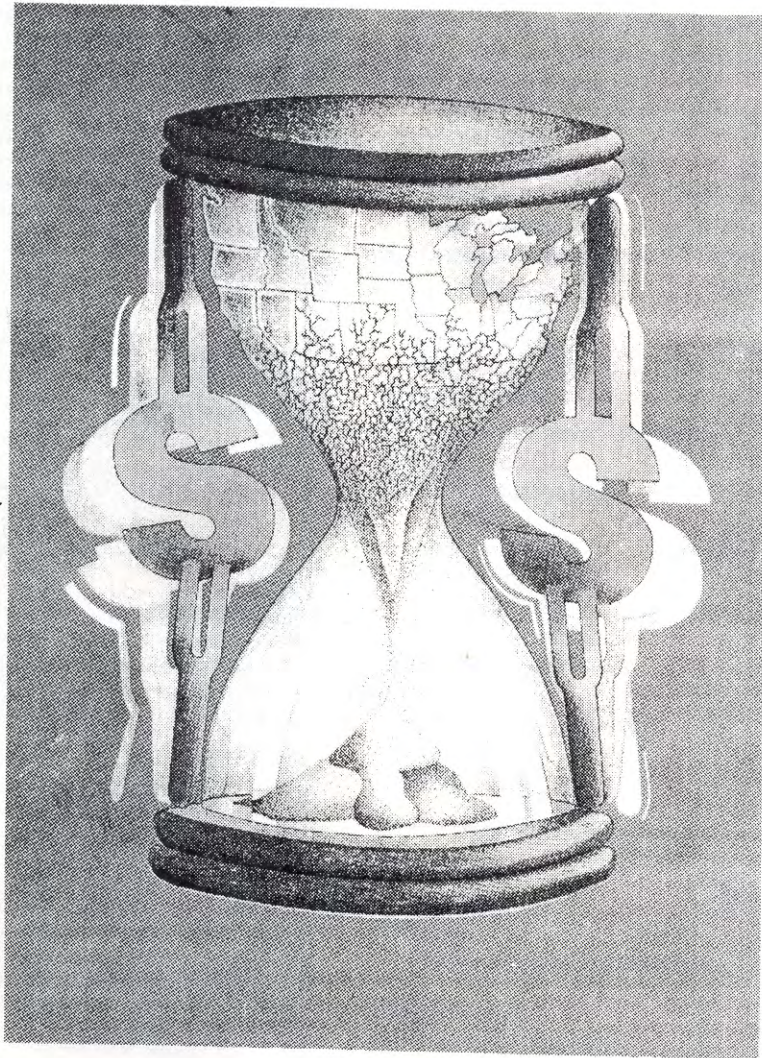


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THE CONTINUING INFRASTRUCTURE CRISIS

Story on page 8

1884  1984
A CENTURY OF ELECTRICAL PROGRESS





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DOUGAN'S NOTES

By James M. Dougan



August already! Where does the time go? Should we have our ducks all lined up - you might **still have time to join the fun** at Arrowhead. **Hurry!!** August 9th - Call C.S.E. at 433-3133.

If you can still find the June **Western Engineer**, you might reread two articles. The Feature article and the Engineering Times reprint. How far we've come, yet we lost an essential ingredient along the way.

August Anniversaries: Congratulations, gentlemen!

Donald Barnes	1947
John Duff	1962
Hugh Hempel	1940
George Hoagland	1938
John Knutson	1977
Arthur Peterson	1953
George Ruchti	1982
Stephen Sikora, Jr.	1932
Enrique Whistler	1932

It's great to have you as members in the Societies Golden Boys Club.

* Alvin Baumgartner	4/35
C. W. Bennett	4/19
Temple Buell	3/31
Mills Bunger	9/16
Frank Calkins	2/34
G. E. Dallemand	7/31
Robert Dudley	11/34
Kent Ehrman	1/33
Samuel Fingerman, Jr.	9/34
R. C. Gish	2/31
John Harvey	1/31

Albert Holland	11/34
James Howe	1/34
* Harlan Hugg	11/35
Frank Johnson	4/34
J. H. Knights	12/34
John Kreiling	12/34
Herbert Linn	11/34
Elmer Malm	4/33
John Marshall	12/20
William McLaughlin	7/32
Mark Mueller	9/33
David Nicholl	12/34
Joseph Parce, Jr.	1/34
* Orley Phillips	1/35
Marshall Reddick	12/32
Oliver Reedy	2/33
Harold Seely	2/34
C. W. Scoville	12/28
Paul Seyler	11/32
Stephen Sikora, Jr.	8/32
Melvin Smith	1/34
* Donald Sutherland	11/35
Paul Van Sickle	12/34
Robert Vance	11/34
Harold Weiland	6/34
David Weinberg	3/31
Enrique Whistler	8/32
Alan Woodward	10/34

Welcome to this year's additions (*) to a most prestigious segment of our Society. What a wealth of knowledge and experience upon which to draw.

