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THE SUNCOAST SIGNAL

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Joint MTT/AP/ED and IEEE-FWCS Meeting

Are Power Lines and Cell Phones Unsafe?

J. Robert "Bob" Ashley, IEEE Life Fellow

MTTS ®

Date/Time: 2001 January 16, Tuesday, 6:00PM

Location: Raytheon Systems Company, 1501 72nd Street North, St. Petersburg.
Gill Robb Wilson Conference Room

Reservation: Please E-mail Shawn O'Brien, skoa@eci.esys.com or phone (727) 302-3493
Please include name, phone number and citizenship

Abstract:

IEEE interest in this safety issue is shown by a full article by Dr. Kenneth Foster and Dr. John Moulder in the 2000 August IEEE Spectrum. Public interest in cell phone safety was shown by the CNN broadcast of the "Larry King Live" show on August 9 which presented a 41 year old neurologist who stated his brain tumor was caused by frequent use of a cell phone. The cell phone questions are variations on the long standing theme of low level or "non-thermal" effects allegations. The work of developing IEEE Safety Standards for microwave frequencies gives definitive theory to evaluate cell phone safety and other low level suspicions. As an active member of IEEE Standards Coordinating Committee 28, Professor Ashley is assisting the work of revising IEEE Std. C95.1-1999 *IEEE Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.* The committee has a 1,400 item data base on the general questions of RF/microwave safety that your speaker can access to further his understanding. General findings in the archival literature back the position of Drs. Foster and Moulder. Some of the suggestive recent and yet to be replicated research is being carefully monitored by the IEEE and FCC.

About the speaker:

J. Robert Ashley graduated with BSEE (1952) and MSEE (1956) degrees from the University of Kansas with prior and concurrent electronic technician (US Navy) and instructor experiences. He made major contributions to low noise oscillator theory, including inventing noise measurement equipment which is still a "gold standard" for transmitter noise measurements while an engineer with the Sperry Electronic Tube Division in Gainesville Florida. While there, he also obtained his Ph.D. degree from the University of Florida, aided by an NSF Traineeship. He commenced his academic career at the University of Colorado at Colorado Springs in 1967. He moved to Tampa in 1981 being active as an engineer in industry and an adjunct professor at University of South Florida. Technically and professionally he has been recognized by receiving the IEEE Centennial Medal in 1984; by election to IEEE's Fellow grade in 1986 for microwave noise engineering contributions, and by selection to IEEE's Instrumentation and Measurements AdCom, the IEEE Committee on Man and Radiation, and service on its Fellow Committee, Standards Coordinating Committee 28 and several conference committees. His current research interests are broad and range from electrical safety to rectifying electroacoustical problems in churches.

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All material for THE SUNCOAST SIGNAL is due by the Friday following the 1st Thursday of the month preceding the issue month. Address all correspondence to:
Quang Tang - Seminole Electric Cooperative, Inc.
P.O. Box 272000, Tampa, Florida 33688-2000
Voice: (813) 739-1222 Fax: (813) 739-1344
E-MAIL: q.tang@ieee.org

Chair's Comment

by Quang Tang

Happy New Year! I wish you and yours had a happy and prosperous holiday season.

I like to extend our thanks to my predecessor, Mr. Albert D. Rosenheck, for an outstanding job bringing our Section to the level where it is recognized by all Regions. Under his leadership, our Power Engineering Society won the Outstanding Chapter Award in 1999; The first Life Member Chapter in Region 3 is established in 2000; Teacher-in-service series pilot program to promote technological literacy among pre-college teachers and their students is also established in 2000; Conferences were held successful here in this area; Electronics newsletters are distributed to members besides hard copies; and many other accomplishment. And that's not all, Al will be back and chair the membership development area.

I want to thank you for your vote of confidence in electing me to serve as Chairperson for 2001. With great pleasure, I will be serving along with Section Officers John Twitchell, Vice Chair, Jules Joslow, Secretary, and John Conrad, Treasurer as well as a fine roster of Executive Committee appointees as shown in side bar on the left.

