EDITOR'S PROFILE of this issue

from a historical perspective …

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

February, 1968:

Cover: Radar subsystems are manufactured with surgical precision at Applied Technology's Microwave Laboratory. Details on page 19.

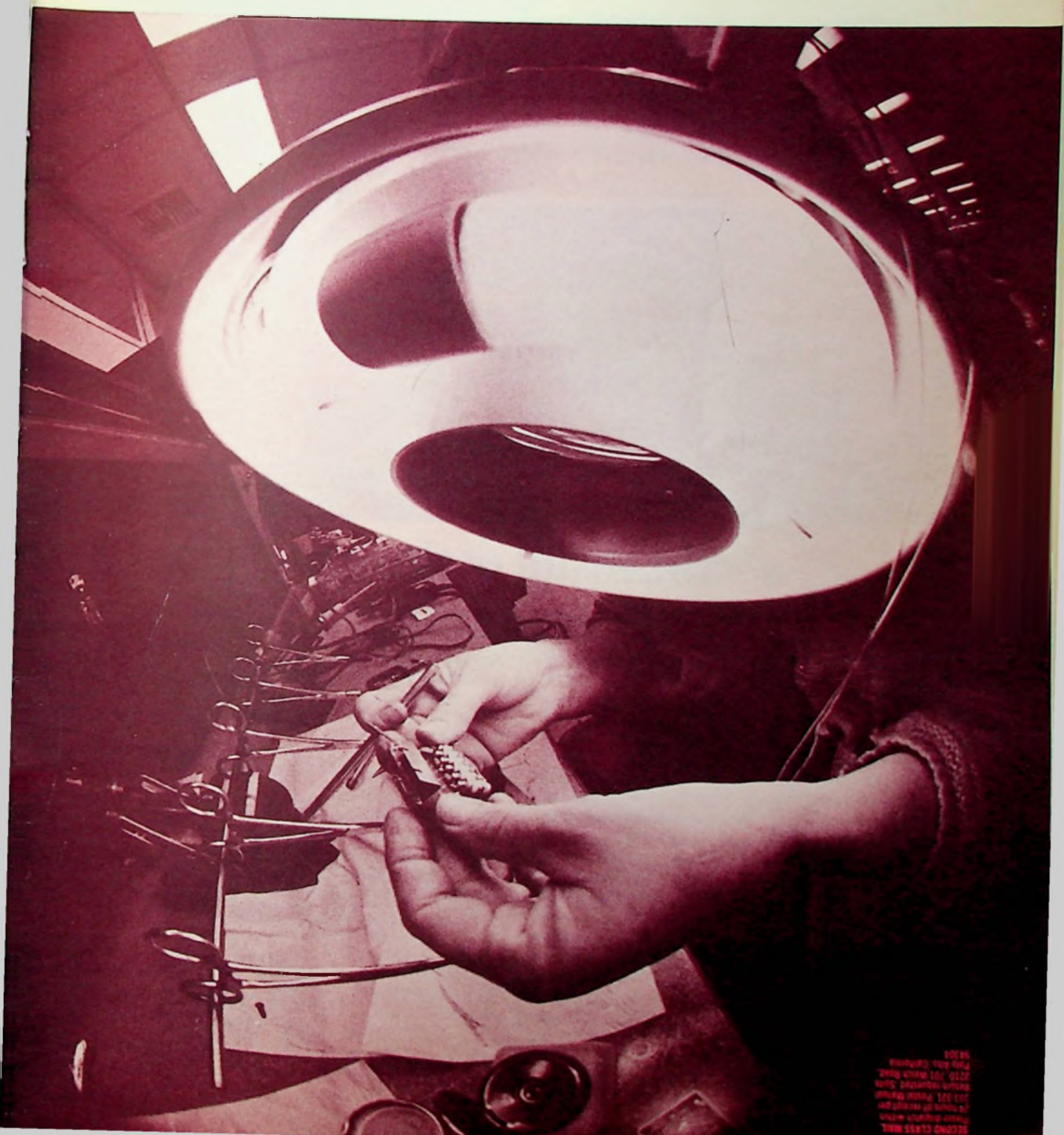
Archive of available SF Bay Area GRID Magazines is at this location:
https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History

At time of scanning, the bound volumes are held by Paul Wesling. July, 2021 Contact p.wesling@ieee.org

IEEE Grid

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

FEBRUARY 1968



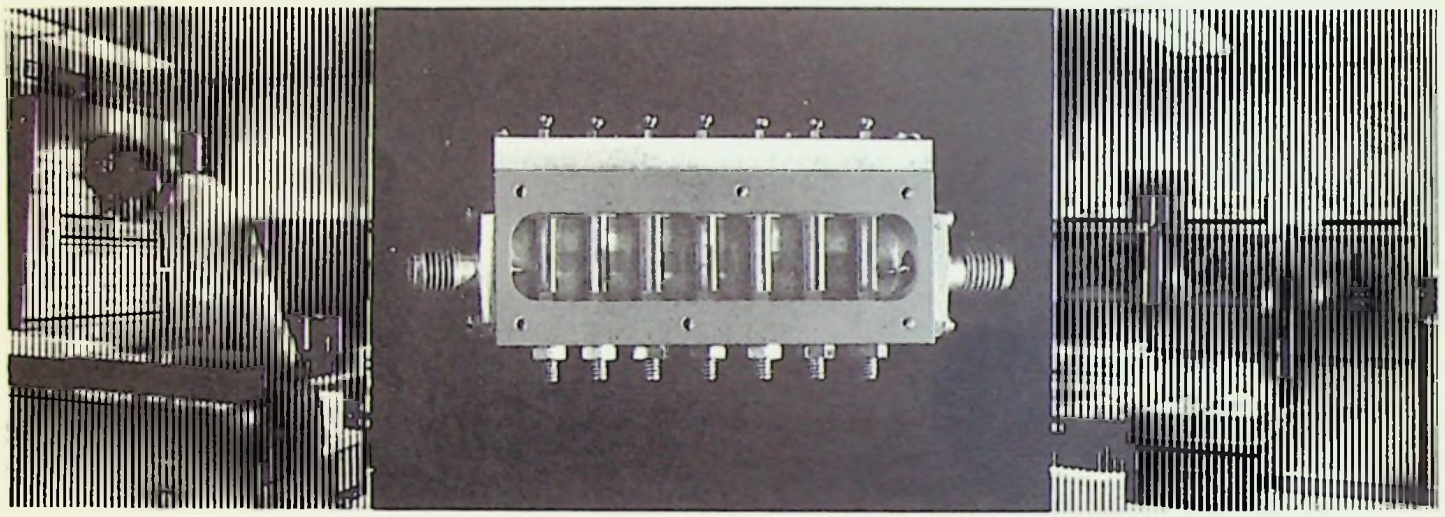
7 POLE COMB LINE FILTER 3730 - 4020

	C 0 1	C 1 2	C 2 3	C 3 4	C 4 5	C 5 6	C 6 7	C 7 8
	1.665	0.414	0.311	0.295	0.295	0.311	0.414	1.665
S/B	0.205	0.570	0.666	0.682	0.682	0.666	0.570	0.205

	C 0	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8
	5.869	3.375	4.361	4.479	4.495	4.479	4.361	3.375	5.869
D/B	0.485	0.334	0.363	0.366	0.366	0.366	0.363	0.334	0.485

ELEMENT	LUMP CAP--PF
1	4.490040E-01
2	4.490040E-01
3	4.490040E-01
4	4.490040E-01
5	4.490040E-01
6	4.490040E-01
7	4.490040E-01

4 4 P S E N D O F J O B



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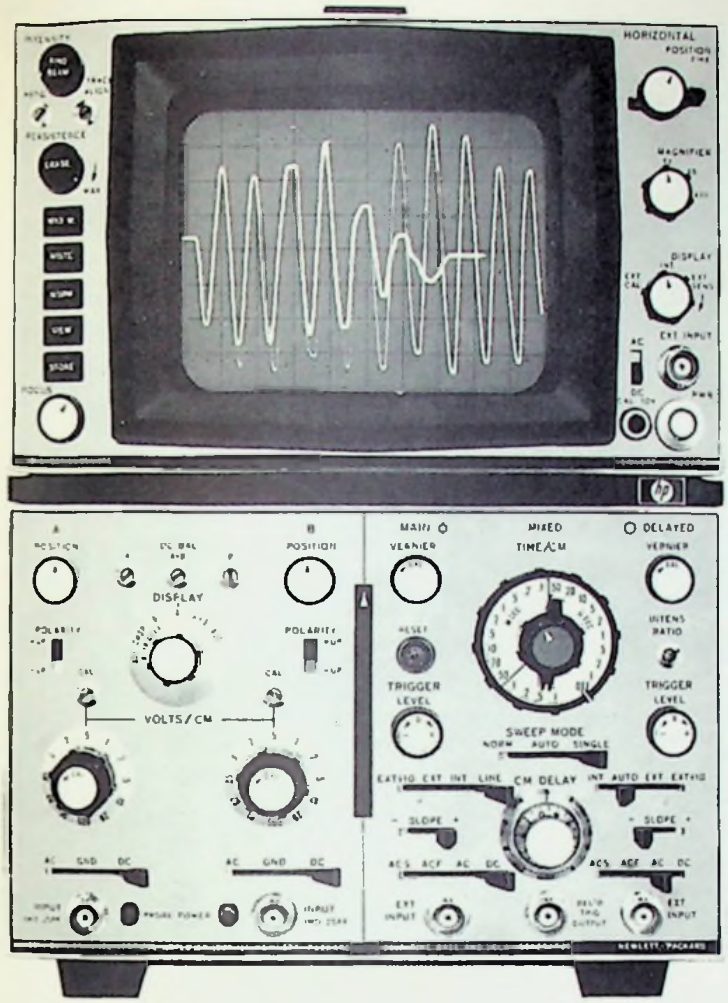

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MEETING

AEROSPACE & ELECTRONIC SYSTEMS Story on page 5

Tour of NASA/Ames Research Center space simulation facilities.

February 29, Thursday 7:30 PM, Bldg. N-210, Ames Research Center. Enter Moffett Field off Bayshore, follow sign to NASA Bldg. N-210. No dinner. Reservations for tour: Al Hastings, 742-9387 or 742-7287 by Feb. 26.

AUTOMATIC CONTROL Story on page 3

Frequency response of systems using algebraic methods. Dr. G. J. Thaler, professor of electrical engineering, USNPGS, Monterey.

February 20, Tuesday, 8 PM, Univ. of Santa Clara, Engineering Center, Room 551. Dinner: 6:30 PM, LeBoeuf (old Luccas) across from the University. Order from the menu. No reservations required.

CIRCUIT THEORY Story on page 3

Fast computation of transient response. H. J. Orchard, advanced development department, Lenkurt Electric Co.

February 21, Wednesday, 8 PM, Room 134, McCullough Bldg., Stanford Univ. Dinner: 6 PM, Red Cottage, 1706 El Camino, Menlo Park. Reservations: Red Cottage, 322-7384.

COMPUTER Story on page 5

Computer aided design. Panelists: Prof. E. J. McCluskey, Stanford Univ.; Dr. Karl Levitt, SRI; Dr. C. Hugh Mays, Fairchild R & D; Donn Parker, Control Data Corp.

February 27, Tuesday, 8 PM, Room 134, McCullough Bldg., Stanford. Dinner: 6:15 PM, Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. Reservations: (dinner) Merrilee Ressel, 321-3300 ext. 451 by noon Feb. 27. (From the menu).

