

## EDITOR'S PROFILE of this issue

*from a historical perspective ...*

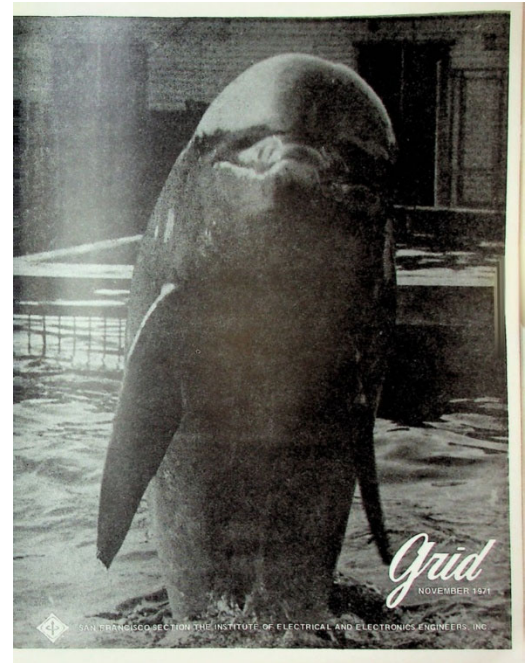
with Paul Wesling, SF Bay Area Council GRID editor (2004-2014)

November, 1971:

Cover: The photo is of a dolphin used for echolocation evaluations.

More on page 3.

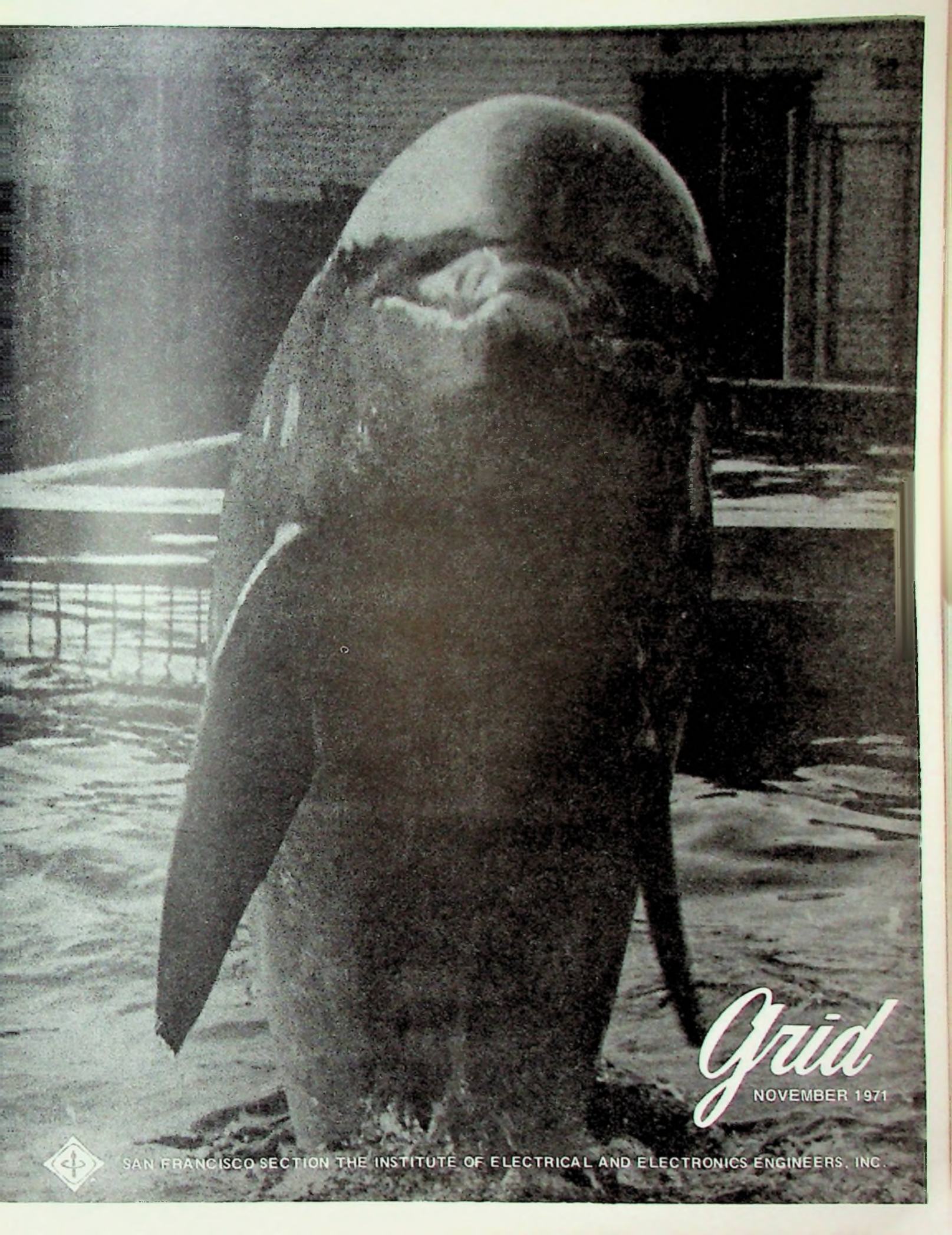
Page 8: William Shockley gives a talk in a joint meeting with the French Engineers of the US group on the topic of a relationship between genetics and IQ, based on a study of 122 pairs of identical twins raised separately.



