page 7
TOUR OF NEW STANDARD OIL BLDG. at 575 Market St., SF
Dennis Gruszynski, Johnson Controls, Inc.

(Tuesday) 4:15 p.m. Meet at Standard Oil Bldg., 555 Market St., SF. Dinner: 6:00 p.m., Iron Duke Restaurant, 132 Bush St., SF Reservations Bill Kononetz.
(415) 768-2320. Cost of dinner $7.00. Tour limited to 40 persons.

MICROWAVE THEORY & TECHNIQUES
JAN. 29
See Page 11
THE DEVELOPMENT OF MODERN AUTOMATIC SYSTEMS FOR THE MEASUREMENT OF NETWORK PARAMETERS
Dr. Robert Beatty (The 1975 MTT-S National Lecture).

(Thursday) 8:00 p.m., Hewlett-Packard 5M Auditorium (Bldg. 5), 1501 Page Mill Road, Palo Alto. Cocktails and dinner 6:00 p.m. at Rickey's Hyatt House, 4219 El Camino, Palo Alto, Reservations: Don Chambers, 493-1501 by Jan. 27th.

ANTENNAS & PROPAGATION SOCIETY
FEB. 21
See Page 9
ONE-DAY LECTURE SERIES: PRINCIPLES OF RADAR, PART II
See story for names of speakers and topics, and registration form

(Saturday) 9:00 a.m. to 4:00 p.m., SRI, Building 44, Main Conference Room, Laurel St., Menlo Park. Information and registration: Dr. Tom Wang, SRI, Building 44, Laurel St., Menlo Park.