EAST BAY SUBSECTION Story on page 2

Stanford Linear Accelerator progress report after one year of operation. Douglas Dupen, head, technical and public information center at SLAC.

February 26, Monday, 7:30 PM, PG&E Service Center, 4801 Oakport, Oakland. Dinner: 6 PM, Venetian Restaurant, 6701 Foothill Blvd., Oakland. Reservations: (dinner) Oakland: Ruth Emerson, 835-8500 ext. 337; San Francisco, Mary Vilter, 399-4974; San Jose; Linda Jarrett (408) 291-4567 by noon Feb. 26.

INDUSTRY & GENERAL APPLICATIONS/ AIME Story on page 4

The future for electrical applications in the mineral industry. Panelists: Leif Jacobsen, Kaiser Engineers, George Raven, Utah Construction & Mining Co., and Gordon Dickman, Bechtel Corp.

February 12, Monday, 7:30 PM, Engineers' Club of San Francisco, 160 Pine St. Cocktails 5:30 PM; dinner: 6:30 PM. Reservations: Engineers' Club, 421-3184 by noon Feb. 12.

Winograd on Information Theory and Redundant Computations

The question of how much redundancy is necessary to achieve a certain level of reliable computation will be discussed. In particular, it will be shown that if the redundancy is measured by the number of switching elements used, then a capacity-like concept can be developed for gate-type switching circuits. If the number of input leads is used to measure the redundancy then no such concept exists.

Dr. Winograd received his Ph.D. in Mathematics from N. Y. University (1967). Has been with the Automata and Computability group in IBM Research since 1961. Presently visiting the University of California at Berkeley. Main professional interests are reliability of computations and complexity of functions.

This meeting of the Information Theory Chapter will be in the main conference room at SRI. Dinner at L'Auberge at 6:15 pm, Feb. 25.

Dupen On SLAC's First Year

Douglas Dupen, head of technical and public information center at SLAC, will present a program report on the world's largest linear accelerator at the February meeting of the East Bay Subsection. SLAC was first operated in the last quarter of 1966. Several experiments have been completed. A new motion picture film describing the accelerator will be shown publicly for the first time at this meeting. The presentation and film will be followed by a question and answer session.

Mr. Dupen holds a master degree in physics and has been with SLAC ever since work began six years ago. Those people who have attended previous presentations should remember that these are very informative and enjoyable meetings. To see what's happened since then, come to the East Bay Subsection meeting on February 26th. Dinner is at 6 p.m. in the Venetian restaurant. The meeting will be at 7:30 in the PG&E Service Center. See calendar.

CALENDAR

INFORMATION THEORY Story on page 2

Information theory and reliable computation; Sam Winograd, visiting professor at University of Calif., Berkeley.

February 15, Thurs. 8:30 PM, SRI main conference room B, 333 Ravenswood Ave., Menlo Park. Dinner: 6:15 PM, L'Auberge, 4826 El Camino, Redwood City. Reservations: Mrs. Rachel Bingham, 321-3300 ext. 453 by noon Feb. 15.

MICROWAVE THEORY & TECHNIQUES/AP Story on page 4

Phased array radar systems. Carl Blake, MIT Lincoln Lab.

(JOINT WITH ANTENNAS & PROPAGATION)

February 28, Wed. 8 PM, Hewlett-Packard Auditorium, 1501 Page Mill Rd., Palo Alto. Dinner: Rick's Swiss Chalet, 4085 El Camino Way, Palo Alto. (From the menu). Reservations for dinner: Doris Juric, 966-3411 by Feb. 27.

RELIABILITY

Reliability analysis by computer methods. (Speaker to be announced).

February 15, Thurs. 8 PM, PH 104, Stanford University. Dinner: 7 PM, Stanford View Restaurant, 1921 El Camino, Palo Alto. (Order from menu). Dinner Reservations: H. Caldwell or Adeline Fako, 966-3342 by Feb. 14.

SANTA CLARA VALLEY SUBSECTION/SCV ENGINEERS COUNCIL/ SANTA CLARA COUNTY MEDICAL SOCIETY

Engineering and medicine at the edge of space. Dr. James Roman, University of Oregon Medical School.

February 22, Monday evening banquet in San Jose. At presstime final details of the location not settled. Watch for publicity in newspapers and displays in SC Co. shopping centers. Call Miss Chris Mazzeo 291-4014 for details and reservations after Feb. 1.

SYSTEMS SCIENCE & CYBERNETICS Story on page 4

Difficulty in computations. Dr. S. Winograd, University of California, Berkeley.

February 19, Monday, 8 PM, 277 Cory Hall, University of Calif., Berkeley. Dinner: 6 PM, Garden Room, Hotel Claremont, Ashby and Domingo Aves., Berkeley. Buffet—$3.75. Reservations: Margie Hensley, 324-4701 by 4 PM Feb. 16.

VEHICULAR TECHNOLOGY Story on page 5

Receiver voting in vehicular systems. Rex L. Elmore, sales manager, Moore Associates Div. Rucker Co.

February 19, Monday, 8 PM, Gold Platter Restaurant, 1000 El Camino Real, San Carlos. No host cocktails 6 PM. Dinner 6:45 PM (from the menu). Dinner reservations: Joan Black, 349-3111 ext. 220 by noon Feb. 19.

Fast Computation of Transient Response

For many years the calculation of the step and impulse response of a system from a prescribed rational frequency function was an awkward numerical operation that engineers preferred to avoid. A novel method, using state-variable techniques, was recently described by Liou; practical experience has proved it to be very fast, accurate and reliable. At the February 21 meeting of the Circuit Theory chapter H. J. Orchard will describe the method and comment on a computer program written to execute it. The session will be mainly of a tutorial nature.

Mr. Orchard received the B.Sc. and M.Sc. degrees in mathematics from London University and is presently in the Advanced Development department of Lenkurt Electric Co. in San Carlos. He is a Fellow of both the IEE and the IEEE, and for many years has been concerned with network theory and design.

The meeting will be in Room 134, McCullough Bldg., Stanford University at 8 pm. Dinner precedes the meeting at The Red Cottage at 6 pm.

Frequency Response Of Systems Using Algebraic Methods

The Automatic Control Chapter will hear Dr. G.J. Thaler on Feb. 20 at University of Santa Clara.

Summary: The usual Bode-Nichols methods for studying frequency response are normally applied to cases with only one variable parameter. Using algebraic methods relationships are obtained for the frequency response as a function of four variables including two adjustable parameters. Appropriate plots of these relationships provide analysis of system frequency response from a broad viewpoint. When the desired frequency response is specified these plots provide a means of designing the system, i.e., of choosing values for the two parameters which best satisfy requirements.

Dr. Thaler was educated at The Johns Hopkins University (BE, 1940; Dr. Eng. 1947). He has taught at Johns Hopkins; at University of Notre Dame, and is presently Professor of Electrical Engineering at the Naval Postgraduate School and Lecturer at University of Santa Clara. His professional publications include five textbooks and about fifty papers. He is also a registered Professional Engineer, a consultant to IBM (San Jose) and a Fellow of IEEE.

On the cover

Surgical hemostats and magnifiers aid intricate assembly in the Microwave Laboratory of Applied Technology, a division of Itek Corporation. The Laboratory designs and manufactures radar sub-systems. (See story on page 19.)

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Phased Array Radar Systems

Because of the great current interest in Phased Array Radar Systems, representing both an outstanding technological achievement and an integral part of our country's defense system, we are indeed fortunate in having one of the leading experts in this field to address our combined MTT and A&P groups.

The theory of electronic steering will be reviewed. Various system configurations will be described and the tradeoffs involved in system choices will be outlined. The status of phased array components, the limitations they impose on systems and a prognosis of impending developments will be presented.

Mr. Carl Blake is the Leader of the Phased Array Radars Group at the M.I.T. Lincoln Laboratory. Previous to this assignment he was engaged in low-noise receiver research and development. Mr. Blake joined Lincoln Laboratory in 1957, prior to which he was Assistant Professor of electrical engineering at the University of Maine. Mr. Blake received his B.S. and his M.S. from M.I.T. He is a member of Eta Kappa Nu and is currently Chairman of the Boston Section, G-MTT.

The meeting will be at 8:00 p.m. in the Hewlett-Packard Auditorium. Dinner: 6:30 p.m., Rick's Swiss Chalet. See Calendar.

Electrical Applications In Mineral Industry

The Industry and General Applications Group will meet with the San Francisco Section of the American Institute of Mining Engineers at 7:30 P.M. on Monday, February 12th at the Engineer's Club of San Francisco. A panel discussion will be provided by three eminently qualified IEEE members on "The Future for Electrical Applications in the Mineral Industry". Speakers will be Mr. Gordon Dickman, Supervising Engineer of Bechtel Corporation; Mr. Leif Jacobsen, Principal Design Engineer of Kaiser Engineers and Mr. George Raven, Chief Electrical Engineer of Utah Construction and Mining Company.

The meeting will be of special interest to the large group of electrical engineers in the area engaged in mineral industry work and will provide an opportunity for interchange of ideas with engineers of other disciplines in the industry. Dinner will preceed the meeting at 6:30 P.M. Dinner reservations are required and may be obtained by calling the Engineer's Club, 421-3184, by February 9th. Guests are invited.

■ The National Science Foundation reports that *U.S. research and development expenditures* are projected at $25 billion in 1968.

Time/Effort Minimums For Computations SSC Chapter, Feb. 19

The meeting will be held at 277 Cory Hall, Univ. of Calif., Berkeley on Monday, February 19 at 8:00 pm. Dinner is at 6:00 in the Garden Room, Hotel Claremont, Berkeley.

Dr. S. Winograd of the University of California at Berkeley will discuss theoretical difficulties in computation at the February 19 meeting of the Systems Science and Cybernetics chapter.

The amount of effort required to compute a given function depends on the particular algorithm used. Thus, an important basic problem is to determine the minimum amount of effort required for the computation. Dr. Winograd will summarize recent results concerning the minimum number of multiplications required to compute certain functions, as well as the minimum time required to perform addition and multiplication.

Dr. Winograd, who is currently the McKay Lecturer in the Department of Electrical Engineering and Computer Science at the University of California at Berkeley, is well known for his work with J. D. Cowan on reliable computation in the presence of noise. He received his Ph.D. from New York University in 1967.

Annual Engineers' Week Banquet To Feature James Roman, MD On Engineering And Medicine At The Edge Of Space

Dr. James Roman, M.D., will address the Annual Engineers' Week Banquet in San Jose on Thursday evening, February 22, 1968. His topic will be "Engineering and Medicine at the Edge of Space." He will discuss the medical and engineering problems encountered and solved during his term as Flight Surgeon for the X-15 Project.

This year's Banquet will be sponsored jointly by the Santa Clara Valley Engineers' Council, the Santa Clara County Medical Society and the Santa Clara Valley Subsection of IEEE. The 1968 theme for Engineers' Week is "Sliderules and Stethescopes" accentuating the increasing involvement between Engineering and Medicine.

Dr. Roman presently is in charge of Cardio Vascular Research at the University of Oregon Medical School in Portland. He is a graduate engineer as well as a medical doctor. He also is a qualified jet test pilot and formerly was the Flight Surgeon for the government's X-15 rocket plane project where he experienced the medical and engineering problems he will talk about.

Dr. David Stoddard will introduce Dr. Roman. Dr. Stoddard is now assoicated with the Palo Alto Medical Clinic. He formerly was Director of NASA's Aerospace Medical Program.