Archive of available SF Bay Area GRID Magazines is at this location:

[https://ethw.org/IEEE\\_San\\_Francisco\\_Bay\\_Area\\_Council\\_History](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](mailto:p.wesling@ieee.org)



*Grid*  
NOVEMBER 1971



SAN FRANCISCO SECTION THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

November 1971

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## THE COVER STORY

Photo of dolphin used in experimental measurement of animal echolocation signal, courtesy of W. G. Evans of the Naval Research and Development Center, San Diego.

## THE EDITOR'S CORNER

Thank you again for efforts to find good cover pictures for the GRID, and the concise stories you are presenting. Cover photos should be 8 x 10, in the vertical position if possible (but not essential). Remember - no GRID issue for December, but your information for the January issue should be at the IEEE office on or before November 30.

# MEETING CALENDAR

**AEROSPACE & ELECTRONICS SYSTEMS**  
NOV. 18

Story on  
page 4

**LOW LIGHT LEVEL TELEVISION SYSTEMS.** Joseph Suarez, Mgr., Electro Optics Engineering, Dalmo Victor Co., Belmont.

NOV. 18, Thursday, 8:00 PM, Philco Ford Auditorium, Bldg. 56, 3825 Fabian Way, Palo Alto. Dinner: 6:15 PM, Rickey's Hyatt House, 4219 El Camino, Palo Alto, Reservations: Pat Hoppe, (415) 326-4350 x 6143 by Nov. 16th.

**ANTENNAS & PROPAGATION**  
NOV. 11

Story on  
page 7

**STANFORD'S NEW 20 ARC SECOND APERTURE SYNTHESIS RADIO TELESCOPE.** Larry R. D'Addario, Radio Astronomy Institute, Stanford University.

NOV. 11, Thursday, 8:00 PM, Lockheed Research Lab Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto. Cocktails: 5:30 PM; dinner: 6:15 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. No reservations.

**AUTOMATIC CONTROL**  
NOV. 16

Story on  
page 4

**ATMOSPHERIC MODEL SYSTEM FOR AIR POLLUTION CONTROL IN SF BAY BASIN.** Dr. J. Y. Wang, Prof. in Environmental Sciences, San Jose State College.

NOV. 16, Tuesday, 8:00 PM, Lockheed Auditorium, Bldg. 202, 3251 Hanover St., Palo Alto. Dinner: 6:15 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. No reservations.

**CIRCUIT THEORY**  
NOV. 20

Story on  
page 6

**SHORT COURSE ON ACTIVE FILTER THEORY AND PRACTICE.** 6 lectures. See story for details.

NOV. 20, SLAC cafeteria. \$15 for IEEE members, \$10 for student members and \$25 for non-members. Fee includes lunch. For information: A. B. Grenbene, EXAR Integrated Systems, 733 N. Pastoria Ave., Sunnyvale 94086; (408) 732-7970.

**COMMUNICATION TECHNOLOGY**

Story on  
page 8

**TOUR - PREVIEW OF LATEST IN TELEPHONE OPERATOR CONSOLES AND SERVICE (TSPS).** Ladies Welcome.

NOV. 16, Tuesday, 8:00 PM, Pacific Telephone, San Jose. Corner Saratoga and Atherton Aves., San Jose (adjacent to Westgate Shopping Center). Dinner: 6:30 PM, Renzo's Continental Restaurant, 1700 W. Campbell Ave., Campbell. Reservations: Ed Carr (415) 399-5550 or Bob Howland (408) 291-4033 by Nov. 12th.

**ELECTROMAGNETIC COMPATIBILITY**  
NOV. 15

**GROUNDING REQUIREMENTS PRACTICES AND PROCEDURES FOR FACILITIES AND GROUND EQUIPMENT.** Speaker to be announced.

NOV. 15, Monday, 8:00 PM, Hewlett-Packard Auditorium, 5301 Stevens Creek Blvd Santa Clara. Dinner: Custom House, 20060 Stevens Creek Blvd., Cupertino. No reservations.

**ELECTRON DEVICES**  
NOV. 9

Story on  
page 4

**LASER MICROMACHINING FOR ELECTRONICS.** M. W. Dole, Coherent Radiation, Palo Alto.

NOV. 9, Tuesday, 8:00 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. Cocktails: 6:00 PM; dinner: 7:00 PM. Reservations: Section office (415) 327-6622.