In January, we will invite our own Dr. Bob Ashley back to present "Are Power Lines and Cell Phones Unsafe?" due to many requests on this topic. For those of you missed this meeting in September, this is your opportunity to listen to Dr. Ashley, who holds 20 US Patents and the last five Patents as an independent inventor of power distribution efficiency enhancements.

Call For Volunteers

On Monday, 19 February 2001, the FWCS sponsored teacher in-service series will present its first program in the Hillsborough County School District. Mr. John Luce, PE, will present a two-hour program for teachers that demonstrates how to apply engineering principles to build working models using common household items.

Volunteers are needed to act as "lab assistants" by working with small groups of teachers during the "hands-on" segments of the program. If you are willing to help make our first program a smashing success please contact Doug Gorham at d.g.gorham@ieee.org

Students' Corner

by Daniel Faria

Happy New Year! I like to welcome all student members back to another exciting semester.

Our Senior Banquet went very well last month with supports from local engineering firms and Florida West Coast Section Executive Committee. Thank you very much.

IEEE-FWCS Life Member Meeting

Date/Time: Thursday, 2000 January 18, 12 Noon

Location: Buddy Freddys Country Buffet, Ruskin, Florida.
I-75 Exit 46, west towards Ruskin. First shopping center on the North side of the road.
Buffet Lunch $7.00 paid individually at the door. Lots of room, everyone is welcome!!

Topic: **Project GIGANTICA [ALTAIR] - The maturing of the electronic age**

Speaker: Mr. Bill Urich, retired Senior Systems Professional Engineer with GTE Sylvania.

Abstract: Designed to ARPA specifications for the army's Kwajalein Western Test Range, it featured a 1.5 x 8 foot Klystron operating at 200,000 volts and producing a 20 MW average 120 KW output. A VHF transmitter using a pair of vacuum tubes and producing 15 MW peak average 120 KW output. It also provided a two-axis 150-foot diameter twin frequency dish antenna that was controlled and stabilized by a computer program. Its receivers, with low noise (cooled) transisters provided an 80 dB dynamic range. Pulse compression techniques provided an additional 30 dB of system gain.

With a 100 channel digital tracker, it produced a complete digital record of each piece of Minuteman Missile from acquisition over Honolulu to impact in 40x40x60 mile Kwajalein Atoll located 2500 miles from Honolulu. Also when a Soviet Missile dropped into the Pacific ocean within 2000 miles of Kwajalein it produced similar data on its performance.

Speaker: As a Senior Systems Professional Engineer, Mr. Uhrich coordinated all of the engineering tasks [including the subcontractors] for GTE Sylvania - now General Dynamics. In the era of cost contracting, Sylvania bid and won a fixed priced contract to erect and operate this radar 7500 miles from their engineering facilities in Needham. Mass.

If you have any questions about this project you can e-mail Mr. Uhrich at Wurich80@aol.com. Time will not permit questions from the floor and questions submitted will be answered in the talks.

Mandatory Continuing Education for Professional Engineers

By Mark McKeage

During its 2000 session, the Florida Legislature enacted Bill 471.017 Renewal of License, which requires Professional Engineers to demonstrate continuing competency by completing four professional development hours (PDH) of training per year. Thus, for each two-year license period, Professional Engineers must complete a total of eight hours of training, four of which is in the Engineer's area of expertise, and four related to the rules and regulations under which he is covered. The Florida Board of Professional Engineers has stated that they will begin enforcing this Bill during the 2002 renewal period.

Professional Engineers are renewing this February do not need to demonstrate the completion of any professional development hours, but those who will be renewing in the future will need to.