George Frohlick continues his Valentinia Yard Sale — some real bargains on

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CONCLUSION

LAWRENCE M. ROBERTSON — AN AUTOBIOGRAPHY

I was a representative for IEEE and the Colorado Society of Engineers as well as chairman of the Legislative and Registration committees and was elected Vice President of the Council in 1947-1949 and President in 1949. This was very valuable experience in all aspects of engineering, technical, professional and educational activities. It also provided personal contact with the people involved.

In 1954, I received one of 14 Gold Medal Awards for engineering achievement from the Colorado Engineering Council.

I was elected a fellow of the New York Academy of Sciences in 1966. The Professional Engineers of Colorado gave me a Certificate of Outstanding Achievement in 1966 and the Alfred J. Ryan Award on May 30, 1969, for "long and devoted service as a professional engineer, for dedicated service, and for his advancement of his proud profession."

I have been a member of the Colorado Society of Engineers from 1944 to present and a Life Member. I was elected President in 1948 and Director in 1949. This is the oldest non-disciplinary engineering group in Colorado. The Rocky Mountain Electrical League is an organization of electric utilities and related suppliers, contractors and engineers. I am a Life Member, and was chairman of the Engineering Division from 1935 to 1940 and also in 1955.

I have been a member of the National Society of Professional Engineers and the Professional Engineers of Colorado from 1948 to date; I was a director in 1948 and a member of the Moffat Tunnel Committee for the State Highway Department. I received the Award for Outstanding Service on April 30, 1966.

I was a member of the American Geophysical Union Section on Lightning and Terrestrial Magnetism from 1945 to 1950.

I have been a member of the Conference Internationale des Grande Recherche Electriques a Haute Tension from 1946 to the present and was made an Attwood Associate on May 3, 1983. This is an international organization in

the field of high-voltage power engineering and founded CIGRE in 1925. It has members and committees all over the world and holds its meeting every other year in Paris. It is the recognized authority on the subject and its publications are sent to all members.

Charlie Wagner of Westinghouse and I were asked to present a paper on "The Leadville High-Altitude, Extra-High Voltage—500,000 Volt Line". This was the only such test line in the world.

I was also asked to serve on the National Advisory Board of Eta Kappa Nu, honorary electrical engineering society from July 5, 1955 to June 30, 1957.

"In the early 1880s, most residences were not wired for electricity. But the Denver Electric Company could supply special lighting and had batteries, lamps and wiring for use on special occasions."

The Edison Electric Institute (EEI) is the trade association of investor-owned and electric-owned utilities. It has many activities including engineering, operations, finance, regulation and research. The Public Service Company of Colorado is a member and I was appointed a member of several committees including Electric Equipment, Edison Award Nominations, Advance Developments, Space Conditioning Policy and two very active committees: Research Projects Committee (1952-1968) as Vice Chairman and Chairman 1965-1967. The E.E.I. received large sums of money from member companies and spent it on research projects relating to electric utilities. Proposals were made to the Board of Directors for study and recommendations pertaining to need, technically sound, reasonable cost and recommendations. The final approval was given by the officers. The usual sub-

jects related to electric transmission and distribution, cables, substations and generation. This was a very interesting job and valuable experience at the top of utility operation, needs, engineering, construction and operation. The government and public power company could not contribute funds, nonetheless, benefited from this and some employees would have liked to have been involved.

In 1972, the Electric Power Research Institute was formed. It has done a great job and is a valuable contribution to the industry. I was very happy to be involved from its beginning.

While I was on these committees the subject of direct current transmission was discussed as a solution of transmitting large blocks of power over long distances by overhead lines or cables buried underground or in the water.

A large electric manufacturing company in Sweden, ASEA, developed high-voltage rectifiers and a cable. An electrical tie was built from the Island of Gotland to the mainland by d.c. transmission with cables in the sea. This produced a great worldwide interest and the West Coast intertie was proposed. Equipment and material was purchased including substation equipment from ASEA. This line was from Silmar near Los Angeles to The Dalles near the Columbia River in Oregon. This line paralleled two 500 Kv lines and such an operation had never been done. There are a number of systems in the Los Angeles area, San Francisco and the Northwest with Bonneville as the receiving system.