**ENGINEERING MANAGEMENT/RELIABILITY**  
NOV. 17

Story on  
page 5

**JOINT MEETING. PRODUCT SAFETY AND THE POLITICAL ARENA.** H. Baron Whitaker, President, Underwriters Lab, Inc., Chicago, Ill.

NOV. 17, Wednesday, 8:00 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. Cocktails: 6:00 PM; dinner: 6:30 PM. Reservations: Sue Mendell (415) 321-2300 x 3619 by Nov. 15th.

**ENGINEERING IN MEDICINE & BIOLOGY**  
NOV. 16

**THE APPLICATIONS OF ULTRASOUND IN CLINICAL MEDICINE.** Thomas Davis, M. D., Smith Kline Instruments, Palo Alto.

NOV. 16, Tuesday, 8:00 PM, Stanford University Medical School, Room M 114. Dinner: 6:00 PM, Red Cottage, 1706 El Camino, Menlo Park. Reservations: Bob Silligman (415) 493-3400 by Nov. 15th.

**GOLDEN GATE SUBSECTION**  
NOV. 17

Story on  
page 7

**POWER GENERATING SUBSTATIONS FOR DEEP SPACE INSTRUMENTATION.** Carl Geib, Director of Engineering, Holt Bros. Energy Division.

NOV. 17, Wednesday, 12 Noon, Leopard Cafe, 140 Front Street, San Francisco. Luncheon Meeting. Guests are invited. Reservations: In San Francisco Martin McLaren 764-5294 and on the Peninsula Jack Shulman 327-8919.

**INDUSTRIAL ELECTRONICS & CONTROL INSTRUMENTATION**  
NOV. 17

Story on  
page 5

**A MANUFACTURING INFORMATION SYSTEM.** Lee R. Lett, IBM Corp.

NOV. 17, Wednesday, 7:45 PM, Rickey's Hyatt House, 4219 El Camino, Palo Alto. Cocktails: 6:15 PM; dinner: 6:45 PM. Reservations: Fran Casalino (408) 289-2365 by Nov. 16th.

# MEETING CALENDAR

## THE COVER STORY

### ANIMAL ECHOLOCATION SIGNALS AS OPTIMUM WAVEFORMS

The study of the echolocation used by many biological species has been approached in several ways, most frequently by biological studies and sophisticated experimentation. The approach used here is an application of communication theory to the study of animal echolocation; in particular, the echolocation of the California Sea Lion, the Bottlenose Dolphin and several bat species. The approach is based on the premise that some animals have evolved forms of correlation processing. The premise is then tested by examination of the echolocation signals themselves and by comparison with theoretical signals that possess optimum doppler tolerance and resolution, and acceleration tolerance properties. For people that have more faith in the works of nature than in the schemes of men, the resemblance between derived and measured signals offers impressive confirmation of well established communications theoretic concepts.

Richard Altes received his BEE and MEE degrees from Cornell University, an MS in biomedical engineering and Ph.D. from the University of Rochester. His papers on this subject have appeared in *J. Acous. Soc. Amer.* and *Science*. He is employed by Electromagnetic Systems Laboratories in Sunnyvale.

Harry Shaver received his B. S. and M. S. degrees in electrical engineering from the University of Arizona and the degree of Engineer from Stanford University. In 1964 he joined Stanford Research Institute. He has published a paper about animal echolocation in *J. Acous. Soc. America*, and is actively working in the areas of Communications System Analysis and Signal Processing.

### DISPLAY DEVICE TUTORIAL

#### LAST THREE CLASSES

See the September and October issues of the GRID for comprehensive details of this exciting course. Note in this month's Calendar that the speakers for all sessions have been announced.

SANTA CLARA VALLEY SUBSECTION/ STUDENT BRANCHES NOV. 10

Story on page 4

JOINT MEETING WITH STUDENT BRANCHES OF SAN JOSE STATE, STANFORD UNIVERSITY AND UNIVERSITY OF SANTA CLARA. OP AMP TRICKS AND TRAPS. Marvin Vander Kooi, Natl. Semiconductor.

NOV. 10, Wednesday, 8:00 PM, San Jose State College Union, 211 S. 9th St., San Jose. Park at the north parking garage, 10th and San Fernando Sts. See map. (25¢ for exit). Sponsored by San Jose Student Branch with SCVSS. No dinner. Coffee and donuts.

INDUSTRY & GENERAL APPLICATIONS NOV. 23

Story on page 6

HEATING DE-ENERGIZED MOTORS WITH SOLID-STATE COMPONENTS - A NEW CONCEPT. Moon H. Yuen, assistant Chief Electrical Engineer, Bechtel Corp., Refinery Div., San Francisco.

NOV. 23, Tuesday, 7:30 PM, Marconi's Restaurant, 122 Battery St., San Francisco. Cocktails: 6:00 PM; dinner: 6:30 PM. Reservations: E. J. Bubb, (415) 781-1177 by Nov. 22nd.