Celebrate Engineering - Outstanding Florida West Coast Engineer

By John Twitchell

The Florida West Coast Section is joining with other engineering professional organizations to celebrate engineering during Engineer's Week 2001. As part of that celebration, we are going to recognize an Outstanding FWCS Engineer from among our membership. Here is your opportunity to nominate a fellow IEEE member for consideration by contacting any Section officer prior to mid-January with a recommendation. Information needed will include: engineering employment history, engineering contributions, achievements over career period and within the past 18 months, honors/awards received, membership in other professional associations, IEEE activities, and community activities. We will be happy to assist in the preparation of the nomination information, if needed.

2001 Engineers Week Banquet

I am writing to you early to announce our new Celebration of Engineering, asking that you will place it on your calendar, this coming Engineers Week Banquet being held on Saturday, February 17th, 2001. IEEE Florida West Coast Section has undertaken a momentous, new and invigorating approach to the traditional Engineers Week Banquet for 2001. Our past associations with this traditional format have left our leadership and membership with a sense of not adequately recognizing our member Engineers.

Hence, we have banded together with ASME (American Society of Mechanical Engineers), AFE (Association of Facility Engineers) and SOLE (Society of Logistic Engineers) to form a different and dynamic evening of Celebrating Engineering. It is clearly our joint sense and commitment to praise the work of the engineering profession and honor the 20th century, as the Century of Engineering. Our innovations have benefited the living conditions of people of the world, more than all advances in science since the dawn of civilization.

Our ***Celebrate Engineering 2001*** will be held at the Ramada Airport Inn at 5303 W. Kennedy Blvd, Tampa, Florida. We invite you and your family to proudly celebrate with us together the fantastic achievements of the past hundred years. Vendors will have displays at 6:00PM. The banquet will begin at 6:30 PM with music filled reception. Dinner at 7:30 PM; a lively keynote address by Dr. Win Phillips of University of Florida; lots of awards to deserving members, high school science teachers, etc. Then, toward the end of the dinner, the Manager of Mechanical Engineering from Disney World will show us some of their Imagination and Innovation in multimedia.

The banquet will cost $24. Come and join us in celebrating the accomplishments of our past heroes and those who have walked in their footsteps, helping create the greatest century ever!

Quang Tang, IEEE-FWCS Chair

2001 Review Seminars For PE Electrical and EIT/FE April 20 & 21 Examinations

Review seminars for the PE (Electrical) and Engineer In Training / Fundamentals of Engineering (EIT/FE) exams will begin:

Monday, Jan. 22 for the EIT/FE Exam
&
Thursday, Jan. 25 for the EE Exam

Seminars are conducted from 7-10 P.M. (Monday or Thursday) for ten weeks. The registration fee is $250 and includes text. The seminars will be held on the main USF campus in Tampa with several viewing sites available via FEEDS. Videos of all classes will also be available to registered students.

To register, contact: Alan M. Keith, P.E., PO Box 14042, (EC51), St Pete, FL 33733 or by email

Top on the List of Greatest Engineering Achievements of the 20th Century

Electrification

Widespread use of electric power has been one of the greatest sources of social change in the 20th century. It influenced the course of industrialization by allowing us to build factories farther from the sources of power, making large-scale manufacturing possible. It changed the face of cities in terms of growth and population, helped farmers increase production through labor-saving machinery, and contributed to a more highly educated populace, liberated from the drudgery of manual chores and labor.

Mass electrification in the United States required the expertise of thousands of engineers. Among them were pioneers who recognized that the natural resources of fossil fuels, water, and sunlight could be turned into electric power; and others who learned how to build the machinery to convert those resources to electric power. Still others learned how to transmit that power over wires and into our houses, barns, offices and factories. Their efforts allow us to awaken to an electric alarm, turn on the lights, toast bread, and use any number of electrical appliances or devices to prepare for the day.

In contrast, the average person in 1900 awoke to a hand-wound clock, often well before sunrise. In an era of kerosene lamps and lanterns, there was no electric light switch; in an era of outhouses and manual water pumps, no tap to turn for running water. There was no radio or TV for local or world news, and preparing for the day took a long time — getting coal or wood for the kitchen stove, using hand-tools to prepare food. Farmers had no electric motors or machinery to milk cows or process grain. Household chores were grueling: scrubbing laundry on washboards, heating heavy irons on the stove, or hauling cumbersome rugs to a clothesline to be pounded with a carpet beater.