At presstime, final details for the location of the Banquet have not been settled. Because of the anticipated large attendance, it is felt that the San Jose Civic Auditorium will be needed. When the location finally is resolved, there will be publicity in the press which will include instructions on how to make reservations. There also will be displays of medical engineering projects and equipment in several Santa Clara County Shopping Centers which will include instructions for reservations. IEEE members can call Miss Chris Mazzeo, 291-4014 after February 1, 1968 and she will tell them how to make reservations and where the banquet will be held. Attendance at the banquet will be open to the public.

Aerospace and Electronic Systems To Tour NASA/AMES Research Space Simulation Facilities

The meeting will cover a description and tour of the manned aerospace simulation facilities of NASA/Ames. These facilities are used to provide, on the ground, the various cues associated with the flight of aircraft and space vehicles. Included are large machinery servo systems to impose the force or acceleration cues, the analog and digital computing equipment for mathematical modeling of the vehicle and its control system for data-taking and reduction, servo-driven color closed-circuit television systems for producing outside world visual cues, bio-instrumentation equipment, and various other devices.

The meeting will be held on *Thursday, February 29, at 7:30 PM* in *Building N-210* of the *Ames Research Center*. Enter Moffett Field via the Moffett Boulevard overpass off Bayshore and follow signs to NASA Building N-210.

The meeting will not be classified, but it is required that the names and citizenship of all attendees be submitted. It will therefore be necessary for those attending to make reservations with Mr. Al Hastings, 742-9387 or 742-7287 by Monday, February 26.

San Francisco Power Chapter Continues Education Series

The San Francisco Power Chapter will present two educational courses this spring. One course will be a repeat of the well received Protective Relaying Principles and Practices offered last fall. This course was over-enrolled last fall and the spring session has been organized to take care of those still desiring to take part. Classes will begin in the new Bechtel Building at 50 Beale St. in San Francisco on March 5.

The second course to be offered will be Power System Computer Principles and Practices. This course will deal with the types of computers used by the power industry, practical applications of short circuit, load flow, and stability programs, system dispatch, power plant control, data handling, and management information systems. The course will be offered Tuesday evenings from 6:00 to 8:00 p.m. starting February 20, 1968, at 340 Market Street, San Francisco (IBM Building).

As in the past, each class will be presented by an engineer well versed in the field being discussed. An enrollment fee of $10.00 will be charged to defray expenses. Class size will be limited by room accommodations, so please call William J. Slimak (781-4211, Ext. 2529) to inquire about enrollment.

Computer Chapter To Hold Panel Discussion On Computer Aided Design

The February 27th meeting of the Computer Chapter will feature a panel discussion on computer aided design. Particular emphasis will be placed on computer design of computer circuits, with an eye toward "bootstrapping" of successive generations of machines. The panelists are Dr. Karl Levitt, Dr. C. Hugh Mays, Professor E. J. McCluskey, Donn Parker, and S. Larry Smith. The panelists have a wide variety of experience in wire list generation, component placement, circuit layout and man-machine interaction techniques.

Dr. Mays is section manager, component aid design at Fairchild R & D Labs, Palo Alto; E. J. McCluskey is Professor of electrical engineering and computer sciences at Stanford University; Dr. Karl Levitt is research engineer in computer techniques lab at Stanford Research Institute; Donn Parker is staff consultant at Control Data Corp., Palo Alto; and S. Larry Smith is project manager, engineering automation, systems development division at IBM, San Jose.

Dinner is at 6:15 pm at Rick's Swiss Chalet. The meeting will be at 8 pm in Room 124, McCullough Building, Stanford U.

Receiver Voting In Vehicular Systems

Rex L. Elmore will address the Vehicular Technology Chapter on Receiver Voting, February 19.

This is an electronic method of comparing the relative merits of the outputs from several receivers on the same frequency, in space or frequency diversity networks. Foremost among such systems is vehicular communications.

He will discuss the earlier methods of Receiver Voting and analyze the operation of the most recent device called the Voiceband Selector. This unit selects one receiver channel solely on the basis of "as received" voice quality, and rejects the remaining receiver inputs. This insures optimum system operational efficiency.

The meeting is at 8:00, with dinner at 6:45, both at the Gold Platter, San Carlos. See calendar.

J.E. Barkle

John B. Damonte

Donald O. Pederson

L.G. Fitzsimmons, Jr.

Nominations

1968-69 PROGRAM YEAR

Nominations for section officers for the 1968-69 program year have been announced and will appear on a postcard ballot to be received by the voting membership in May.

for Chairman: J.E. Barkle

Present vice chairman and former secretary of the section, former chairman of the Power chapter, for which he also served as organizer; a senior member. Present chairman, professional education committee. B.S.E.E., Carnegie Institute of Technology, Westinghouse Electric Corp., Loggers and Mill Supply Co. Member, Edison Electric Institute, electrical systems and equipment committee, active in IEEE committee affairs, author of several technical papers on power generation, transmission and system protection, manager of electrical projects, power and industrial division, Bechtel Corp., San Francisco.

for Vice-Chairman: John B. Damonte

Section secretary, former chairman and vice chairman of the membership committee, former chairman of the Antennas & Propagation chapter, a senior member. Manager, microwave engineering department, Dalmo Victor Co., 1958-1966, formerly assistant director of research, supervisor of microwave section, research lab, and research microwave engineer. Manager, Antennas & Microwaves—electrical, at LMSC, Sunnyvale, since 1966. University of California, 1948-50 as research engineer and teaching assistant. B.S. and M.S., UC. Author and co-author of numerous papers in the antenna and microwave fields.

for Secretary: Donald O. Pederson

Section treasurer, a professor, dept. of electrical engineering, U.C., Berkeley. Received the B.S. degree in 1948, and the M.S. and Ph.D. degrees in 1949 and 1951. He was research associate at Stanford, and on the technical staff at Bell Labs, NJ. Since 1955, he has been a faculty member at U.C., Berkeley. He was a Guggenheim Fellow in 1964, is a member of Sigma Xi and Eta Kappa Nu. He is a member of the Ad Com for circuit theory, member of the Committee on Solid State Center, and has been chairman and vice-chairman of the East Bay Subsection.

for Treasurer: L.G. Fitzsimmons, Jr.

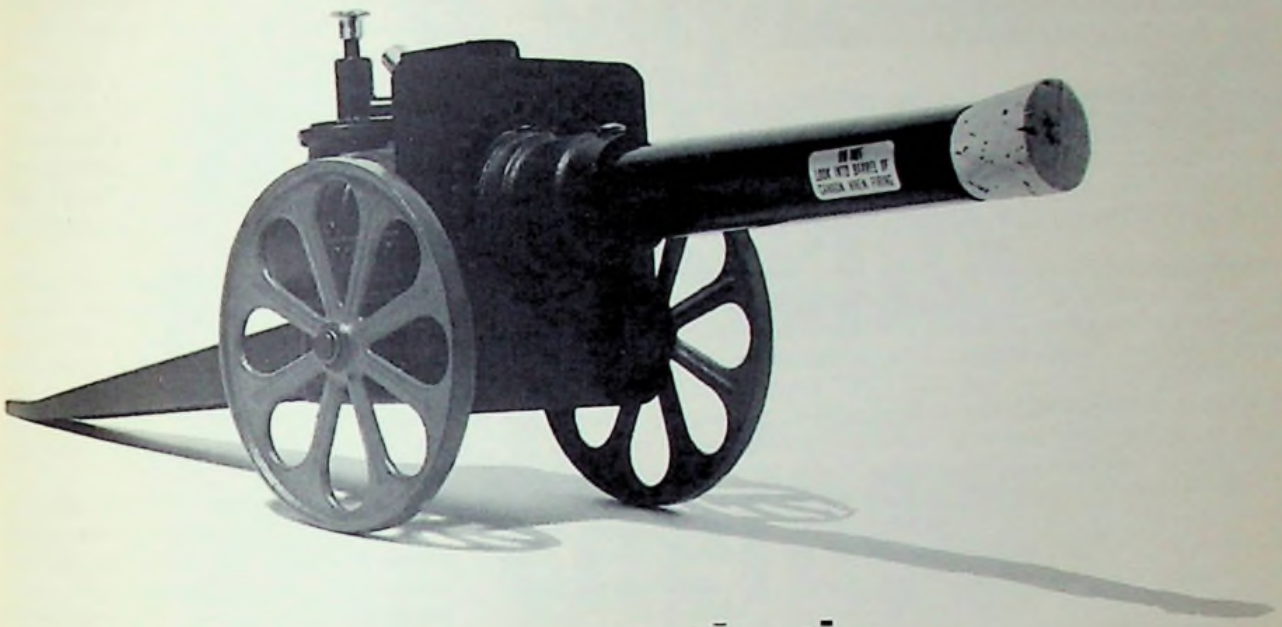
Now Chief Engineer in San Jose for Central Counties Pacific Telephone. Graduated from University of California in 1940 with B.S.E.E. Completed one-year Applied Communications course at Naval Postgraduate School, Annapolis. Eleven years with Bell Telephone Laboratories. Since 1951 with Pacific Telephone in various engineering, maintenance and staff assignments. Member of Tau Beta Pi, Eta Kappa Nu and American Society for Engineering Education. Fellow of the IEEE and present Chairman of the Section Fellows Committee. Member of the Communication Technology group and on their National Awards Committee.

for Treasurer: James J. McCann

Now Chief of the Department of Engineering Services, Pacific Gas and Electric Co., San Francisco. Previously Administrative Engineer, Office of the Vice President in charge of Engineering. He is a registered electrical engineer in California. He is a past program chairman, San Francisco Section of AIEE; a past chairman of Power Chapter, San Francisco Section IEEE; member board of directors of San Francisco Engineers' Club; now conference chairman, September 1968 Joint ASME/IEEE Power Generation Conference.

for ~~Section/Wescon~~ Director at Large Jeremy K. Schloss

Now Electronics Program/Project Leader in LMSC's Space Systems Division. Joined Lockheed in 1965 after 5 years with Boeing. Senior member of IEEE, associate fellow of AIAA, registered engineer in Washington and California. Education includes a B.S.E.E. from U.C., an M.A. in education and administration from Michigan State, and numerous post-graduate courses aimed at an eventual Ph.D. IEEE activities encompass all chairs, Seattle; Aerospace Systems Conf. Chmn.; and Meetings Chmn. for G-AES. Presently G-AES Vice-chmn. West Coast, WINCON Rep., Newsletter Associate Editor, and Ad Com member.



security systems organization

Conceive, develop, design and produce systems using electromagnetic, infrared, acoustic, seismic, optical, magnetic and other technologies to provide detection of perimeter or volume intrusions for military, government and industrial installations.

Detection and reporting movement or location of men or equipment in combat situations. Security devices and techniques to assume acoustical or visual security for rooms or buildings.

All levels of engineers are needed, BSEE required with MSEE preferred. Prefer two or more years applicable experience.

SSO Systems Engineering Analytical and experimental evaluation of new techniques and concepts/perform signal analysis, using data processing and information display techniques; translate system operational requirements into equipment specifications / write systems specifications. Plan and execute system evaluation tests.

SSO Equipment Engineering Apply various kinds of sensors to security detection systems. They will perform design, development and worst-case analysis of solid state circuitry. Will perform tests and evaluations, and will analyze test data to determine system effectiveness, sensitivity and weaknesses. Some will be involved in design and development of solid state low power transmitters and receivers for alarm data transmission, and in design and development of the transmitter and receiver portions of low power radar equipments.