INFORMATION THEORY/ COMMUNICATION TECHNOLOGY NOV. 18

Story on page 3

JOINT MEETING. ANIMAL ECHOLOCATION SIGNALS AS OPTIMUM WAVEFORMS. Dr. Richard Altes, Sr. Staff Member, ESL Inc. and Harry Shaver, Sr. Research Engineer, SRI, Menlo Park.

NOV. 18, Thursday, 8:30 PM, SRI Bldg. 1, 333 Ravenswood Ave., Menlo Park. Dinner: 6:00 PM, Mings, 1700 Embarcadero Road, Palo Alto. Reservations: Paul Shaft, (408) 734-2244 x 342 by Nov. 17th.

INSTRUMENTATION MEASUREMENT DEC. 13

Story on page 7

MICROWAVE ANALYSIS AND DESIGN WITH A PROGRAMMABLE CALCULATOR. Stephen F. Adams, Chief Microwave Engineer, Hewlett-Packard Co.

DEC. 13, Monday, 8:00 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. Dinner: 6:30 PM. Reservations: Sunnie Marr, (408) 742-6868 by Dec. 12th.

MICROWAVE THEORY & TECHNIQUES NOV. 17

Story on page 5

APPLICATIONS OF SOLID STATE MICROWAVE POWER SOURCES. Carl Blake, Massachusetts Inst. of Tech. Lexington, Mass.

NOV. 17, Wednesday 8:00 PM, SRI Bldg. 44, entrance off Laurel St., Menlo Park. Dinner 6:00 PM, Rickey's Hyatt House, Palo Alto \$6.00. Reservations Dianna Tseu (415) 326-6200, x 3903.

MICROWAVE THEORY & TECHNIQUES DEC. 16

Story on page 7

IMPATT DIODE APPLICATIONS. Neil Corpron, Hewlett-Packard, Palo Alto.

DEC. 16th, Thursday, 8:00 PM, Hewlett-Packard Auditorium, Palo Alto. No dinner.

NUCLEAR SCIENCE/ FRENCH ENGINEERS OF THE U.S. INC NOV. 19

Story on page 8

JOINT MEETING RESEARCH TABOOS ON GENETICITY OF I.Q. Dr. William Shockley, Stanford University.

NOV. 19, Friday, 8:30 PM, International Inn, 326 S. Airport Blvd., South San Francisco. Cocktails: 7:00 PM, dinner 7:30 PM. Reservations: mail check to Mrs. L. Burch, SLAC, Box 4349, Stanford, CA 94305; phone (415) 854-3300 x 2401, payable to: IEEE Nuclear Science Group.

PARTS, HYBRIDS & PACKAGING NOV. 2, 9 & 16

Story on page 3

COURSE ON DISPLAY DEVICE TECHNOLOGY. Last 3 sessions. Session 4, Nov. 2: Light Emitting Diode Display Packaging, Norman Tarowsky, Fairchild. Session 5, Nov. 9: Liquid Crystal Display, Dr. James Ferguson, Ilxco. Session 6, Nov. 16: Gas Discharge Displays, G. Holz, Burroughs, N. J.

Nov. 2, 9 & 16, Tuesdays, 7:30 to 9:30 PM, Hewlett-Packard Auditorium, 5301 Stevens Creek Blvd., Santa Clara. For information call Jeff Schlageter (415) 962-3393 or W. Littell (415) 968-9211. Also see Sept. and Oct. Grids.

POWER ENGINEERING SOCIETY/ASCE POWER DIV. NOV. 9

Story on page 4

POWER PLANT SITING IN CALIFORNIA. E. E. Hall, Dr. R. H. Brooks and J. E. Schumann, PG&E Co., San Francisco. Joint Meeting. Early Reservations recommended.

NOV. 9, Tuesday, 7:30 PM, Engineers Club of SF, 160 Sansome St., San Francisco. Cocktails: 5:30 PM; dinner 6:30 PM. Reservations: (415) 421-3184 by Nov. 8th.

SANTA CLARA VALLEY SUBSECTION DEC. 8

Story on page 5

PICTUREPHONE DEMONSTRATION AND DISCUSSION. David G. Schutt, Sr. Engineer, Customer Service Engineering, PTT.

DEC. 8, 8:00 PM, Pacific Telephone, 111 No. Market St., San Jose - Cafeteria on second floor. No dinner.

SYSTEMS, MAN & CYBERNETICS NOV. 8

Story on page 6

JOINT WITH SPECIAL INTEREST GROUP ON A.I. of ACM. Composing, Using and Executing Robot Plans. Dr. Nils J. Nilsson, Staff Scientist, Information Science Lab, SRI.

NOV. 8, Monday, 8:00 PM, Conference Room B, Bldg. 1, SRI, 333 Ravenswood Ave., Menlo Park. Dinner: 8:00 PM, Red Cottage, 1706 El Camino, Menlo Park. Reservations: Section office, (415) 327-6622 by noon, Nov. 5th.

