

RockIEEE Overlook

Newsletter of



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

September 1991

Electrical Engineering Milestone **Shoshone Transmission Line Gains Distinction**

More than 80 years ago, the Shoshone Transmission Line was designed and built in difficult conditions over a rugged section of the Rocky Mountains.

That achievement was recently honored by The Institute of Electrical and Electronics Engineers (IEEE), which designated the line an Electrical Engineering Milestone. A dedication ceremony was held at PSCO's Georgetown Hydroelectric Plant -- one of the sites along the original route of the line -- and company officials were on hand for the event.

Construction of the line started in late 1906 and service began on July 17, 1909. Power was generated by the Shoshone Hydroelectric Generating Station in Glenwood Canyon and carried to Denver. Originally operated at

90,000 volts, the line spanned more than 150 miles, crossed the Continental Divide three times and at one point reached an altitude of 13,500 feet.

"The line's length, as well as the rough terrain and weather conditions, presented engineers with a difficult task in maintaining a high degree of continuous service," said Charlie Wright, a PSCO retiree and member of IEEE. "But some of the original towers are still in use, and the Shoshone Plant continues to operate."

Construction of the line was completed solely by the efforts of men and horses. Because there were few roads, all equipment had to be hauled by wagon or on pack horses. Towers were assembled on the ground and then raised to an upright position by a system of ropes

and pulleys, and teams of horses. Although the Shoshone Line was notable for the size of territory the system served and its length, Wright said it was more notable for the extremely rough and mountainous country it was constructed in, along with the severe weather conditions existing at such high altitudes.



Society Chapter Meetings and Information

Joint MTT/AP/GRS Microwave Theory and Techniques, Antennas and Propagation, Geoscience and Remote Sensing

Tuesday, September 17, 1991

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

Speaker

Joe Pizzicaroli
Systems Engineering Manager
Radersat Bus
Ball Space Systems Division

"The Canadian Radersat Mission"

Radersat is a Canadian project with a mission of synthetic aperture radar (SAR) mapping for ice, oceans, renewable resources, and non-renewable resources. The satellite will be launched in 1995 and will have a 5-year mission duration. The radar system provides an antenna system which features C-Band (5.3 GHz) spectral coverage, has a resolution of 10-100 m, and a swath coverage of 50-500 km.

Please call Ron Vidano at Ball Aerospace, 460-2001 if you have any questions.

EMC

Electromagnetic Compatibility Society

Tuesday, October 15, 1991

Speaker

Ed Bronaugh
National President, IEEE/EMC Society

"Current Status of Proposed FEC-VDE-CISPR Regulations"

Contact Ev Evans, 761-9447, Mark Lapchak, 773-4626, or Bill Bryant, 977-6578 for more information.

Joint PES/IAS Power Engineering/Industry Applications

Thursday, September 19, 1991

Brooklyn's Saloon & Restaurant, 572-3999
2644 W. Colfax, Denver (under the viaduct)

6:00 p.m. Social

7:00 p.m. Dinner (optional @ \$10.00)

STUDENT IEEE MEMBERS DINNER FREE

8:00 p.m. Meeting

Speaker

Lynn Coles, Manager
Technology and Systems Analysis
Solar Energy Research Institute

"Renewable Energy: A Status Report"

Mr. Coles will review the major technologies from renewable energy resources. The electrical generation resources now under study and development are photovoltaic, solar thermal, biomass, advanced hydro, wind, and geothermal. He will discuss the present costs and performance associated with these resources, and where they may be headed in the future. He will also discuss utility planning and modeling issues for these technologies.

Please contact Barbara at Peterson Company, 388-6322, by Monday, September 16, 1991.

VTS/COMSOC Joint Vehicular Technology and Communications Societies

Wednesday, October 9, 1991

US WEST Advanced Technologies, Boulder

Contact John Hardzinski, 977-2224 for further details.

Chairman's Message

by Gary Petersen

Is it possible that Summer is nearly over? The September **Overlook** is just one of many reminders that Summer is coming to an end. The Denver Section had a busy Spring and Summer, with several activities of note.