SSO Product Engineering Perform electrical and mechanical design to transform engineering models or engineering data into producible militarized products which are fully documented and which comply with specifications. Based on specifications and data from development engineers, they will redesign, package and document devices and systems for military applications. Will direct the procurement, fabrication, assembly and test of equipment which is to be delivered, insuring that it complies with specifications and engineering data.

EXPANDED FACILITIES

New facilities of our Security Systems Organization has now relocated to 475 Ellis St., Mountain View. Your inquiry should be addressed to Mr. C. M. Davis or he may be reached at (415) 966-2732. Sylvania is an equal opportunity employer.

SYLVANIA

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Stanford Center For Radar Astronomy Discovers New Facts About Venus

A "magnetic pileup" on the solar windward side of Venus has been postulated to explain surprising new discoveries about the planet, including a sharp cutoff of the dayside ionosphere.

In a letter to the project's staff, Prof. Von R. Eshleman, who headed the experiment, said "This discovery may be of fundamental importance in continuing efforts toward understanding the difference between the evolution of the atmospheres of Earth and Venus over the past billions of years, where these differences may be related to the reasons we are here instead of there."

The new findings are discussed by engineers of the Stanford Center for Radar Astronomy in the current (DEC. 29) Science magazine. The Center is jointly operated by the University and Stanford Research Institute (SRI), and the research was sponsored by the National Aeronautics and Space Administration (NASA), through the Jet Propulsion Laboratory in Pasadena.

The new findings are discussed by engineers of the Stanford Center for Radar Astronomy in the current (DEC. 29) Science magazine. The Center is jointly operated by the University and Stanford Research Institute (SRI), and the research was sponsored by the National Aeronautics and Space Administration (NASA), through the Jet Propulsion Laboratory in Pasadena.

A dense ionosphere on the planet's sunlit side, which vanishes suddenly at a height of only 300 miles, was revealed by radar signals beamed from the Center's 150-foot dish antenna to the Mariner V spacecraft during its brief passage behind Venus on Oct. 19.

The signals thus passed through the planet's atmosphere on both day and nighttime sides. A special receiver aboard the spacecraft recorded the signals, including changes caused by their journey through space, and this information was telemetered back to NASA's Deep Space Network stations on Earth and relayed to the Stanford experimenters.

Having now analyzed this data on computers, the engineers were surprised to find that a strong Venusian ionosphere extends at least three times farther out on the planet's night side than on its day side. This contrasts with Earth's ionosphere, which extends far out on both sides.

The sudden disappearance of Venus' ionosphere, termed a "plasmapause," could be the most important single finding of their experiment, the radar astronomers said. It may prove of great significance for understanding the interaction of the solar wind with Venus, they added.

(In earlier announcements they reported confirmation of Russian evidence for a very dense atmosphere on Venus which would trap all low-angle electromagnetic waves, including light waves.)

Unlike Earth, Venus has no magnetic field of its own to shield it from the charged particles and magnetism of the million-mile-an-hour solar wind. But it does have a very dense, highly conductive ionosphere. This conductivity stops the magnetized plasma of the solar wind.

"The interplanetary magnetic field lines cannot pass rapidly through the conducting body," the engineers explain, "so a stagnation field builds up which deflects subsequent lines and particles, and a (planetary) bow shock forms." The solar wind thus flows around Venus as it does around Earth, but approaches it much more closely, and sweeps away all the charged particles above the plasmapause.

The Moon, on the other hand, which has neither magnetosphere nor atmosphere, absorbs the full impact of the solar wind particles. Being a non-conductor, the Moon allows the magnetic field lines of the solar wind plasma to pass right through it.

"It seems very likely that Mars is similar to Venus with respect to the solar wind," said the Stanford engineers. "Mars appears to be without appreciable self-magnetism, and it has a daytime ionosphere comparable to that of Venus.

"There appear to be three different types of interaction of planetary bodies with the magnetoplasma of the solar wind. These differ due to planetary magnetism (Earth), high ionospheric conductivity and an atmosphere but no magnetism (Venus and Mars), and no magnetism, no atmosphere, and low conductivity (Moon)."

Prof. Eshleman noted that the lack of magnetism on Venus and Mars makes any possibility of Earth-like evolution on either planet extremely remote. Any atmospheric components that become ionized above the very low plasmapause must be swept away by the solar wind, while Earth's much deeper ionosphere is protected by its magnetic shield. This effect may be related to the puzzling lack of large amounts of water on Venus, he added.

SRI's Prof. Allen M. Peterson and Ray L. Leadabrand are co-directors with Prof. Eshleman of the Radar Astronomy Center. Stanford's H. Taylor Howard was the overall manager for the project, and Dr. Gunnar Fjeldbo and Prof. Bruce B. Lusignan contributed to the scientific planning and analysis.

Roy Long and Boyd Fair of SRI built the special Mariner V receiver, and SRI's Ronald Presnell and Robert Foss operated the dish antenna. Site manager for the radar transmitters is William Faulkerson.

Two radar signals (423.3 and 49.8 megacycles) were transmitted simultaneously to the spacecraft. Changes in their known timing and phasing on arrival at the receiver indicated the amount of ionization they encountered en route.

Special precautions were taken to insure against failure during the critical 50 minutes of the October morning when Mariner V passed behind Venus and the signals went through the planet's atmosphere. This occured approximately five months after the craft's launching in June.

Back-up transmitters were held in readiness, and the radar site was given almost exclusive use of the commercial power line that normally serves other residential areas nearby. The residential areas were temporarily switched to another line.

Dr. Herwald New IEEE President

Dr. Seymour W. Herwald, Vice President, Electronic Components and Specialty Products Group, Westinghouse Electric Corp., has been elected President of the Institute of Electrical and Electronics Engineers. His election to head the world's largest engineering society was announced by the IEEE Board of Directors. He succeeds Mr. Walter MacAdam.

Mark your calendar!

August 20-23—WESCON (Western Electronic Show and Convention), Sports Arena and Hollywood Park, Los Angeles. WESCON Business Office: 3600 Wilshire Blvd., Los Angeles, Calif. 90005. General Manager: Don Larson.

WESCON is co-sponsored by the Western Electronic Manufacturers Association, and the Los Angeles Council and San Francisco Section of the Institute of Electrical and Electronics Engineers (Region 6).

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'Big Dish' continues to explore solar system

In mid-January engineers and students of Stanford's Center for Radar Astronomy expect to get a closer look at the earth's "tail" in space by studying it with radar signals from the Center's 150-foot big dish antenna.

That will be just 36 days after the Dec. 13 launching of the third Pioneer spacecraft, when it is scheduled to arrive at a point two million miles from earth in an "outside" orbit around the sun.

Aboard the Pioneer 8 spacecraft is a special radio reciever built by Stanford Research Institute (SRI) engineers Roy Long and Boyd Fair. It will receive two different radar signals (423.3 and 49.8 megacycles) beamed from the big dish at Stanford.

Changes in the known timing and phasing of the two signals, caused by their passage through the electrically seething plasma that bathes the whole solar system, will be recorded by the receiver. High frequencies are little affected by the quantity of electrons present in interplanetary space, but low frequencies are slowed down.

This record will then be telemetered from the spacecraft to a NASA Deep Space Network stations at Johannesburg, South Africa, Canberra, Australia, and Goldstone, Calif., whence it will be relayed back to Stanford. Back here the experimenters will feed it into computers to discover just how much ionization was encountered by the two signals during their two-million-mile flight.

The same procedure was followed last year with Pioneer 7, the previous shot in the series of five sun-orbiting spacecraft.

Analysis of that data told the Stanford group that interplanetary space contains 5.5 electrons per cubic centimeter, on the average. They also discovered that during solar storms, when great tongues of flame lick out from the sun sending hot blasts of plasma through space, the electron density jumps to 30-40 per cubic centimeter.

During the Pioneer 7 flight it also was discovered that the earth's magnetosphere—a magnetic envelope generated by the earth's magnetic field which deflects much harmful radiation from the ground—is blown into the shape of an elongated windsock, or tail, by the solar wind.

The solar wind, which consists of great clouds of charged particles thrown off by the sun, compresses the magnetosphere on the daylight side and stretches it out for millions of miles on the dark side of the earth.

Pioneer 7 found that the magnetosphere's long tail extended past 3.5 million miles, and that its tip was waggling around in the solar wind.

This time, Pioneer 8 may enable the experimenters to better define some of the limits of this tail. The sensitivity of their equipment has been sharpened and its range extended to 200 million miles.

Also, the electron content of the earth's ionosphere—which must be subtracted from the total recorded along the signal path to the spacecraft—will be determined more precisely and simultaneously this time by measurements from new "geostationary satellites" monitored by Stanford's nearby satellite tracking station.

The Pioneer program is directed by the National Aeronautics and Space Administration's Office of Space Science and Applications, with project management by the NASA Ames Research Center at Mt. View. Several other universities and research centers also have experiments aboard the spacecraft.

It will be the fourth time that the Stanford team, composed of SRI and Stanford engineers aided by about 15 graduate students, have used the big dish to explore the solar system—three times in the Pioneer program, and once with Mariner V during its trip to Venus.

Prof. Von R. Eshleman directs the Mariner and Pioneer experiments at Stanford. Co-directors are Prof. Allen M. Peterson and Ray L. Leadabrand of SRI. Senior engineer H. Taylor Howard is overall project manager, and Prof. Bruce B. Lusignan and research engineer Gunnar Fjeldbo, all of Stanford, are associates in the research.

Careful preparations attended the Mariner experiment because of the critical, 50-minute period during which Venus "occulted" the spacecraft—that is, came between it and the earth, so that the radar signals would pass directly through Venus' own atmosphere. This occurred on Oct. 19 at 10:20 to 11:10 a.m., a day and hour for which the experimenters had waited five months after the June launching.

Every precaution against equipment failure during this crucial period was taken by technical teams at Stanford and SRI, led by senior engineers Taylor Howard and Ronald Presnell. The transmitters and dish performed their tasks perfectly through the critical period under the direction of William Faulkerson and Robert Foss.

They prepared back-up transmitters and power supplies in case anything went wrong. And to insure against accidental power failure during this time, Pacific Gas & Electric Co. temporarily switched neighboring residential areas to a different circuit, leaving the big dish almost alone on its own power line.

At the Jet Propulsion Laboratory in Pasadena, where satellite tracking and communications are handled, Prof. Eshleman spoke of their results at a November press conference:

"It would appear that Venus does have an overly dense atmosphere—that tangential rays will be bent . . . and that occultation experiments cannot get radio refractivity profiles all the way down to the surface," he said.

"This would create a very interesting phenomenon to a refrigerated visitor (surface temperature about 500°F.) to Venus because light also would travel along these paths and . . . would be trapped. All light leaving the surface at angles less than a few degrees would curve around the planet and never go out into space.

"In other words, while a ship going out to sea sinks below the horizon, on Venus it would appear to rise up as it sailed away. In fact, you could see all around the globe, and the back of your head would be a distorted multiple image near the horizon.

"If the (setting) sun could be seen through the clouds . . . it would become very distorted and pour out along the horizon. At midnight (it would) fill the horizon and in every direction you would see light over a thin wedge.

"It (would be) like hell in terms of temperature, but because of this critical refraction the visitor, because he has a rising horizon, would feel that he is in a hole. Everywhere he goes would seem to be at the bottom of the depression, and as he moved the depression would move with him. So it is not just hell, but is a hell hole."

