

RockIEEE Overlook

November 1990

Newsletter of



**The Institute of Electrical and Electronics Engineers
Denver Section**

Chairman's Message

by Jack Reesy

Time has passed and we are again near the end of our Denver section IEEE year. In January we will install new officers for 1991 and say thanks to those who served in 1990.

Something that doesn't change in IEEE is what our membership brings us; the opportunity to participate, meet new people, and establish friendships and above all to be exposed to new ideas. IEEE provides tutorials, symposiums, standards, history, conventions, tours and speakers on various subjects at the meetings. Through these, we can not only learn about the advances in our areas of endeavor, but we can also receive exposure to many other areas of engineering and life.

Each of us should take advantage of IEEE opportunities by holding office, attending meetings and tutorials, and we should always encourage others to visit and to join IEEE. This is my last Chairman's message, so let me say it has been my pleasure to serve the Denver Section these past few years. My best to the new section officers and to the Denver Section for a successful 1991 and beyond.

Upcoming meetings

November 28, 1990 - Executive Board

Formation of Power Electronics Chapter Within the Denver Section

An attempt is being made to establish a Power Electronics Chapter
Anyone interested should contact:

Clyde Manning
Intellistor, Inc.
2402 Clover Basin Dr.
Longmont CO 80503
(303) 682-6492 FAX: (303) 682-6401

Society Chapter Meetings and Information

IEEE Reliability Society

Thursday, November 8, 1990

Martin Marietta Aerospace
Includes Tour of Tital Production Facility

Speaker

Bob Jaquess
Titan IV Payload Integration Manager
Martin Marietta

"Future Space Missions"

Reservations required. Please call Rick Karcich, 673-6223 or Juan Hernandez, (719) 590-8880 x 410 for further information.

Front Range Software Quality Committee

Friday, November 16, 1990

StorageTek
Louisville, Colorado
Dining Rooms 1 and 2, Building 4
(use South entrance)
2:00 - 4:00 p.m.

Speaker

Dr. Robert Terwilliger
Assistant Professor, Dept. of Computer Science
University of Colorado, Boulder

"ENCOMPASS an Environment for Incremental Software Development Using Executable, Logic-Based Specifications"

Please call Rick Karcich, 673-6223 if you have any questions.

**THANK-YOU to John Tierney at
Public Service Company of
Colorado for his effort in working
with the Denver Section member-
ship database.**

VTS/COMSOC

Tuesday, November 13, 1990

Dinner 6:30 p.m. at the Armadillo Restaurant
15151 E. Mississippi Ave. in Aurora
Meeting at 8:00 p.m. at the Aurora Police Dept.
15--1 E. Alameda Dr.
Park on the North side of the Library.

Speaker

Mark Widee

"Tour of the Aurora Police Department Communication and Computer Center" The New McDonald-Douglas 18/600 Computer"

All IEEE Members and their guests are welcome.
You need not attend dinner to attend the meeting.

Call John Hardzinski at 977-2224 or Ken Shugg at 397-7417 if you plan to attend.

Joint PES/IAS

Power Engineering/Industry Applications

Wednesday, November 14, 1990
Brooklyn's Saloon and Restaurant
2644 W. Colfax, Denver (under the viaduct)
572-3999

6:00 p.m. Social
7:00 p.m. Dinner (optional @ \$10)
8:00 p.m. Meeting

Speaker

Malin Jacobs
Electrical Engineer
Power Apparatus & Systems Section
Electric Power Branch
Research & Laboratories Division
United States Bureau of Reclamation

"Adjustable Speed Drives and Harmonics"

This talk will deal with the harmonic current characteristics of adjustable speed drives and the effects of these harmonic currents on the power system. Attention will be given to the generation of non-integer related frequencies due to drive asymmetry and control system "hunting". Filtering strategies for mitigating the effects will also be mentioned.

Please contact Barbara at Peterson Company, 388-6322, by Monday, September 17, 1990.

Joint AP/MTT/GRS

Antennas and Propagation, Microwave Theory and Techniques, Geoscience and Remote Sensing

Thursday, November 15, 1990

National Institute of Standards and Technology
325 Broadway, Boulder, Room 1103
4:00 - 5:00 p.m.