In April, the Denver Section and Centennial Subsection hosted the Region 5 Annual Meeting in Laramie.

Thanks to the hard work and gracious hospitality of the Centennial Subsection (led by Sadrul Ula and many others at the University of Wyoming) we had a great meeting !!

This meeting brought together Region 5 officers, Section officers, Student Branch members and IEEE dignitaries. The primary purposes of this meeting are Section officer training, Student Paper/Design Contest competition and Region 5 business meetings. Eric Sumner, the current president of IEEE, was one of several IEEE dignitaries present for this meeting. Don Cottrell of the Denver Section received a special service award for his many years of dedicated service to Region 5 and the Pikes Peak and Denver Sections.

The PES Substation Committee met in Boulder in May with a very successful meeting, including record-breaking attendance. The Communications Society hosted ICC '91 in June with a highly successful conference attended by

1800 persons. Also in June, the Section co-hosted an Electrical Engineering Milestone Dedication ceremony in Georgetown to commemorate the historical significance of the Shoshone Transmission Line. In July, your Executive Board and Committee officers met for a picnic/planning session to set the stage for Section and Chapter meetings in the future. In August, Rory Laiho represented the Section at the Region 5 Summer Committee meeting in St Louis and gave a presentation on reviving chapters in need of assistance.

You may have noticed on the back of the **Overlook** that there are two new appointments to the Section Executive Board. Rory Laiho of IBM has agreed to serve as Vice Chairperson, member Services, replacing Don Cottrell, who retired from the University of Denver and moved to Arizona. Tom Gibbs of Fichtner/Lee Wan replaced John Barnick as Section Secretary due to John's extensive travel obligations. Welcome to Rory and Tom -- and thanks to Don and John for their many contributions to the Denver Section.

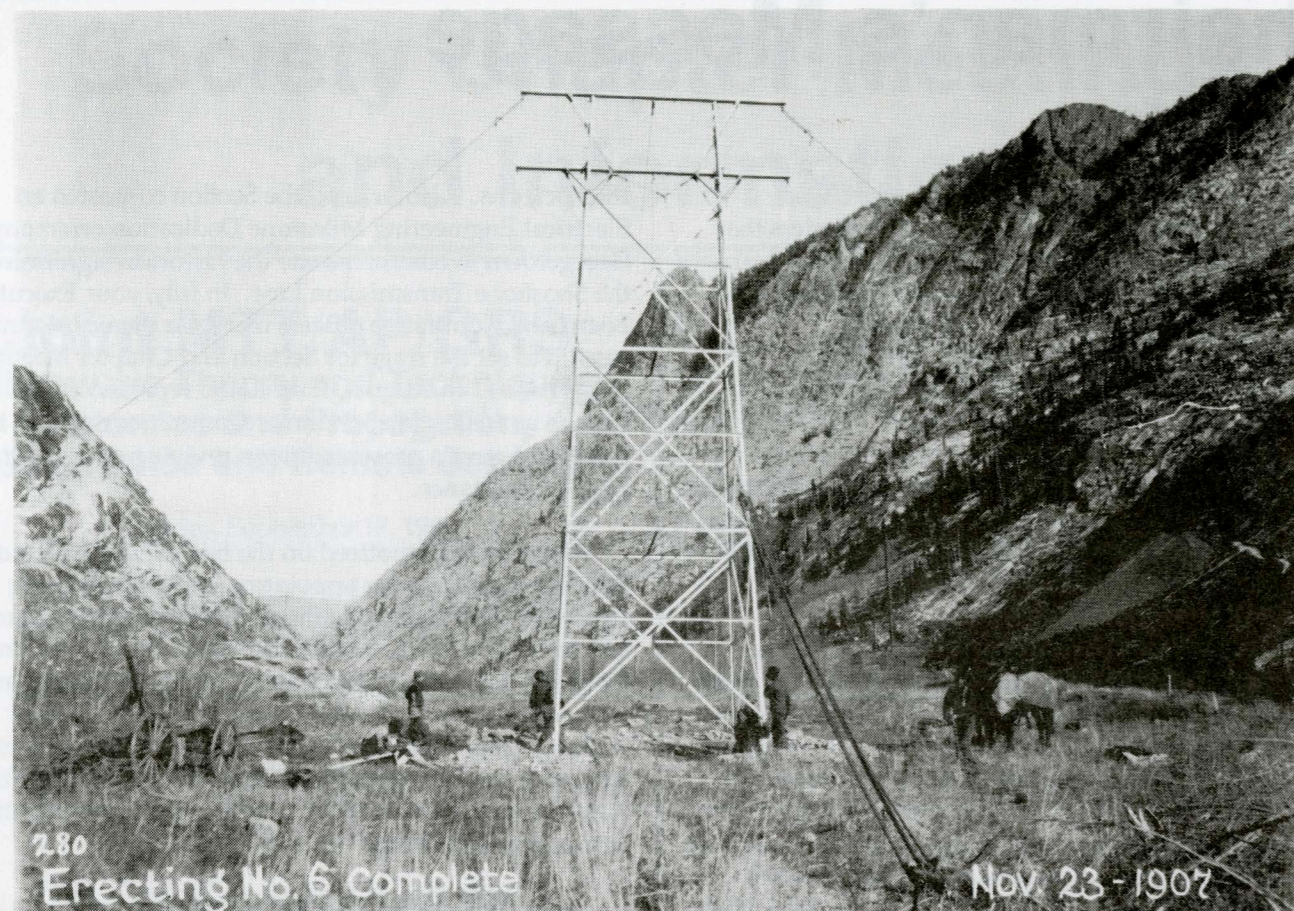
Your Section and Chapter officers are anxious to provide the type of technical and professional meetings you expect from IEEE. Your input can help us give you the kind of Chapter/Section activities you want. Please call any of us with your ideas, suggestions and comments for meetings, tutorials, and seminars.