VEHICULAR TECHNOLOGY NOV. 15

Story on page 8

VHF AND UHF FIELD INTENSITY SURVRY PROCEDURES AND EVALUATION OF PAGING SIGNAL PENETRATION INTO BUILDINGS. R. A. Isberg, P.E., Consulting Communications Engineer.

NOV. 15, Monday, 8:00 PM, Shadows Restaurant, 213 - 2nd Ave., San Mateo. Social hour: 6:00 PM, dinner 7:00 PM. Reservations: Ben Wright (415) 588-5315 by Nov. 12th.

## POWER PLANT SITING

Nearly everyone is aware of the controversy on selecting sites for power generating facilities. The people of California are especially active in this often emotional subject.

We are fortunate to have three members of Pacific Gas & Electric Company talk to us about numerous factors involved in selecting a site for a power plant, nuclear or fossil. All three speakers are well qualified on various aspects of the complex subject. Each will make a short presentation and then all will be available as a panel for further discussions.

The presentation will cover some of the many investigations and studies which are made for site selection, including those on geology, seismology, meteorology, oceanography, land use and environmental effects, as well as some of the processes involved with site approval, and also some of the proposals being considered for solving the problems of site selection.

The speakers will be: Elmer E. Hall, Chief Siting Engineer, Department of Planning and Research, P.G. and E. with responsibilities for siting of new thermal plants, power contracts, and Federal Power Commission licensing; Dr. Ralph H. Brooks, Supervisor of Environmental Quality, Department of Environmental Quality, P.G. and E., and James E. Schumann, Supervising Civil Engineer, Department of Planning and Research, P.G. and E.

## AUTOMATIC CONTROL

### "LOOKS" AT AIR POLLUTION

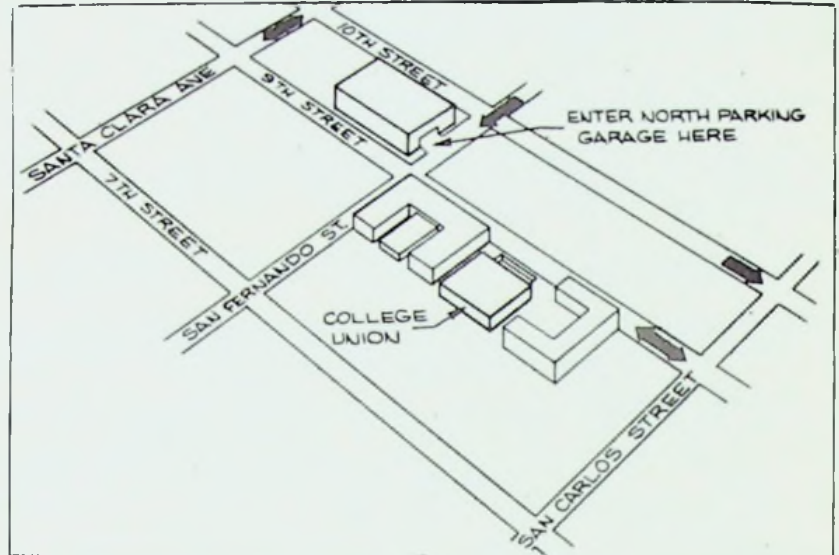
At the Automatic Control Chapter meeting on Nov. 16th, Dr. J. Y. Wang will give a review of the atmospheric model of the San Francisco Bay area. A monitoring system for both background and pollution information will be employed for the effective management of air pollution control.

Dr. Wang is a professor in Environmental Sciences at San Jose College. He is a staff member of National Academy of Science and consultant to World Meteorological Organization (WMO). He has over 100 articles and a dozen books published in the area of instrumentation, meteorology and environmental sciences. See Calendar for details.

## SCVSS MEETS WITH THREE STUDENT BRANCHES

### "OP AMP TRICKS AND TRAPS"

An informal lecture by Marvin Vander Kooi of National Semiconductor Corporation. He will discuss operational amplifier fundamentals, usage techniques and common application pitfalls. Question and answer session, coffee and donuts.



### ED - GROUP

### LASER MICROMACHINING

The first and possibly still the most cost effective industrial uses of the laser were micromachining applications in the electronics industry. This important subject will be discussed by M. W. Dowley, Coherent Radiation, Palo Alto.

Following a brief review of the important laser parameters and design features relative to micromachining, a number of specific areas of laser machining will be examined. Both present technology and possible future technology will be covered. The lasers most useful to date have been the CW and Q-switched YAG laser and the Q-switched and electrically pulsed CO<sub>2</sub> laser. Examples of the uses of both these laser types will be presented.

Mr. Dowley received his Bachelor's degree from University College, Dublin, Ireland, his Master's and Doctorate from the University of Toronto in 1959. His experience since 1961 has been with IBM Research Laboratories, San Jose; Spectra Physics, Inc., Mountain View; and since 1968 with Coherent Radiation, Palo Alto.