Electron/Ion/Laser Technology Papers Now Available

Nearly 50 papers presented at the IEEE 9th Annual Symposium on Electron, Ion, and Laser Beam Technology held in Berkeley, Calif., last May are now available in book form. The meeting was co-sponsored by the Institute of Electrical and Electronics Engineers, Inc., and the University of California's College of Engineering.

The annual meeting is the outgrowth of meetings originally organized by Alloyd Corp. and concerned with the generation and control of radiant energy for the purpose of modifying the shape or nature of materials, including processes such as melting, refining, welding, machining, and evaporating. In recent years, nonthermal interactions with materials have also been included, notably such topics as scanning electron microscopy (a very active research area at Berkeley), electron-probe microanalysis, and high-precision measurements, as well as novel instrumentation and the applicable physics.

Other topics covered at the Berkeley meeting included microelectronic fabrication and examination, information storage, and biomedical applications of beams—a subject that occupied two whole sessions.

The "MRS" series is a completely self-contained receiver-transmitter combination suitable for monochrome or color TV transmission. It includes antenna, tripod and tilt head for both receiving and transmitting ends. RHG offers a complete line of FM microwave relay equipment for fixed, portable, ground or airborne installations, all described in Catalog 67b. Or, special systems for TV, telemetry, or telephony, can be tailored to your exact requirements.

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Varian Offers Vacuum Technology Seminar

The Vacuum Division of Varian Associates announces plans for its Sixth Annual Vacuum Technology Seminar. A three-day program of lectures and small group workshops will be held in Palo Alto, California, on April 8, 9, 10, 1968, at Rickey's Hyatt House. Varian has conducted previous Vacuum Technology Seminars in Turin, Italy, New York City, and in California.

The Seminar is intended to explain and demonstrate vacuum principles and techniques to engineers and scientists who use vacuum as a tool in research, production and testing. Topics will include: Getter-Ion Pumps; Vacuum Pumping Techniques; Recent Developments in Achieving and Measuring Very Low Pressures; Vacuum System Operation; Titanium Sublimation Pumping; Partial Pressure Analysis; Refrigerated Sorption Pumping; Vacuum Seals; Thin Film Deposition by Sputtering; Clean Pumping for Large Chambers.

The program, non-commercial in orientation, is structured to provide not only significant fundamental information but also discussion of specific vacuum problems. Fourteen members of the research and engineering staff of the Varian Vacuum Division will take part in the Seminar

Registration information is available from the Seminar Registrar, Varian Vacuum Division, 611 Hansen Way, Palo Alto, California 94303, (415) 326-4000, ext. 3043. In Europe, information may be obtained from Varian AG, Baarerstrasse 77, Zug, Switzerland.

IEEE Members To Participate in Value Symposium

Several prominent Bay Area IEEE members and professional engineers will be taking an active part in an on-campus Symposium at San Jose State College from 15 to 17 February. Jointly sponsored by the college and the San Francisco Bay Area Chapter, Society of American Value Engineers, this unusual Symposium will explore new techniques and novel applications of value engineering/analysis. It is one of the major events of Engineers' Week in the Santa Clara valley.

Special Value in Government topics will be covered by Assemblyman John Vasconcellos (D-24th District), Congressman Charles S. Gubser (R - Calif.), and Gordon P. Smith, State Director of Finance and former V.P. of Booze-Allen.

Prominent local IEEE participants include Dr. W. K. Linvill, Chairman, Dept. of Engineering-Economic Systems, Stanford University; Dr. Richard C. Dorf, Head, Electrical Engineering Dept., University of Santa Clara; Gerd Wallenstein, V.P. of Lenkurt Electric, San Carlos; John J. Heldt, Sr. Research Engineer at Lockheed; Jack T. Nawrocki, Sr. Operations Engineer at Lockheed; and Terry A. Ross, Value Engineer Specialist at Lockheed.

With the theme of "Value in Today's Economy", this symposium will consist of moderated and tutorial sessions addressing both the qualitative and quantitative aspects of value. For further information regarding registration, contact Terry Ross, general chairman, c/o SAVE, P.O. Box 482, Sunnyvale 94086, or call (408) 742-6645, days.

Memorex Plans Construction of Belgium Plant

Memorex Corporation of Santa Clara, California—producers of the world's widest range of precision magnetic recording media—will construct a new plant in Herstal (Liege Province), Belgium, it was announced by Eugene Rogers, Vice President of the International Division. The new plant is slated for construction in the spring of 1968.

The new plant, to cover a 110,000 square foot area, will produce precision magnetic tape for the European, British, North African, and Middle Eastern markets.

Upon completion in the winter of 1968-1969, the plant will be the most modern facility available for the production of precision magnetic media.

Bell Telephone Cable Layers Discover Ancient Shoreline Off Modern Jersey Coast

An oceanographic survey conducted by the Bell Telephone Laboratories in connection with burial of undersea telephone cable shows that at one point in glacial movements the coast of New Jersey was some 64 km seaward of its present location but looked as it does today, with long sand dunes and associated shallow lagoons perhaps similar to the present Barnegat Bay area.

The continental shelf off New Jersey extends about 128 km to a depth of 110 meters. The shelf bottom was found to be flat, with the soil composed of a thin surface layer of sand underlaid with a stiff clay material having the consistency of baked mud. Clay layers are found in pockets over nearly the entire distance of the present New Jersey shelf.

In addition to standard oceanographic techniques, the Bell Laboratories group used an ocean bottom survey vehicle equipped with television cameras, 35-mm color cameras, hydrophones, pitch and roll sensors, and devices to measure the consistency and pliability of the ocean floor.

Ernest Kuh Appointed Chairman Of EE and Computers Sciences Dept. At University of California

Professor L. A. Zadeh, chairman of the Department of Electrical Engineering and Computer Sciences has stepped down from his duties effective with the end of 1967 to return to full-time teaching and research. The new chairman will be Prof. E. S. Kuh.

Professor Kuh was born in China and recieved his secondary education there. He attended the University of Michigan (B.S. '49) and MIT (S.M. '50) before coming to Stanford University, where he received the Ph.D. degree in 1952. He then joined the Bell Telephone Laboratories, where he remained until his appointment to the Berkeley faculty in 1956. He became a full professor in 1962. He was an NSF Senior Postdoctoral Fellow at Imperial College in London and at the Technical University of Denmark during 1962-63; and during 1965-66, he was Research Professor in U.C.'s Miller Institute of Basic Research in Science.

Since he came to Berkeley, Prof. Kuh has co-authored three texts. The first (with D. O. Pederson), "Principles of Circuit Synthesis," was published by McGraw-Hill in 1959. The second, "Theory of Linear Active Networks" (with R. A. Rohrer), is a graduate text published by Holden-Day in 1967. A third book, the two-volume "Basic Circuit Theory," is an upper-division text co-authored with Prof. C. A. Desoer, now available in preliminary edition from McGraw-Hill.

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New Products

EIMAC'S NEW TETRODE

A new quick heat, 500 watt tetrode has been announced by the EIMAC Division of Varian.

The air-cooled X-2099B warms up to half-power in 250 milliseconds without using booster or standby circuits. This represents a 30 per cent advance over any tube now available.

The new tetrode is designed for use with "push-to-talk" mobile and airborne communications systems. The tube is also compatible with solid state circuitry and can be used with a low-level solid state driver.

It features rugged, ceramic-metal construction.

Power Grid Tube Marketing, EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070.

XENON LAMP SLIDE PROJECTOR

The Christie XENOLITE "Carousel" Slide Projector, Model BFL450-46, is one of several new series of Xenon and Mercury Arc Lamp Illuminator Systems. These consist of lamphouse with optics, rectifier power supply, igniter and bulbs with 1500 to 2000 hours average life. The 450 watt XENOLITE projector is said to produce 4 to 8 times the light of a standard Kodak AV900 or Ektagraphic, making it suitable for use in large auditoriums, theaters, rear screen projection, outdoor amphitheater, advertising, display systems, trainers and other applications where the standard "Carousel" or other slide projectors cannot deliver enough light. Furthermore, pictures are sharper and colors are brighter with the XENOLITE. Designed for use with standard cardboard mounted 35mm or super slides, it is also available with random access and remote controls.

Christie Electric Corporation, 3410 W. 67th St., Los Angeles, Calif. 90043.

PHILCO MICRO OFFERS NEW MOS-LSI DESIGN KIT

You don't have to know MOS device technology to design your own large scale arrays. All you need are some decals, scaled paper representing the chip area of the array, a ruler, and the Philco-Ford Corporation, Microelectronics Division's new MOS-LSI building block kit.

"The system engineer, using our new building block kit, can carry his own design from concept to manufacture," explains Jack Hegarty, newly named director of marketing for Microelectronics Division of Philco-Ford Corporation. "The digital building block design procedure provides the users of MOS-LSI a technique to facilitate design and partitioning of their own custom arrays," he added.

Mr. Hegarty explained the procedure: "The equipment manufacturer is provided with precisely scaled replicas of typical digital functions, such as gates and flip flops. The user can partition his MOS system using the decals. Philco-Ford also can provide a computer aided first order placement routine if he desires."

This placement routine, Mr. Hegarty said, minimizes metal interconnects through rearranging of the functions. After partitioning the chip with the building blocks, penciling the interconnections, and indicating the location of input/output bonding pads, the customer then submits this layout to Philco-Ford who, in turn, makes the interconnection mask in accordance with the provided layout.

Philco-Ford will also generate a computer test routing to test the chip. A handbook defines the general design techniques for LSI chip layout. These include building block dimensions, bonding pad areas, and interconnect dimensions. The book contains a listing of the building block including the block dimensions, logic symbols, equivalent MOS circuit diagrams and electrical specifications.

The building block approach provides many advantages Mr. Hegarty explained. For example, the use of proven circuits permits the user to predict system performance based on tested function designs rather than random calculated designs. The library of building block circuits has been collected from Philco-Ford's standard MOS family.

Philco-Ford Microelectronics Division, 3939 Fabian Wy, Palo Alto, Cal. 94303.

NEW TRAINING AID FOR USE IN SCHOOLS

Philco-Ford Corporation has designed a new portable electricity and electronics training aid for use in vocational and technical schools, technical institutes and community and junior colleges.

The new portable laboratory, designated the Philco Model 1040, can be used for teaching basic electricity up to advanced electronics skills in conjunction with the recently published third edition of the Electronics Industries Association training manuals.

Philco-Ford's Education and Technical Services Division introduced the Model 1040 at the annual convention of the American Vocational Association at Cleveland, Ohio, December 4-8.

The Model 1040 is a self-contained unit. It includes all of the materials and equipment necessary to carry out all of the experiments detailed in the EIA's new manuals on Basic Electricity and Basic Electronics, according to Dr. Robert D. Gates, Director of Education Operations.

Dr. Gates said the Model 1040 joins a long list of Philco training aids which have won wide acceptance in the vocational education community. Training aids designed and manufactured by Philco-Ford are in use in 1,600 schools and colleges in the United States and 45 other countries, Dr. Gates said.

He said the Model 1040 is a versatile unit which meets all basic requirements economically, but which contains extra features making it possible to tailor-use the unit to meet the needs of advanced students.

Dr. Gates said the unit is ideal for teaching characteristics of devices and circuits, transistors, semiconductor diodes, microelectronic integrated circuits and silicon-controlled rectifiers. To provide complete course coverage, special material on vacuum tube circuit analysis has been provided.