Schedule of Conferences and Meetings

October 7-11, 1991	Boulder	Ant. Meas. Techniques Assoc.	Mike Francis	(303) 497-5873
October 10-11, 1991	Denver	IEEE Careers Conference	Bill Whipkey	(303) 830-4713
May 11 - 13, 1992	Denver	Vehicular Technology Conf. (VTC '92)	Jim Schroeder	(303) 871-3519
Sept./Oct. 1994	Denver	IAS Annual Meeting	Paul Meisel	(303) 469-2161
September 10-14, 1995	Denver	Petroleum & Chemical (PCIC)	John Nelson	(303) 431-7895
July, 1996	Denver	PES Summer Meeting	John Barnick	(303) 969-0391
1997	Denver	PES Joint Power Generation	Gary Petersen	(303) 329-1506
May 1997	Denver	MTT	Hussain Haddad	(303) 460-2114
			John Dunn	(303) 449-1055
			Claude Weil	(303) 497-5305

Proposed Conferences and Meetings

International Conference on Harmonics in Power Systems (ICHPS) 1994-1996
ESMO 1996
Sections Congress 1996
Transmission & Distribution 1997
ITC 2000



IEEE Electrical Engineering Milestone

Shoshone Transmission Line

Dedication Ceremony at Georgetown CO

June 22, 1991

Frederick Nebeker
IEEE Center for the History
of Electrical Engineering
Rutgers University, New Brunswick NJ

On 17 July 1909 the Shoshone Transmission Line began carrying power from the Shoshone Hydroelectric Generating Station, on the Colorado River near Glenwood Springs, across the Continental Divide to Denver. This power line was a pioneering achievement because of its 150-mile length, the mountainous country it traversed and the extreme weather conditions under which it operated.

The year the Shoshone Line went into operation was also the year William Howard Taft was inaugurated as the 27th President. When Teddy Roosevelt, thus relieved of the Presidency, then set off for Africa and big-game hunting, several conservative senators wished "health to the lions" and J. Pierpont Morgan said he expected the first lion Roosevelt met to do its duty. The 16th Amendment, giving Congress the power to levy an income tax, was ratified in 1909. Robert E. Peary reached – or at least claimed to have reached – the North Pole, and the Panama Canal was nearing completion. It was a time of suffragettes, the Anti-Saloon League, and ragtime.