### A - ES - LOW LIGHT LEVEL

### TELEVISION SYSTEMS

Mr. Joseph Suarez, Manager of the Electro Optics Engineering Department at Dalmo Victor Company, will discuss the advances and applications of low light level television (LLTV) at the November meeting of the Aerospace and Electronic Systems Group.

LLTV provides a new means of sensing and imaging under extremely low energy conditions which can use natural illumination or be aided by covert illumination sources. Use of low light level television in conjunction with active methods of illumination will be reviewed both in the visible and non-visible spectrums. Gate operation similar to monopulse radar will be discussed.

Mr. Suarez received his BSEE from Clarkson College of Technology and MSEE at the University of Pittsburgh. Prior to his current position at Dalmo Victor he held other engineering management positions in with the development of automatic test equipment, data acquisition, and flight simulation and control systems.

## INFORMATION SYSTEM



An information collecting/storage/retrieval computer was installed in a batch oriented manufacturing process to help alleviate many of the problems which are ever present in such a process. It is built around a pyramidal data base in which real time accesses are made using CRT terminals. Traceability is inherent throughout the data, providing one to access any piece of the data pyramid from the most basic data on up to the managerial summaries (i.e., cost performances, schedules, etc.). This provides communication between the Manufacturing people, Management, and Engineering which in turn has provided "feedback control" not unlike that used in the continuous oriented processes (i.e., Petrochemical

Lee R. Leth, a Senior Associate Engineer who graduated from the University of Washington, has been working in the IBM manufacturing area for the last five years. Leth has been the primary link between the programming staff and the user by establishing and defining the needs of the users.

## POWER SOURCES



Solid-state devices currently available in industrial and university laboratories are capable of generating and/or amplifying energy throughout the microwave spectrum. Early indications are that these devices can be manufactured reproducibly at costs comparable to current microwave devices such as varactors and PIN switching diodes. With time and ingenuity, availability of low cost, highly reliable, solid-state, microwave power devices will lead to new applications and a broader base for the microwave industry.

This paper reviews the status of three generic, solid-state, microwave power generating devices. Practical and fundamental performance limitations will be discussed. The extent of current applications and the outlook for new ones will be discussed.

Mr. Carl Blake is the Leader of the Phased Array Radars Group at the M.I.T. Lincoln Laboratory, which he joined in 1957. Mr. Blake received his B.S. and M.S. from M.I.T.

## UNDERWRITERS PRESIDENT



H. Baron Whitaker, President of Underwriters' Laboratories, Inc., will speak on Product Safety and the Political Arena at the November meeting of the Engineering Management and the Reliability Groups. Mr. Whitaker has been President of Underwriters' since 1964. He was appointed to the President's National Commission on Fire Prevention and Control and is a member of the National Bureau of Standards' Committee on Laboratory Evaluation and Accreditation.

The 77 years experience of UL in the safety testing and evaluation of consumer, commercial and industrial products convinces UL that careful consideration should be given in legislative efforts to maintain that delicate balance which permits consumers to enjoy the benefit of our technology, while at the same time, not being subject to unreasonable risks of personal injury.

Unless one is rather intimately involved in product safety he might readily assume that because the Federal Government has only limited involvement in this area, that the American consumer is completely naked in so far as protection against products that present a reasonable risk of injury. Such is far from the truth. Some of the forces influencing product safety are regulatory powers granted the states, codes of local municipality, the modern common law, industry self regulation accomplished through independent third party certification. Such as UL, the costs associated with product liability insurance and the publicity associated with product recall procedures.

SCVSS TO SEE PICTUREPHONE

Picturephone, one of the latest Bell System developments, is starting to make its appearance in California. At the present time it is principally being offered as an office intercommunication system. Later on it will be offered as a local exchange service. Some of the principal operating fea-

tures and the underlying technical principal will be discussed along with a demonstration as part of the December 8th meeting of the Santa Clara Valley Subsection. The presentation will be given by Mr. David G. Schutt, Senior Engineer at the Pacific Telephone Co. See Calendar for details.

## COMPOSING, USING AND EXECUTING ROBOT PLANS



SRI is developing problem-solving and executive systems to control a robot. Features of these systems include:

### Problem-Solving or Planning

The system can automatically synthesize appropriate sequences of basic actions to accomplish complex tasks. These are called sequence plans.

### Learning or Bootstrapping

Plans can be saved in generalized form so that they can be used as components of more complex plans to accomplish more difficult tasks.

### Monitoring the Execution of Plans

Once a plan is generated, the system can execute it and monitor the effects of robot actions to see that plans are proceeding appropriately.

Dr. Nils J. Nillson received his M.S. (1956) and Ph.D. (1958) at Stanford University. He is the author of many technical papers, and two published books. He is Staff Scientist, Information Science Laboratory, Information Science and Engineering Division, at SRI.