Marketing Manager, Education and Technical Services Division, Philco-Ford Corp., Fort Washington, Pa. 19034.

(More New Products on page 16)

150 MHz, 2.4 ns

New performance from probe tip to CRT!

The Tektronix Type 454 is an advanced new portable oscilloscope with DC-to-150 MHz bandwidth and 2.4-ns risetime performance where you use it — at the probe tip. It is designed to solve your measurement needs with a dual-trace vertical, high performance triggering, 5-ns/div delayed sweep and solid state design. You also can make 1 mV/div single-trace measurements and 5 mV/div X-Y measurements.

The vertical system provides the following dual-trace performance, either with or without the new miniature P6047 10X Attenuator Probes:

*Deflection Factor**	*Risetime*	*Bandwidth*
20 mV/div to 10 V/div	2.4 ns	DC to 150 MHz
10 mV/div	3.5 ns	DC to 100 MHz
5 mV/div	5.9 ns	DC to 60 MHz

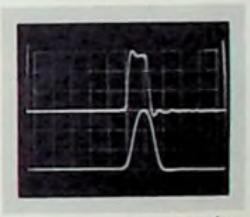
*Front panel reading. With P6047 deflection factor is 10X panel reading.

The Type 454 can trigger internally to above 150 MHz. Its calibrated sweep range is from 50 ns/div to 5 s/div, extending to 5 ns/div with the X10 magnifier on both the normal and delayed sweeps. The delayed sweep has a calibrated delay range from 1 μs to 50 seconds.

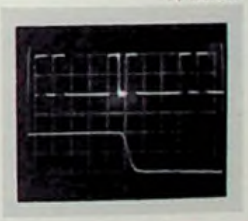
For a demonstration, contact your nearby Tektronix field engineer, or write: Tektronix, Inc., P. O. Box 500, Beaverton, Oregon 97005.

Type 454 (complete with 2 P6047 and accessories)	$2600
Rackmount Type R454 (complete with 2 P6047 and accessories)	$2685
New Type 200-1 Scope-Mobile® Cart	$ 75

U. S. Sales Prices FOB Beaverton, Oregon



10 ns/div



Double Exposure

150 MHz AM

Pulse fidelity

This double-exposure photograph shows the same 12-ns-wide pulse displayed on the Type 454 (upper display) and on a 7-ns, 50-MHz oscilloscope (lower display). Note the difference in detail of the pulse characteristics displayed on the Type 454 with its 2.4-ns risetime performance.

5 ns/div delayed sweep

The delayed sweep is used to measure individual pulses in digital pulse trains. The Type 454 with its 1 μs-to-50 s calibrated delay time, 5-ns/div sweep speed and 2.4-ns risetime permits high resolution measurements to be made. Upper trace is 1 μs/div; lower trace is 5 ns/div.

X-Y

The upper display is a 150-MHz signal that is 50% modulated by a 2 kHz signal. The lower display is an X-Y trapezoidal modulation pattern showing the 150-MHz AM signal vertically (Y) and the 2kHz modulation signal horizontally (X). Straight vertical line is the unmodulated carrier. Multiple exposure.

Tektronix, Inc. SAN FRANCISCO FIELD OFFICES

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FROM OAKLAND, BERKELEY, RICHMOND, ALBANY AND SAN LEANDRO: 254-5353
3750 FABIAN WAY • PALO ALTO, CALIFORNIA 94303 • Phone: 326-8500

NEW MICROFILM CARTRIDGE CARROUSEL FOR HIGH DENSITY STORAGE

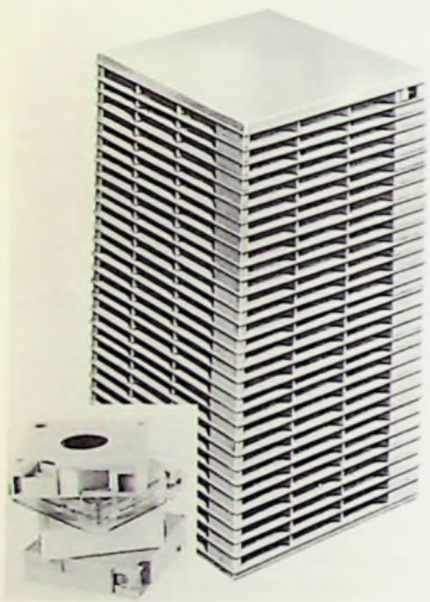
A new microfilm cartridge carrousel, with a capacity of up to 360 cartridges, has been introduced by Information Design, Inc. of Palo Alto, California.

The new rotary model, "360 Cartridge Carrousel", is a modification of the carrousel produced earlier this year for use with the IRI Vendor Catalog File on Microfilm. Measuring 18 inches square by 36 inches high, the carrousel has a capacity of more than one million documents on microfilm.

High impact polystyrene has replaced the wood and chrome of the earlier model and results in lighter weight and easier handling. New modular construction provides greater flexibility and versatility.

The carrousel accepts, in addition to Recordak and 3M 16mm cartridges, IBM tape cartridges and 16mm roll film in boxes, and is adaptable to an infinite variety of filing and small parts storage applications.

Leonard Nelson, General Manager, Information Design, Inc., 755 Loma Verde, Palo Alto, California 94303.



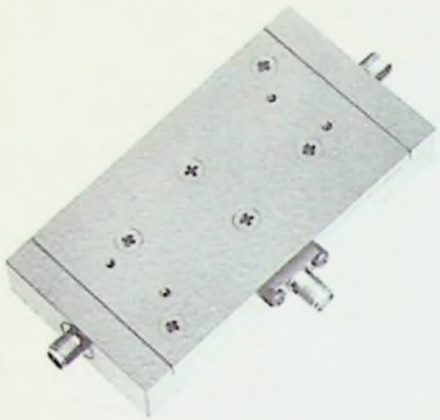
New Wanlass Invention For Converting Power

Wanlass Electric Company, Santa Ana, Calif. based subsidiary of American Bosch Arma Company, has issued an 8-page brochure describing its new "parametric power" invention for converting energy. Called "Parax", it is claimed to be the most significant development in the field since introduction of the ferroresonant transformer in 1938.

The new device is understood to be entirely passive and to give complete bilateral transient noise rejection. It also has a unique overload protection, produces phase locked voltage output and is said to be ultra-reliable.

P-I-N DIODE MODULATOR CONTROLS HIGHER POWER, HIGHER FREQUENCIES

A new smaller H-P p-i-n diode Absorptive Modulator can modulate, switch, or attenuate cw microwave power up to 2 watts. Previously, p-i-n diode modulators were limited to 1 watt, peak or cw. This one can handle up to 100 watts peak from pulsed sources (1 μs pulse width, 0.001 duty factor), the first p-i-n diode modulator capable of handling such high peak powers.



The frequency range of the new modulator (Hewlett-Packard Type 33001A) extends from 8 GHz to 18 GHz, whereas earlier ones were limited to frequencies below 12.4 GHz.

Unlike diode microwave switches, which reflect excess power back towards the source, p-i-n diode absorptive modulators dissipate the excess power. The SWR of absorptive modulators hence is substantially constant over the attenuation range. These devices are thus particularly useful for controlling the output power of klystrons and other devices that are sensitive to the SWR on the output line. Maximum VSWR of the new 33001A Absorptive Modulator is 2:1 at any attenuation.

The attenuation provided by the new Modulator spans a range between 2.5 dB (residual attenuation) to 45 dB. Response time is typically 50 nanoseconds, much faster than ferrite modulators or other non-absorptive modulators that control active devices in high-Q circuits.

Drive requirements for the new modulator are modest. Typically, maximum attenuation is achieved with 50 mA of forward bias current at a voltage of less than -1 V. The modulator can be driven by any waveform shape, from sine waves to fast pulses, provided that suitable waveform shaping is applied to accelerate diode charge storage and removal.

The new Model 33001A Modulator differs from earlier p-i-n diode adsorption modulators by not requiring the p-i-n diodes themselves to absorb all the microwave power that is to be removed from the throughput. The new design uses two 3-dB couplers in a hybrid configuration with the diodes shunting the line in a functionally-integrated 50-ohm coaxial structure on the arms of the hybrid.

Hewlett-Packard, 1501 Page Mill Rd., Palo Alto, California 94304.

SPACE-SAVING INFORMATION DISPLAY

A new instrument designed to display a maximum of information in a minimum of panel space is now being manufactured and marketed by Metra Instruments. The instrument, called the Metrascope 12, occupies only 10-1/2 inches of panel height in a standard rack.

Up to 25 or more inputs—from thermocouples, strain gauges, or other transducers—are sampled a minimum of 50 times per second and displayed on a CRT with electronically generated calibration. Inputs may be as low as 10 mv or as high as 10 volts DC for a full scale signal. Vertical height of each readout trace is directly proportional to signal amplitude.

The instrument incorporates a high-low alarm capability, causing the signal trace to brighten and a relay to close whenever any input signal exceeds its pre-set limit. Additional features include means for digital readout of signal levels; brightening of every fifth channel for quick channel identification, thermocouple cold junction reference when required; front access to all components; and quick-disconnect chassis and plug-in components to enable easy maintenance.

To change the number of channels, the full scale value, or grid calibration, the user simply substitutes appropriate plug-in modules. Additional switch modules each contain 5 data channels. Calibration is direct in units such as degrees centigrade or fahrenheit, decibels, pounds per square inch, and others, to suit the needs of such applications as information display in power plants, wind-tunnels, petro-chemical re-

actors, environmental test labs, nuclear reactors, engine test stands, hospitals, biological and medical labs, universities, and general research labs . . . wherever there is a need for instant visual reference to fast-changing measurement parameters.

Metra Instruments, Inc., 2257 East Middlefield Rd., Mt. View, Calif. 94040.

LOW-COST SINGLE PACKAGE POWER AMPLIFICATION AND CALIBRATION DEVICE

A low-cost, single-package power, amplification and calibration device has been introduced by Endevco for broad laboratory use as a companion accessory for any half- or full-bridge strain gauge or other resistance bridge transducer.

Designed for use in research, testing and development laboratories, the unit is designated the Bridgepac Model 4630. The 2-1/2-inch-high by 2-inch-long package employs integrated circuits and weighs only six ounces. It will plug directly into any type of readout system that requires 0.1 ma, providing power to the transducer, while amplifying the resulting signal up to ten times.

The Bridgepac Model 4630 was developed by Endevco to supply power, amplification and calibration to any resistance device between 300 and 3000 ohms, while eliminating the need for DC supplies, batteries, or cables.

Power source of the unit is a replaceable mercury battery used for transducer excitation and as a means of bias voltage for the amplifier.

Endevco Laboratories, Division of Endevco Corporation, 1675 Stierlin Rd., Mountain View, Calif. 94040.

ADVERTISER/AGENCY INDEX

UNION CARBIDE OFFERS NEW TRANSDUCER AMPLIFIER

Union Carbide Electronics' new DC transducer amplifier designated H3100G, features performance comparable to many rack mounted signal conditioning DC data amplifiers, yet is only 2" x 2" x 0.6". It has a high input impedance of 10^{12} ohms and an input current less than 50 pico amps. The common mode rejection for line frequency and noise pickup is 100 dB at a gain of 1000.