Speaker

William F. Croswell
Harris Corporation
Palm Bay Florida

"Spacecraft and Aircraft Antennas"

The evolution of antennas and antenna systems has grown markedly in the last decade. There is increased emphasis on precision and multi-function performance. In addition, there has been a rapid increase in the use of MMIC devices in deliverable antennas. As APS Historian, Mr. Croswell will develop a brief history of the nature of rocket and spacecraft antennas since he joined the space business in 1958.

This lecture will emphasize both deployable and multiple beam antennas that have been developed for space-

craft and airborne uses. In particular, the design and performance of deployable antennas for such projects as TDRSS, Galileo, and ATDRSS will be reviewed in some detail and discussed in view of much higher frequency requirements. Particular emphasis will be placed on how to qualify such devices for space performance by analyses and testing on earth.

Mr. Croswell will discuss array designs and hardware which make use of graphite composites to maintain dimension stability and the use of special interconnection techniques for MMIC phase shifters. The graphite antenna is a 220 slot array operating at 14.5 GHz built for NSCAT, a spacecraft wind radar. The large multiple beam array forms ten simultaneous beams and utilizes approximately six thousand MMIC phase shifters. This MIL SPEC deliverable hardware has direct thousand MMIC phase shifters. This MIL SPEC deliverable hardware has direct application to the ATDRSS multiple access antennas and many other applications.

Reservations are **not** required. Please call Katie MacReynolds at 497-3471 if you have any questions.

University of Colorado at Denver

The Division of Extended Studies and the Department of Electrical Engineering
present

Short Courses in Electrical Power Systems & Machines

We are continuing our series of one-day, eight-hour short courses on topics in electrical power systems, machines and energy. These courses serve as refreshers and professional updates for practitioners in the electrical engineering field. In response to a significant number of requests, the next course is a repeat of the *Fundamentals* course conducted last year.

Fundamentals of Power Systems Design

Friday, December 7, 1990
CU-Denver (Auraria) Campus

Instructors: Dr. Pankaj (P.K.) Sen and Dr. William R. (Bill) Roemish
Cost: \$175 per participant
\$150 per participant for two or more from same job site

Call Arne Arnesen, CU-Denver Director of Corporate Programs, at (303)893-8521 to receive a program brochure and registration form.

Special Note: A simultaneous, live (interactive) broadcast of this program is being hosted by the University of Colorado-Colorado Springs (UCCS) Division of Continuing Education on the UCCS campus. Ask for details when you call.

IEEE Student Activities

By Don Cottrell

The Denver Section has always been a strong supporter and sponsor of student activities; this upcoming academic year will be no exception. One of the main events with which the Denver Section is involved is the Area A Student Paper Contest. Area A has 14 schools from Colorado, New Mexico, South Dakota, Texas and Wyoming. Usually, one or two of Area A's top two contestants are also winners in the Region 5 Student Paper Contest, although last April we didn't place in the top three. We hope to do better in 1991.

The contest prizes are provided by the Denver Section: the first place winner and student branch of that school both receive \$150; the second place contestant and student branch of that school both will be awarded \$100; and the third place contestant and student branch both will receive \$75.

At this point in time, Region 5 is planning to implement a new plan for the Area Student Paper Contests, which will eliminate travel and the large expense associated with it. Briefly, the student branches would each have their own local contest with a written IEEE student paper and an oral presentation. The oral presentation would be video taped and mailed, along with the written paper to judges from the

Area. The judges would select the winners who would compete in the Region 5 contest to be held in Laramie, Wyoming around April 13, 1991. It is hoped this new format will eliminate a lot of expense and travel time for the large areas we have in Region 5.

Another student activity with which the Denver Section is involved through our members is the Student Design Contest, which will also be held in Laramie, Wyoming around April 13, 1991 at the University of Wyoming. In this contest, two students from each represented university are given a design problem, with the necessary components and asked to design and build a workable circuit in approximately an eight-hour period. The student team must optimize, test, and prepare a short report of their design. After this, each project is viewed and evaluated by two or three judges in accordance with the contest rules. Winners (the top 10 teams) are announced at the evening banquet with the winners being awarded (even the runners-up) a suitable prize provided by companies like Hewlett Packard and Texas Instruments. This has been a very popular event the last two years; twenty-three universities from Region 5 were represented in last year's design contest in Little Rock.