## IEEE SHORT COURSE ON ACTIVE FILTERS

A one-day short course on ACTIVE INDUCTORLESS FILTERS: THEORY AND PRACTICE will be offered on November 20, 1971 at the main auditorium, Stanford Linear Accelerator Center, 2505 Sand Hill Road, Palo Alto, California. This course is being presented by the San Francisco Chapter of the IEEE Circuit Theory Group and the IEEE Educational Activities Board. The purpose of this course is to familiarize the practicing electronics engineer with the design and applications of state-of-the-art active inductorless filters.

Six lectures are scheduled for this course. Dr. S. K. Mitra, UC Davis, is the organizer of this course and will present an overview of the active filters area. He has authored numerous papers in active and passive networks, and Analysis and Synthesis of Linear Active Networks (Wiley). He is the editor of Active Inductorless Filters (IEEE Press).

Mr. D. C. Huey, M.S. Oregon State University, and a doctoral candidate at UC Davis, will lecture on sensitivity aspects of active filters.

Active filter design using voltage amplifiers will be presented by Professor L. P. Huelsman, Ph.D. UC Berkeley, 1960. Since then he has been Professor of Electrical Engineering at the University of Arizona.

Professor L. T. Bruton, the Univer-

sity of Calgary, will discuss generalized-immittance-converters and their applications to active filter design.

LC Filter Simulation techniques will be discussed by Dr. D. F. Sheahan of Lenkurt Electric Company, San Carlos. Dr. Sheahan received his Ph.D. from Stanford University in 1968.

Microelectronic fabrication of active filters will be discussed by Dr. J. Berger. Dr. Berger received his Ph.D. degree from the Institute of Radio Engineering and Electronics, Czechoslovak Academy of Sciences, Prague, and is now with the Department of Electrical Engineering, Stanford University, Stanford, California.

The fee for this course is \$15.00 for IEEE regular members, \$10.00 for student members and \$25.00 for non-members. The fee also includes the cost of text for this course and lunch at SLAC cafeteria. The enrollment for this course is limited. Therefore, persons interested in taking this course are urged to enroll early by completing and mailing the registration form provided. To ensure enrollment, completed registration forms must be received before November 10, 1971. For additional information concerning this program, write or call: Dr. A. B. Grebene, EXAR Integrated Systems, Inc., 733 North Pastoria Ave., Sunnyvale, California, 94086, (408) 732-7970.

## IGA TO DISCUSS HEATING DE-ENERGIZED MOTORS WITH SOLID STATE COMPONENTS

Mr. Yuen, Assistant Chief Electrical Engineer for Bechtel Refinery Division in San Francisco, will review the problems involved in the heating of de-energized motor windings, and discuss the new concept of economic heating with solid state components.

Mr. Yuen is registered in five states, and teaches protective relay courses for UC Extension and Bechtel. The talk is a resume of a recent paper in which he discusses the use of solid state components vs conventional relays for this application.



## MICROWAVE CIRCUIT ANALYSIS AND DESIGN WITH A PROGRAMMABLE CALCULATOR



Many powerful design concepts exist in the field of high frequency microwave circuits. Basically two methods have been used to implement these concepts. Tedious manual calculation and plotting was the first method used. Then large scale computers were utilized.

Simple programs for a desk top calculator and plotter have been developed, which adequately satisfy the design engineer.

A few microwave analysis and design programs will be discussed and demonstrated using a programmable calculator. Simple parameter conversion, then generalized mapping functions and their applications will be shown.

Stephen F. Adam was a research and development engineer in Budapest, Hungary before he joined Hewlett-Packard Company in 1957. He received his engineering training there and holds Master's Degrees in Mechanical. He is Chief Microwave Engineer at Hewlett-Packard, and has supervised the development of wavemeters, thin-film coaxial attenuators, and coaxial switches.

He holds several patents and has others pending, mainly in the fields of transmission-line components and microwave instrumentation. He is chairman of the IEEE-GMTT Waveguide Measurements Committee, and a member of both GMTT and HFIM Standards coordinating committees and several other standardization committees.

## HIGH RESOLUTION RADIOTELESCOPE ANTENNAS



Stanford's Radio Astronomy Institute has had under construction a five element array of 60 foot paraboloids intended for use as a high resolution radiotelescope. The system is now essentially completed, and it is undergoing testing and calibration.

Operating at X-band, five elements are arranged non-uniformly along an east west line 675 feet long. The antenna positions are chosen so that their spacing include all possible multiples of the smallest spacing with minimum redundancy. Such maps are of great interest to radio astronomers in their efforts to understand the de-

tails of a wide range of phenomena, including the structure of solar flares, of the magnetic field of Jupiter, of hot gas clouds within our galaxy, and of the giant clouds of relativistic electrons which surround certain other galaxies and quasars.

The speaker, Larry R. D'Addario has been working with the Radio Astronomy Institute at Stanford University since 1969 on operation of the new telescope. He is a Ph.D. candidate in electrical engineering, having received the B.S. degree from MIT in 1968, and the MS degree from Stanford in 1969.