The H3100G amplifies DC signals by a fixed gain of 1 to 1000, adjustable by one external resistor. Gain stability and linearity are better than 0.5% over the specified gain range. The bandwidth is 1 MHz at a gain of 1.0, and the output is ±10 volts at ±2mA. The amplifier operates from ±18 volts DC power. The H3100G is suitable for use with both low impedance transducers, such as strain gauges and thermocouples, and high impedance transducers, such as pH electrodes and photodetectors.

Union Carbide Electronics, 365 Middlefield Rd., Mountain View, Calif.

News Briefs

- NASA's planned 1971 *Mariner flights to Mars* program is the chief victim of a $517 million House cut in NASA's fiscal 1968 budget.
- During fiscal 1967, patent examiners disposed of 97,000 cases in the backlog at the *Patent Office.*
- *The National Science Foundation has combined all its computer programs* under a newly established Office of Computing Activities. The Office will be in three units: Institutional Computing Services Section; Education, Research, and Training Section; and Special Projects Section.
- *An advisory panel,* made up of engineers from a variety of technical disciplines, has been appointed to advise the newly formed Public Broadcast Laboratory of the National Educational Television Network on matters pertinent to engineering and technology.
- *The number of scientists and engineers in higher education* is expected to double by 1975, according to a new NSF report.
- The Alfred P. Sloan Foundation has given an unrestricted *grant of one million dollars to the National Academy of Sciences.*

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People

Applications Manager Appointed At Fairchild Instrumentation

Gordon Padwick has been appointed Manager of Systems Applications Engineering, according to Gordon Westwood, Systems Marketing Director at Fairchild Instrumentation, a division of the Fairchild Camera and Instrument Corporation.

A graduate of the University of London, he received a BSc degree in electrical engineering. He was associated with Fairchild Instrumentation Ltd. in Aylesbury, Buckinghamshire, England, where he worked for the four preceding years. He was previously associated with the General Electric Company, IBM World Trade Laboratory, and Mullard, all in England.

Padwick is the author of many technical papers concerning integrated circuits and field effect devices, and is an editorial advisor for MICROELECTRONICS, a United Kingdom journal.

Quantic Industries Elects Twining

The election of Fred N. Twining as a Director of Quantic Industries, Inc., San Carlos manufacturer of aerospace components and systems, was announced today by Morgan A. Gunst, Jr., Chairman of the Board and Chief Executive Officer. Mr. Twining is a partner of Management Resources Company, a San Francisco-based organization specializing in management services to smaller companies on the west coast.

Organizational Change At Quantic

Charles R. Newman, President of Quantic Industries, Inc. announced today that Sheldon A. Knight has been named Assistant Manager of the Electro-Optical Division which is engaged in research, development, and manufacture of spacecraft navigational and guidance systems. He will retain responsibility as Director of Engineering of the Division, the position he has held since 1964.

Knight attended Iowa State and Stanford Universities, earning his MSEE at Stanford. He served as a pilot in the Air Force and prior to joining Quantic held an administrative engineering position at Advanced Technology Laboratory, a division of American Standard.

Fthenakis New Philco-Ford VP

Emanual Fthenakis, General Manager of Philco-Ford Corporation's Space & Re-entry Systems Division, has been elected a Vice President of the Corporation, Robert O. Fickes, President and Chairman of the Board, announced today.

Mr. Fthenakis was named General Manager of the Division when it was established in September, 1966. His headquarters are in Palo Alto, Calif.

Nelson Joins Micom As Marketing Manager

David L. Nelson has joined Micom, Inc, as marketing manager, responsible for sales of the firm's product line of electronic instrumentation.

Nelson has extensive experience in the field of electronic instrumentation. Most recently, he was associated with Hewlett-Packard's Mountain View Division.

Lynch Communications Appoints Hawke and Gaspers

Roy A. Hawke has recently accepted the position of Assistant to R. C. Ragland, Treasurer-Controller of Lynch Communication Systems.

In his position as Assistant to the Treasurer-Controller, Hawke will be responsible for the organization of systems, procedures and techniques, including electronic data processing.

Hawke

Gaspers

Michael T. Gaspers has recently been appointed Industrial Engineer in the Manufacutring Department of Lynch Communication Systems. Gaspers will act as liaison between manufacturing and engineering, with special emphasis on testing, production improvement techniques, and trouble shooting.

Gaspers received his B.S. degree in Physics from the University of San Francisco in 1962.

Friden Announces Staff Changes

Three major corporate executive staff changes, effective December 26, have been announced by Friden President, Alan W. Drew.

Thomas P. Gilmer, Jr., Director of Engineering at San Leandro since February 1967, steps up to General Manager of Friden's San Leandro Division. He will report to Mr. Mantell and have responsibility for all manufacturing and product development activities in San Leandro.

Robert A. Ragen, who has served as Manager of the Electronic Calculator Engineering Department since 1966, advances to Director of Engineering at San Leandro. He will report to Mr. Gilmer.

In a change involving reporting procedures, George Comstock, as Vice President, Research and Engineering, will report directly to President Drew.

General Recorded Tape, Inc. Appoints Engineering Manager

Stewart L. Smith, Palo Alto, has joined General Recorded Tape, Inc., as Engineering Manager to direct the company's development of new magnetic tape duplicating techniques and equipment.

He will be responsible to GRT President Alan J. Bayley for applied research and engineering in the field of tape storage and reproduction and for new product development and design including duplicating and production equipment.

He is an IEEE member (Audio chapter), and the Society of Motion Picture and Television Engineers.

Union Carbide Names Beadling

David A. Beadling has been named assistant general manager, semiconductor department of Union Carbide Corporation's Electronics Division, Mountain View, California.

Beadling will have complete responsibility for manufacturing, marketing and administration at the company's Mountain View plant.

Beadling holds a BSEE degree from the U.S. Naval Academy at Annapolis.

Fetzer to Melabs

Melabs, Palo Alto, has announced the appointment of Mervin J. Fetzer as Quality Assurance Manager.

Fetzer received both his B.S.E.E. and M.S.I.E. from Stanford University. He is a member of IEEE and the American Society of Quality Control.

Applied Technology's Microwave Lab Expanding Rapidly Under David Leeson

The pressures of continued successful growth recently compelled ATI to expand its Microwave Laboratory to new quarters in the Itek building at 1450 Page Mill Road, Palo Alto.

Leeson *Johnson*

The ATI Microwave Laboratory conceives, designs, develops and manufactures radar and receiver subsystems. The Laboratory is headed by Dr. David B. Leeson, Director, and Gilbert F. Johnson, Associate Director. The organization is now less than a year old.

Dr. Leeson joined Applied Technology in February, 1965, as a project engineer. He has secured large contracts for electronic surveillance subsystems, resulting in important product diversification.

In May, 1967, Leeson and Johnson set up the Microwave Laboratory for engineering and program management, with a beginning staff of 10; there are now 70. Organizational responsibilities now include marketing, assembly and testing.

Dr. Leeson says, "We feel that the Lab is now organized to enable us to take most effective advantage of the opportunities in our particular area of electronics."

Million-volt Microscope Used to Study Steel

An electron microscope capable of revealing the internal structure of matter on a scale equal to atomic dimensions has been installed at the United States Steel Corporation's Fundamental Research Laboratory in Monroeville, Pa.

It was pointed out that the microscope's higher resolving power will permit closer study of the myriad of microstructural components of steels, since the many varied properties of steel depend on the internal atomic arrangement resulting from heat treatment and processing by rolling, drawing, etc. The researchers are seeking to develop superior microstructures to achieve improvements in strength, toughness, and corrosion resistance.

To attain its power, the microscope uses a million-volt accelerator, which, although more than 5 meters high and weighing some 15 tonnes, maintains the dc voltage constant to within 0.0004 percent. An accelerated stream of electrons is fired through the microscope's magnetic lenses at approximately 94 percent of the speed of light. This velocity gives the electrons a penetrating power of up to ten times that of beams used in standard electron microscopes. Increasing the accelerating voltage also has the effect of reducing the wavelength of the electrons; this, in turn, improves the instrument's resolving power. Thus the microscopist expects to "see" features only 2 Å apart.

Image intensification techniques will be used that permit the reduction of the beam strength by as much as 50 times, thus diminishing the damaging effects of radiation and heat on metallurgical specimens. The techniques also electronically brighten the image so that it may be displayed on a television monitor screen to an audience. Electrons traveling in vacuum down the microscope column are controlled by six magnetic lenses—two condenser lenses, one objective lens, and three projector lenses.

The instrument system was designed and built at the Radio Corporation of America's Broadcast and Communications Products Division in Camden, N. J.

Medical Electronics

Medical electronics is finally being taken as seriously by the medical profession as by the engineering profession. Latest indication of this trend is inauguration this January 1968, of a new column, "Electronics in Medical Practice," by the national medical journal *Postgraduate Medicine*, published in Minneapolis by McGraw Hill.

This is the first major medical magazine consisting of physician-contributed articles to include a department on electronics. The new column will be co-authored by two Northern Californians: William E. Chapman, III, M.D., M.S. E.E., and Marion Lewenstein.

Dr. Chapman, a practicing internist associated with the Palo Alto Medical Clinic, has both his medical and engineering degrees from Stanford.

Mrs. Lewenstein has been a science writer for the past 12 years specializing primarily in electronics and medicine.

The authors of "Electronics in Medical Practice" have informed GRID that they would be pleased to receive information on latest developments in the medical electronics field from California manufacturers and research institutions. Address all releases to: Mrs. Marion Lewenstein, Postgraduate Medicine, 3348 Middlefield Road, Palo Alto, California 94306. Phone: 321-4043.

Robert Ward new WEMA president

Robert M. Ward, general manager of the Ultek Division of Perkin-Elmer Corp., Palo Alto, is the newly elected president of the Western Electronic Manufacturers Association.

He has been active in WEMA for eight years and was chairman of the San Francisco Council in 1966.

Ward left Thompson Products (now TRW) in 1957 to become general manager of the Berkeley Division of Beckman Instruments, moving up to vice president of marketing in 1962, and leaving two years later to head Ultek Corporation.

Native of Philadelphia, Ward graduated from Case Institute of Technology with a bachelor's degree in mechanical engineering. He obtained a Navy Certificate in aeronautical engineering from the University of Minnesota and participated in Case Institute's Advanced Management Program.

U.C. Berkeley Offers Six-Day Intensive Course On Fundamentals Of Digital Computing

"Computers for Professional Engineers," a six-day intensive course designed to provide an introduction to the fundamentals of digital computing and programming, will be offered June 24-29, 1968, by Engineering Extension and the College of Engineering, University of California, Berkeley. It will cover the basics of Fortran programming in lectures and extensive workshops that will afford participants an opportunity to gain a working knowledge of programming and to solve representative engineering problems.

WESCON Issues 1968 'Call For Sessions'

A "Call for Sessions" to be presented at the 1968 Western Electronic Show and Convention has been issued by Dr. Robert Ashby, chairman of the WESCON Technical Program Committee.

WESCON is to be held in Los Angeles, August 20-23, 1968.

Following the "session unit" method of organizing the technical program, Dr. Ashby's call is for proposals of full sessions in which three or four authors will present related papers intended to cover a particular technical topic. In actuality, each individual or engineering group submitting a successful proposal becomes the session "organizer," responsible for the entire content and presentation of the session.

A two-step procedure will be used in selecting sessions for presentation at WESCON, Dr. Ashby said. The first step is evaluation of "letters of intent" which describe a proposed session topic and individual authors (or panelists) and their subjects. Proposers whose letters of intent are approved are asked to proceed to the second step, which is a more formal and detailed proposal including abstracts of papers to be delivered.