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IEEE PES/IAS 1990/1991 Seminar Schedule

Friday, February 8, 1991
8:00 a.m. - 12:00 noon
"Analysis of System Harmonics
Due to Adjustable Speed Motor
Drives"

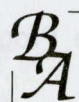
Friday, April 5, 1991
8:00 a.m. - 12:00 noon
"Fundamentals of Relay
Protection"

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Brush Power Project

by Walter H. Rowell, Jr., Sr. Project Manager, UE&C

The Brush Power Project is a 50MW cogeneration project developed by Colorado Power Partners and will be completed in October, 1990. The plant is a combined cycle configuration consisting of two combustion turbines and one steam turbine with an 18-acre greenhouse for production of tomatoes. Power is sold to Public Service Company of Colorado, and the tomatoes will be marketed over a broad area through the major grocery chains.

The prime movers are two Westinghouse 251 combustion turbines. These 1969 units were purchased from Philadelphia Electric Co., moved to Brush, Colorado, completely refurbished and reinstalled. Because of the used equipment, there is complete redundancy. Only one machine runs at a time, and one is an operable spare. The combustion turbines have been converted from oil to natural gas fuel, and from air to water cooling. Water injection has been added for NO_x control.

The gas turbines exhaust to a new heat recovery steam generator (HRSG) which raises 270,000 pph to drive a steam turbine in combined cycle. The Vogt HRSG also produces 900,000 pph of 190F water for use in the agricultural plant which is also part of the project. The HRSG utilizes auxiliary duct firing for full output.

The 30 MW steam turbine is a 1948 General Electric two-flow machine with 850 psig, 900F throttle conditions. It saw little service after a 1968 overhaul, and was purchased from a utility in Columbus, Ohio. Like the gas turbines, it was completely refurbished. Along with the steam turbine, a used condenser, feedwater heaters, boiler feed pumps, and other accessories were reinstalled. The piping is new, as are the condensate pumps. A deaerator was added to the cycle. The steam turbine generator building is an outdoor design with a removable enclosure over the machine. A 40-year old refurbished gantry crane is provided.

The generators all have used 13.8 kV switchgear including generator breakers and feeders to auxiliary transformers. 4160 volt and 480 volt gear is also used. A 115 kV substation was purchased from an idle smelter facility in southern Arizona. The yard includes a 50 MVA 13.8/115 kV step-up transformer, two 115 kV OCB's and auxiliary equipment. A used 115 kV grounding transformer was also purchased. It has a 4160 tertiary rated 7500 kVA which is used for station service. A 3-mile 115kV line connects the plant to PSCO's Beaver Creek substation east of Brush. The plant can be dispatched by PSCO over a microwave link to Lookout Mountain via the Pawnee Station.

The plant operates over peak and shoulder hours only. A buffer thermal storage system allows independent production and use of waste heat. The BTU storage is in six 560,000 gallon insulated tanks. When the power plant is operating, water is taken from the cold end of the tank farm, heated in the HRSG and returned to the hot end. The greenhouse heating pumps circulate the same water in the other direction, when required.

The greenhouse is two 360' x 1140' fields covered by two layers of 6 mil. plastic. The greenhouse, auxiliary equipment building and packing house are served at 13.2 kV from local PSCO distribution. There is a non-synchronous emergency tie between the power plant auxiliary bus and the greenhouse supply. Each greenhouse contains 90,000 plants. Total annual yield will be 5 million pounds of tomatoes. Temperature and humidity are controlled, and the irrigation system delivers nutrients to each plant. Fertilizer mix is computer controlled with feedback loops from each row of plants.

The extensive application of used equipment results in a plant capital cost of less than \$500/kW. The combined cycle and cogeneration configuration create operating economies not possible with the individual units, each on their own.

General Electric/Power Systems Engineering Seminar Series

The Joint Power Engineering/Industry Applications Society with Public Service Company of Colorado is interested in bringing General Electric instructors to Denver to provide the following two seminars:

Electro-magnetic Transients and Insulation Coordination
Geomagnetically Induced Currents: System and Equipment Impacts

Please contact Fred Jones at (303) 299-5266.