At the start of the 20th Century, electric power was young but growing rapidly. Thomas Edison's work had led to the first commercial power plant for incandescent lighting and power in 1882. However, Edison's system used direct current (DC), which could only be profitably distributed in a limited area around the generating station. The work of engineers such as Nikola Tesla and Charles Steinmetz led to the successful commercialization of alternating current (AC), which enabled transmission of high-voltage power over large distances.

Prime movers in power stations evolved from water wheels to dams with a variety of turbines: reaction and hydraulic, fixed and variable blade, turbines that could be reversed to pump water into elevated storage wells, then reversed back to generate power. Each design innovation met the burgeoning needs of an increasingly industrial society.

Benchmarks along the way included the steam turbine generator in 1903, pioneered by Charles Curtis. It generated 5,000 kilowatts and was then the most powerful plant in the world. It marked a transition to turbine generators that required one-tenth the space and weighed one-eighth as much as reciprocating engines of comparable output. The next breakthrough was the world's first high-pressure steam plant, which further increased efficiency and brought substantial savings in fuel. The Edgar Station in Boston (1925) became a model for high-pressure power plants worldwide.

Adapting fuels to power generation was, and still is, an ongoing process. One early milestone was the use of pulverized coal, demonstrated in 1918 at the Oneida Street plant in Milwaukee. As steam pressures inched up in the increasing quest for more power, new materials such as chrome-molybdenum steel offered superior heat resistance in turbines.

But even as power plants and fuel resources became more developed, bringing electricity to the rural world was a low priority for power companies. The monetary return was minimal due to the small numbers of customers per mile versus the high cost of constructing a distribution line. Of the potential 5 million customers early in the century, only some 247,000 had electricity.

In spite of growing awareness that the country's economic development depended on a rural population with the same opportunities and amenities as people in the cities, a major push for this did not happen until the Depression. In 1935 the Rural Electric Administration (REA) was established, and President Roosevelt chose Morris Llewellyn Cooke — an engineer — to head it. He was charged with the following task: Electrify the majority of the continent, quickly. To make electricity affordable, Cooke instituted innovations that included standardized designs for distribution lines, mass

production and construction techniques, system protection, and wide area distributed power planning. It was a remarkable undertaking. Construction costs plummeted from $2,000 per line mile at the beginning of the project to less than $600 by 1939.

The impact of electric power on agriculture became as significant to the farmer as steam or gasoline had previously. Electric motors drove barn machinery, grain crushers, and water pumps. Eventually, the electric motor began to replace the mobile steam engine in equipment for threshing, winnowing, and other crop-processing.

Early public works projects built during the Depression are still major providers of electricity today. The hydroelectric generators of the Hoover Dam, built between 1932 and 1935, supply nearly 1.5 million kilowatts-hours of electrical power per year to people in Arizona, Nevada, and southern California. In 1933, the Tennessee Valley Authority (TVA) was launched to bring power and flood relief to the Tennessee River basin. It currently operates numerous dams, 11 large coal-burning steam plants, and two nuclear plants in Alabama and Tennessee. They produce more than 125 billion kilowatt-hours of electricity annually — almost 90 times that generated in the same region in 1933.

Since the early days of power generation and distribution, the use of various fuel sources has resulted in environmental consequences. As knowledge and experience with fuel sources has grown, new technologies have emerged to address these problems. The growing field of environmental engineering focuses on techniques for measuring pollutants, the development of clean fuel technologies, and other initiatives.