### GMTT - "IMPATT" DIODE APPLICATIONS

Reliable IMPATT diodes are now on the market for power levels up to 1.5 watts. Under proper bias conditions, the diode equivalent circuit is a negative resistance with associated parasitic reactances. Straightforward design techniques for oscillators and amplifiers will be discussed. Experimental results for a double tuned amplifier will be compared with theoretical predictions.

Neil H. Corpron received his B.S. in electrical engineering from Milwaukee School of Engineering in 1963. His experience includes the Microwave Department of General Dynamics/Electronics Corporation, advanced development of microwave sources and microstrip circuits at the Raytheon Corporation.

Presently, Mr. Corpron is an Applications Engineer at HP Associates, primarily concerned with step recovery diode and IMPATT devices and circuits.

### POWER SYSTEMS

#### FOR DEEP SPACE FACILITY

The Golden Gate subsection November meeting will present a discussion of the power generating system used on all NASA deep space shots.

Carl Geib, director of engineering, Holt Bros, Energy division, will discuss this subject with pictorial presentation. This firm was selected by the Jet Propulsion Laboratory to design, test and assemble an unattended automatic power system to power the 210 foot antennas utilized for these shots.

Features of the system include a total of 6,000 KW in eight individual generators that automatically sequence.

Initial installations now are being made in Australia and Spain.

This will be a luncheon meeting at Leopard Cafe, 140 Front St., San Francisco. See Calendar for details.

## NUCLEAR SCIENCE AND FRENCH ENGINEERS DISCUSS " RESEARCH TABOOS ON I.Q."

Dr. William Shockley of Stanford Uni- will address the Nuclear Science Group in a joint meeting with the French Engineers in the United States, Inc. The subject will be "Research Taboos on Geneticity of I.Q." Taboos block objective evaluation of the best estimate of IQ-geneticity: For 122 pairs of separately-reared, white identical twins genetic differences push IQ around more than four times as much as all other causes including differences in environment. Does belief that good intentions suffice - - the Apple of God's Eye Obsession - - prevent diagnosis of social sickness?

Reservations required for dinner. See Calendar for details.

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### COM TECH TO TOUR

#### PACIFIC TELEPHONE

Pacific Telephone will host the communication Technology Group on a tour of their new San Jose TSPS (for Traffic Service Position System) office. This modern building is located at Saratoga and Atherton Avenues. Floor to ceiling windows look out over the Westgate Shopping Center and the surrounding suburban neighborhood. The tour will give members and their guests a preview of the very latest in telephone operator consoles and services. Ladies are especially welcome. No reservations required for the tour which begins at 8:00 P. M.

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### VHF AND UHF FIELD INTENSITY SURVEY PROCEDURES



## BAY AREA ENGINEERING COUNCIL ESSAY PROJECT CONTEST



In order to establish rapport between engineers, students and teachers of some hundred high schools in the Bay Area, the San Francisco Bay Area Engineering Council conducts an Annual Essay/Project Contest. The basic theme for the Contest this year was "Engineering to Improve the Quality of Life" with suggested sub-categories of Transportation, Waste Disposal, City Services and Community Planning.

The student's submittals demonstrated their awareness of the necessity of reducing the impact of technical and social projects upon our environment - a matter in which the engineer is greatly concerned. Mitchell Heynick, a senior of Cubberley High School, Palo Alto, was judged first for his essay on a solution for mass transportation. Suzy Hagstrom, a Jun-

ior at Alhambra High School, Martinez, was runner-up in the essay class for her "National Plan for Garbage Disposal". In the Project Section, Jane Hazen, a Junior at Monte Vista High School, Danville, was placed first for her presentation on Low Cost Housing.

Award prizes, which include a portable TV set, a tape recorder and a typewriter, were presented to the winners at the Bay Area Engineering Council's Award Dinner.

In the accompanying photo, standing, left to right are: Mr. A. J. Birkmyer, Bechtel Corp., who handled details of the contest. Prof. of Chem. Eng. M. C. Williams, UC Berkeley, Chairman of the Career Guidance Committee. Seated, left to right, are: Suzy Hagstrom, Mitchell Heynick, and Jane Hazen.

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R. A. Isberg, Consulting Communications Engineer, will describe the methods used for making field intensity surveys of transmissions from a 454 MHz radio telephone utility base station for the VT Group. A standard mobile receiver was calibrated with reference to microvolts input to the receiver from a standard generator. A 1/4 wave whip antenna was mounted in the center of a sedan roof top so that it had essentially omnidirectional pattern. Measurements of signal strengths were made while the vehicle was in motion near numerous selected locations.

Subjective tests were simultaneously made of paging receiver performance. Paging signals did not penetrate into the interior of hospital buildings even where the signal strengths on the street were several times the 43 dbu value which is considered to be adequate for 90% reliable service. Preliminary steps have been taken to field test paging signal boosters and to amend the FCC Rules and Regulations to permit their use. Signal boosters are presently used in automobile tunnels for broadcast signals and in shadowed areas of FM broadcast stations.