In 1909 the American Institute of Electrical Engineers had about 7000 members – the IEEE has some 300,000 today – and the Institute of Radio Engineers – the other IEEE predecessor society – had not yet been founded. Still, electrical engineering was in some ways a mature profession. The professional society, the AIEE, was 25 years old, and its *Transactions* had been published for almost as long. A number of colleges and universities offered courses of study in electrical engineering. (In the year 1909 at the most influential of these institutions, the Massachusetts Institute of Technology, the director of the EE program, Dugald Jackson, appointed a new assistant professor, William E. Wickenden, an appointment which, as things turned out, led to closer ties between industry and EE education.) But perhaps the best evidence of the maturity of electrical engineering was in its products, and perhaps its most impressive products, in the year 1909, were three networks of electrical lines – telephone lines,

telephone lines, and power lines.

The telegraph lines began their spread in 1837 at Morristown NJ when Samuel Morse and Alfred Vail publicly demonstrated the instruments capable of sending messages over a 10-mile line. In 1844 Morse's line between Baltimore and Washington DC carried the first message, "Whjat hath God wrought." By 1851 there were 11 lines radiating out from New York City, and in 1861 the United States had a transcontinental telegraph line, which was honored last year in a Milestone Dedication Ceremony at Fort Laramie, WY. In 1866 regular transatlantic telegraph service began – there had been a short-lived success eight years earlier – and just four years later, in 1870, all the inhabited continents were linked by telegraph lines. In this country at that time an extensive network was in use – in fact, so much in use that many people worked on ways to send, over one line, more than one message at a time. In 1876 at the Centennial Celebration in Philadelphia, Elisha Gray demonstrated his device to send eight messages simultaneously.

Another man who worked on simultaneous telegraph transmission was Alexander Graham Bell. he achieved fame, however, with a different device, the telephone, which also was demonstrated at the Centennial Celebration. Telephone service between Boston and Providence RI began in 1880 and between Boston and New York in 1884; in 1892 it reached ou to Chicago. In 1909, as the Shoshone Transmission Line was being completed, John J. Carty, Chief Executive of AT&T was making a tour of telephone exchanges in the West and laying plans for transcontinental service. Two years later Denver was connected to New York, and in 1915 lines connected San Francisco and New York telephones. Demand was so great that in the next 15 years three additional transcontinental lines were completed.

The third network of electric lines, power transmission lines, owe their spread to the successful development of quite a number of devices, notably dynamos, electric lights, electric motors, and transformers. In 1870 Zenobe T. Gramme of Belgium built the first commercially

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

Shoshone

successful dynamos for the electroplating industry. In 1876 Thomas Edison turned from telegraph improvements -- that had been his main concern until then -- to the problems of electric lighting and power. In 1882 he opened his Pearl Street generating station, which provided electricity to a small area of Lower Manhattan. The first hydroelectric generating station, at Appleton WI, went into service that same year. In 1890 George Westinghouse's transmission line, from Willamette Falls to Portland OR, a distance of 12 miles, went into service, and the following year a 3-mile line at Telluride CO and a 100-mile line to Frankfurt, Germany, went into service. The use of electricity by local governments, by individuals, and by industries grew rapidly, as did the size of distribution systems. In 1909 Louis A. Ferguson in his Presidential Address to the American Institute of Electrical Engineers described the time as an "Age of Centralization", and an excellent example of this is the distribution system made possible by the Shoshone Line that opened that same year.

Thus, three networks of electrical lines spread across the country. Each of them grew from a single line to a dense web connecting all urban areas in a period of about 40 years: for the telegraph, from the 1840s to the 1880s; for the telephone and for power transmission, from the 1880s to the 1920s. The telegraph and telephone networks grew, for the most part, from east to west. The power network, on the other hand, grew from many centers. Some of the most important ones were in the Midwest, such as Samues Insull's system in Illinois, and in the West, such as Colorado's system which included the Shoshone Transmission Line.