Deadline for the first step—letters of intent to propose—is March 15, 1968. Letters should be addressed to Dr. Robert M. Ashby, WESCON Technical Program Committee, 3600 Wilshire Boulevard, Los Angeles, Calif. 90005.

Dr. Ashby and his committee are designing an August program that will concentrate on four kinds of sessions, he said. They are: New applications and techniques; New trends in design engineering; Discussions of significant new technological developments; and Needs for new electronic devices and systems.

The committee's published "call" will list a number of topic areas of particular interest, although submissions need not be restricted to those areas. Areas of interest to be noted are:

Technology for Education; Life Science and Electronics; Electrical Power Systems (with subcategories of electric power distribution and power sources for electronic systems); Space Electronics (and applications of aerospace developments in science programs); Modern Microwave Materials and Techniques; Solid-State Devices and Circuits; Computer Techniques and Electronic Data Processing; Management and the Engineer; Oceanology; Electro-Optical Techniques; Transportation and Traffic Control; Electronic Test Equipment; and Electronic Communications.

Dr. Ashby is vice president for technology, Autonetics Division of North American Rockwell. Members of the committee include Dr. John M. Salzer (vice chairman), vice president, technology and planning, Librascope Group of General Precision; Charles Aker, vice president, ITT industrial products; John W. Thatcher, manager, Deep Space Network, Jet Propulsion Laboratory; Prof. Ellis King, head of electronics and electromagnetics division, engineering department, University of California at Los Angeles.

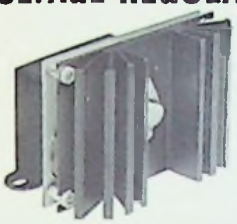
Grid Erratum
Re: "Electronics In the West"

In the January issue of GRID it was mentioned that the book *Electronics in the West—The First Fifty Years* by Jane Morgan will be used by Bay Area schools as background material for field trips to "the Perham Museum." This should have read "the Foothill Electronics Museum."

NEW CONCEPTS IN POWER CONVERSION

R-3000

SOLID STATE AC VOLTAGE REGULATORS



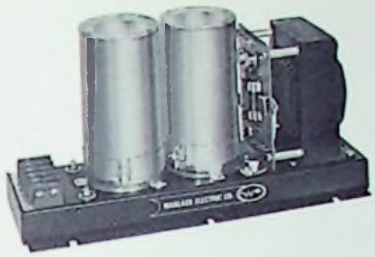
Designed Especially for OEM Application. Two Lines Available.

SPECIFICATIONS

	R-3100	R-3200
Type of Voltage Regulation	True RMS	Peak
Regulation Technique	Peak Clipping	Peak Clipping
Type of Reference	RMS Sensor	Zener Diode
Input	100-130 VAC 47-63 Hz	100-130 VAC 47-63 Hz
Output	115 VAC	115 VAC (RMS)
Line Regulation (±10% line variation)	±0.5%	±1.0%
Load Regulation (10% to Full Load)	±0.5%	±1.0%
Frequency Regulation (47-63 Hz)	±0.5%	±1.0%
Power Factor Regulation (−0.7 to −0.7)	±0.5%	±1.0%
Phase Shift	None	None
Response Time	10-50 μsec.	10-50 μsec.
Models Available	15-1000 va	15-1000 va

LX

ECONOMY SOLID STATE POWER SUPPLIES



Now...A low cost Power Supply with 1% Line and Load Regulation, Minimum Ripple, 3% Output Voltage Adjustability, Frequency Insensitive with 47-63 Cycle Operation. 45 Standard Models, 4-240 vdc 0-25 Amps.

Three Lines Available

60-LX	60 watts output	$85 each
120-LX	120 watts output	$125 each
200-LX	200 watts output	$170 each

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INTEGRATED CIRCUIT POWER SUPPLIES

Designed Specifically for Original Equipment Applications.

THE IC PRODUCT LINE

After a careful analysis of existing power supply product lines, Wanlass Electric concluded that there was an important omission in these lines, namely, the low-cost quality supply for use by OEM's with their integrated circuits. The Wanlass IC line is aimed specifically at this market. This line features a quality series regulator but no frills . . . no expensive package, no unnecessary precision components, 0.25% regulation not 0.05%, 5 millivolts ripple not 1 millivolt, overvoltage protection is available as an option.

7.5 Amp Model $105.00
15 Amp Model $150.00

RF-1300

DYNAMICALLY FILTERED AC VOLTAGE REGULATOR

Designed especially for Precision Laboratory AC Line Regulation.

SPECIFICATIONS

Line Regulation	95-130 volts input ±0.1% for ±10% input variation
Load Regulation	±0.1% for zero to full load
Dynamic Filter	No residual SCR or overvoltage transients
Distortion	Less than 3%
Response	Regulator—30 milliseconds. Dynamic Filter—less than 1 microsecond
Output Voltage Adjustment	110-120 volts
Frequency	50 or 60 cps
Remote Sensing	Programmable
Current Limiting	Standard feature

Model	Power Rating	Price (including Exclusive Dynamic Filter)
RF-1310	1000 va	$500
RF-1330	3000 va	$800
RF-1350	5000 va	$1100

R-2000

MULTI-FREQUENCY AC VOLTAGE REGULATOR

Ideal for Use with Locally Generated Power where Frequency is not held constant.

SPECIFICATIONS

Line Regulation	100-130 volts input ±0.5% for ±10% volts input variation
Load Regulation	±0.5% for 10% to full load
Output Voltage Adjustable	110-120 volts
Frequency Insensitive	Wide range including 47-63 cps operation
Power Factor Insensitive	Typically 1.0 to 0.7 lagging
Response	30-100 milliseconds
Operating Temperature	0-50°C
Stability	±½% after warm up
No Zero Load Circulating Currents	Better Efficiency
Current Limitation	Inherently Self limiting
No SCR Circuits	No "spikes"
Magnetic Techniques	Variable Inductor Element

Model	Power Rating	Price
R-2002	250 va	$125
R-2005	500 va	$205
R-2010	1000 va	$270
R-2030	3000 va	$425

WANLASS PARAX T.M.

TRANSIENT FREE PARAMETRIC POWER

The Ultimate in Laboratory and OEM Power Conversion Equipment.

Parametric Power

If the inductance of a winding can be changed while a current is flowing through that winding, then energy can be transferred. If this change in inductance can be accomplished without the usual use of mutual inductance, then transient free energy transfer can be achieved. By inventing a technique for rhythmically varying the parameters of a magnetic circuit without relying on mutual inductance, Wanlass Electric has discovered an important new way to convert electrical energy. This we have named Parametric Power.

This concept has been translated into a complete line of parametric power conversion products, including: Voltage Regulators, Line Filters, AC Power Supplies, DC Power Supplies, Inverters, DC Converters, and Frequency Converters. All will bear the name PARAX[T.M.].

P-1405 500 va Line Conditioners . . .$275.00

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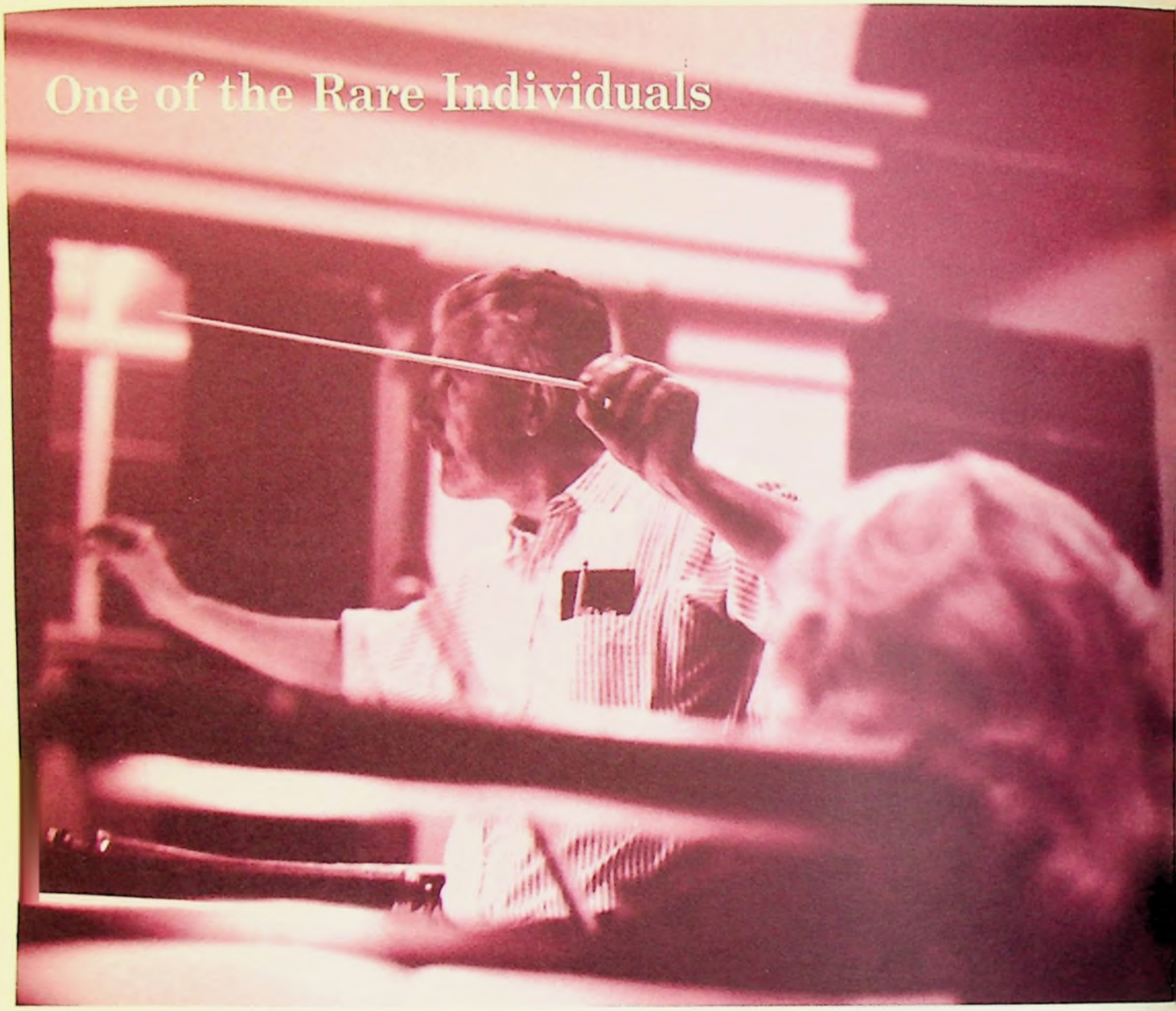

Phil Carter, part time conductor and composer, invented the YIG filter. He's an authority on YIG devices.

Dr. Carter is an Applied Technology senior engineering specialist.

Applied Technology has positions for inventive engineers, designers and technicians. You can be a recent graduate or an experienced electronic engineer. The kind of engineers we need have Ambition, Talent, Imagination – rare individuals who work best in a creative environment.

Applied Technology develops and manufactures electronic reconnaissance, surveillance, and active countermeasures systems. Because of aggressive leadership and a talented team of scientific and engineering specialists, ATI has secured a reputation for creativity, equipment reliability and extremely quick reaction to customer needs.

For technical interview appointment ask for:

Mr. Lawrence Peckler

Professional Employment Representative

or

Mr. Richard Denzler

Employment Manager

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