City Electrical Engineer

Responsible for planning, designing, load management, construction specifications, and bid process for an electrical transmission and distribution system for approximately 7000 customers. This position reports to the Director of Utilities. A Bachelor's degree in electrical engineering and four years of experience required. Registration as a Wyoming Professional Engineer is required within one year of employment. The salary for this position is \$3147 - \$3730 per month plus benefits. Apply to the Personnel Office, City of Gillette, P.O. Box 3003, Gillette, WY 82717; 307-686-5203. EOE.

Calls For Papers

IEEE USA 7th Annual Biennial Careers Conference Change & Competitiveness & Careers

Denver, Colorado
October 1991

This conference is a national forum on all aspects of technical careers, with the goal of contributing to the nation's competitiveness and to improving individual careers in a rapidly changing world.

Papers are invited on any aspect of engineering careers and the organizational and government practices that affect those careers, based on data, experience, or on expert opinion.

Address all correspondence and questions to:

William R. Anderson
IEEE-USA
Suite 1202
1828 L St. N.W.
Washington DC 20036
(202) 785-0017

Schedule

500 word abstracts (6 copies) due 2/1/91
Notification - 4/1/91
Camera-ready paper - 8/1/91

Organized by the Career Maintenance and Development
Committee, Institute for Electrical and Electronics
Engineers - United States Activities.

International Symposium on Software Reliability Engineering 1991

Austin, Texas
May 17-18, 1991

The Second International Symposium on Software Reliability Engineering is sponsored by the IEEE Computer Society and its Technical Committee on Software Engineering, and the National Aeronautics and Space Administration. This year, the Symposium will convene immediately after the International Conference in Software Engineering.

SRES-91 will focus on the transfer of software reliability engineering research to the software development and management process.

Papers, Tutorials, and Panel Session Proposals are invited on methods, current best practice, data collection, accreditation of software and management issues.

Please address correspondence and questions to:

John C. Munson
Division of Computer Science
University of West Florida
Pensacola FL 32514
(904) 474-2989

Schedule

Submission Deadline - 11/1/90
Acceptance Notification - 12/15/90
Camera-ready copy - 2/1/91

Joint CS/IT Computer Society/Information Theory Society

Thursday, November 15, 1990
University of Colorado at Denver, Science Building, Room 138, 1150 12th St., Denver, 7:00 p.m.

Speaker: Dr. Tom Altman, Department of Electrical Engineering and Computer Science, CU Denver

"Sequential and Parallel Rough Sorting"

A number of practical applications may require only roughly or nearly sorted sequences, such as a sorted file in which the item values are occasionally updated. In many cases, the new item values may not differ greatly from the old ones. However, in replacing the old items with new ones, the sorted order may be disturbed. Since re-sorting the entire file is costly, it may be more efficient to leave it in a roughly sorted order. Algorithms can then be applied to obtain a completely sorted file. Dr. Altman will discuss sequential and parallel algorithms for sorting.

Please contact Rory Laiho at 924-7534 for reservations.

Conferences and Meetings

By John Tary

The Denver Section proposes, staffs, offers financial support, and acts as host for conferences and meetings.

Why?

True, these events do create visibility for our Section. Attendees do help our local economy with some returning as tourists. We however believe there is a more important reason for this effort.

When a conference or meeting are held locally, they provide an opportunity for our membership to grow professionally. They may attend and participate locally. Members can volunteer for committees and exert their style

of leadership. The opportunity exists to interact with prominent leaders in the electrical and electronics fields from throughout the world. They work together as a team toward a common goal; a successful and meaningful conference or meeting.

The goal of the Denver Section Conference Committee is to serve the membership by bringing at least one major conference and/or meeting to our area each year.

If there is a particular conference or meeting you would like to have hear, please let us know. Our committee will be happy to assist.

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Insert 8-1/2 x 11	\$ 200.00/mo.	

Business card ads must be actual business cards. All other ads should be provided in camera-ready format or additional set-up charges may apply. Inserts must be provided (quantity approx. 3800) and delivered to the printer.

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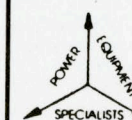
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The Month at a Glance

November 8, 1990
Reliability Society Meeting

November 13, 1990
VTS/COMSOC Meeting

November 14, 1990
PES/IAS Meeting

November 15, 1990
AP/MTT/GRS Meeting
CS/ITS Meeting (see page 6)

November 16, 1990
Front Range Software Quality Meeting

November 28, 1990
Executive Board Meeting

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