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1992 Officer Nominees for IEEE Denver Section

The following individuals have been nominated by the Nomination Committee for the IEEE Denver Section for 1992:

Chairman
Sr. Vice Chairman
Vice Chairman, Members Services
Vice Chairman, Student Activities
Secretary
Treasurer

Paul Meisel
Lew Beck, Jr.
Rory Laiho
Doyle Ellerbruch
Tom Gibbs
Diana Lindstrom

Elections will be held at the IEEE Denver Section Meeting scheduled for October 16, 1991. Nominations for any position may be made from the floor at that meeting.

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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. 4225) and delivered to the printer.

Deadlines for 1991-1992

October 1991 Newsletter - September 2, 1991
November 1991 Newsletter - October 4, 1991
(There will be no December 1991 issue)
January 1992 Newsletter - December 2, 1991

February 1992 Newsletter - January 3, 1992
March 1992 Newsletter - February 3, 1992
April 1992 Newsletter - March 2, 1992
May 1992 Newsletter - April 1, 1992

Please make checks payable to Denver Section IEEE. Send business card or ad copy and check to:
Anita Wanberg, AMW, P.O. Box 4056, Englewood CO 80155-4056, (303) 220-8042.

The Institute of Electrical and Electronics Engineers - Denver Section

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4949 Colorado Blvd.
Denver CO 80216
(303) 388-6322

Past Chairman - **John R. Reesy, 755-1720**
Professional/Industrial Liason - **Dennis Edwardson**, Black & Veatch Engineers, 671-4245
Student Branch Activities - **Michael Meister**, National Telecommunications and Information Administration, 497-6571

Executive Committee (Includes Executive Board)

Standing Committee Chairmen

Society Chapters - **Ray Jukkola**, EMC Engineers, 988-2951
Educational Activities - **Pankaj K. Sen**, EE & CS Dept., Univ. of CO Denver, 556-2872, 556-2685
Conferences - **John Tary**, Tri-State Generation and Transmission Association, 452-6111
Awards - **Keith Henderson**, Electric Power Testing, 650-2218
Student Fund - **Diana Lindstrom**, 422-9374

Professional Activities - **Darrell Sabatka**, Public Service of CO, 329-1547
Nominations - **John R. Reesy**, 755-1720
Membership - **Don E. Lindahl**, Siemens Energy & Automation, 770-7907
Pre-College Student Activities - **Dan Michaels**, Ball Aerospace, 939-5139
Region 5 Director - **John E. Martin**, 233-0023

Executive Committee (Ex-Officio Members)

Subsection Chairmen

Black Hills - **R.D. McNeil**, Electrical Engineering Dept, South Dakota School of Mines & Technology, Rapid City, SD, 57701, (605) 394-2452
Centennial - **Sadrul Ula**, Electrical Engineering Dept., University of Wyoming, Laramie WY 82071, (307) 766-6268

Society Chapter Chairmen

Aerospace and Electronics - **Ed LeBlanc**, Transmountain Electronics, 393-9257
Electromagnetic Compatibility - **Mark Lapchak**, Metrum Information Storage, 773-4626
Engineering in Medicine and Biology - **Jim Heller**, 790-9010
Joint Antenna and Propagation/Microwave Theory & Techniques/Geoscience and Remote Sensing - **Ron Vidano**, Ball Aerospace, 460-2001
Joint Computer/Information Theory - **Brice Chapman**, Storage Tek, 673-4762
Joint Vehicular Technology/Communications - **Ken Shugg**, Martin Marietta Information and Communications Systems, 397-7417

Instrumentation & Measure. - **Richard Groves**, CO School of Mines, 273-3677
Joint Power Engineering/Industry Applications - **Bob Struthers**, United Engineers & Constructors, 843-2235
Laser & Electro Optics - **Arun K. Majumdar**, Univ. of CO Denver, 556-2715
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Power Engineering - **Kenneth McBryde**, CO Ute Electric Assoc., 249-4501
Reliability - **Rick Karcich**, StorageTek, 673-6223

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The Month at a Glance

September 17, 1991
MTT/AP/GRS Meeting

September 19, 1991
PES/IAS Meeting

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