The electric power grid system continues to develop with a movement to interconnect grids into huge national or international networks. For example, in the United States, the whole country was linked into two giant grid systems by the 1990s, one serving each half of the country. This allows power produced in one state to be used thousands of miles away. Practical transmission voltages have increased steadily from 220 volts in the 1880s to 765,000 volts in 1999. Indeed, transmission techniques have now come full circle, with a return to DC transmission at high voltage. Made possible with semiconductor switches, the use of long-range DC transmission is just beginning — one of many technologies that hold promise in bringing further advantages in economy and reliability.

Electrification – Timeline

1903 Charles Curtis, steam turbine generator.

1903 William Le Roy Emmet, steam turbine.

1920s Charles L. Edgar designs the first high-pressure steam plant.

1927 Single-core paper-insulated cables designed to carry 132,000 volts are laid in the United States.

1932 Construction begins on Hoover Dam.

1933 Tennessee Valley Authority is established.

1934 First coiled-coil electric light bulb is introduced; increases the amount of light radiated.

1935 President Franklin Delano Roosevelt issues executive order to create the Rural Electrification Administration (REA), which formed cooperatives that brought electricity to millions of rural Americans.

1942 Grand Coulee Dam on the Columbia River is completed.

1942 There were 800 rural electric cooperatives with 350,000 miles of lines.

To view history and timeline of the other 19 Greatest Engineering Achievements in the 20th Century, go to web site http://www.greatachievements.org/.

Brain Teaser Challenge Column

by Butch Shadwell

December BTC Solution

Daydreaming is a wonderful thing. If you recall from last month, it was from this state of mind that Fredrick discovered electrolyzing water into oxygen and hydrogen. This BTC was to test your mastery of what may seem intuitively backward. Fred knew that hydrogen had a much lower mass than oxygen, more than 8 times lower. One might presume that if you had equal numbers of molecules of a gas (O2 or H2), at the same temperature and pressure, that the more massive molecules should take up more space. If one applies this presumption to the case of electrolyzed water, one would say that even though there are twice as many molecules of H2 produced, since O2 is so much more massive it must be a larger volume of gas.

However, all of the respondents to this problem being regular readers of this column, knew the gas laws well, and correctly predicted that the volume of hydrogen would be twice that of the oxygen. The mass of individual molecules of a gas are not relevant to the volume at a given temperature and pressure.

January BTC

Due to some recent developments, there has been a great increase in interest in developing better ballot reading technology here in Florida. I was recently contacted by a certain political party, to do a little applied research in the area of dimpled chad detection. Of course the goal of this sponsored research was merely to ensure that the will of the people, or at least the correctly thinking people, was properly accounted. They were disappointed when I explained that I probably could not detect what the original ballot caster was thinking during the brief time the ballot was in his or her presence. However, their spirits were lifted somewhat when I explained that if the ballots had a smooth reflective surface, we could scan the ballot with a laser and find all sorts of interesting sub-microscopic depressions that could be later divined to tell us the intent of the voter. (Who knows, we might even find the faint image of the face of the candidate of choice.)

I was pleased to report that if two competing chads were slightly dimpled, we would definitely be able to determine within a micrometer, which represented the intent of the voter (even if they were confused at the time). I'm not really asking for free consulting here, but I wonder if you readers might be able to name and describe how this method might work? If you are hesitant to send me your answer, do it in the spirit of helping those less fortunate, or least more confused, than you are.

Questions or comments to the Brain Teaser Challenge, please contact Butch Shadwell at 904-223-4465 (v), 904-223-4510 (fax), b.shadwell@ieee.org (email), 3308 Queen Palm Dr., Jacksonville, FL 32250-2328. http://www.se.mediaone.net/~butchs/

January 2001 Calendar of Events

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9 *EXCOM Meeting TECO Data Center 6:00 PM*	10	11	12 *Material Due For Next Month's SIGNAL*	13
14	15	16 *Joint Section & MTT/AP/ED Meeting, Raytheon 6:00PM*	17	18 *Life Member Meeting Buddy Freddy's Ruskin, 12 Noon*	19	20
21	22	23	24	25	26	27
28	29	30	31			

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