The problems associated with alternating current were known but some theories were proposed regarding relaying in case of line faults on these systems going out-of-step with each other and to cease operation with outages of power.

The EEI set up a Research Project to study a small scale model in a laboratory on how systems of a.c. and d.c. similar to the West Coast intertie could be successful.

LAWRENCE M. ROBERTSON

Continued from page 4

Money was appropriated for equipment and a building in Philadelphia adjacent to the University of Pennsylvania campus, where laboratory equipment and faculty were available. There the Philadelphia Electrical company had engineers who were familiar with d.c. and a.c. operation.

The E.E.I. set up a Joint Task Force with William (Bill) Johnson, a top engineer at Pacific Gas and Electric Company. When he was chairman I was fortunate to be selected as a member of the new Research Projects Committee. This task force was set up in 1963 and went on for a short time after 1965.

This was a good experience in the new electric transmission method and it was a privilege to be involved. In fact, there are still a number of lines in existence.

I saw the line and substations in operation and also the 1,000,000 volt a.c. Test Line built near Salem, Oregon. This line has produced valuable information.

While I was chairman of the E.E.I. Research Projects Committee, two interesting projects were proposed and approved. One was to develop lighter weight and higher capacity batteries for electric cars and trucks. This method is used in many places.

In my younger days, I remember seeing small electric cars and delivery trucks on the streets. In the early 1880s, most residences were not wired for electricity. Air conditioning, refrigeration, laundry, electric blankets, microwave ovens and other appliances such as vacuum cleaners, radios, and TV were unknown. But the Denver Electric Company could supply special lighting and had batteries, lamps, and wiring for use on special occasions. The batteries were hauled to different locations in horse-drawn wagons and located outside. They were picked up the next day for recharging. Denver Gas and Electric Light Company had electric trucks and vans for service. Painted on the sides of the vehicles was the company name and "Electricity for Light—Power—and Transportation". This is still an active subject.

The company later supplied power to Denver, Boulder and the Denver Tramway Company. I knew the chief engineers of both companies very well. They

were excellent engineers, Mr. Edmonds and Mr. Nelson Love. But the competition of hard surface roads, cars, and trucks was too much so they went out of business.

Another project that was proposed to E.E.I. for research involved reverse osmosis for treating water. This process provides a special filter. Impure water can be forced through the filter and pure water obtained. Similar work was done at San Diego by General Atomic Lab on desalting sea water for boiler feed water. This method reduced costs by

"A proposal was made in the 1960's to obtain funds for research and development on a new fuel cell that combined fuel and oxygen without combustion to produce electricity, cleanly and efficiently."

eliminating boiling and condensation.

A proposal was made in the 1960s to obtain funds for research and development on a new fuel cell that combined fuel and oxygen without combustion to produce electricity, cleanly and efficiently. It was approved and after much work it will be "ready for the '90s". This proposal was very interesting.

The U.S. fusion research program was started in 1952 by the Department of Energy and many other nations. The Japanese IT-60 device will soon begin operating.

In 1962, I was appointed to be a member of the General Technical Advisory Committee of the National Power Survey by Mr. Swidler, chairman of the Federal Power Commission. He had decided that this study was needed. The work was completed in 1967 after five years. It was a very interesting job and included working with top people in the field.

Besides the General Technical Advisory Committee, there were special committees such as fuel, generation, transmission, planning and other items. We met once a month, at no cost to the government. There were engineers from major regions of the nation. I represented the Rocky Mountain Region. Mr. Swidler would usually meet with us and his own staff wrote the reports and did the detail work. It was very interesting to assemble, observing the ideas develop for the industry futures. It was also a great opportunity to meet and work with the staff and make valuable contacts.

I was also appointed to the Colorado State Board of Registration of Professional Engineers and Land Surveyors in 1957 and served through 1969, then was named chairman for the last nine years. This was a very interesting assignment. I met many engineers who were very great and leaders in the profession. I had always heard of these engineers and their accomplishments. This appointment was a lot of work but it was a service to the state and the profession. It was recognized by the Governor who appointed me to the National Council of State Boards of Engineering Examiners by certificates. I was Director of the National Council and was awarded a Distinguished Service Certificate in 1976. This gave me a feeling of satisfaction for the work, time and expense put into it.

Similarly, I was named a member of the City and County of Denver Licensing Board of Examiners of Motion Picture Operators (1956-1964). I was also appointed as a member of the Inter-county Planning Commission Technical Advisory Committee on Solid Waste Disposal (1968-1970) and later chairman. This commission has been part of the Denver Regional Council of Governments from 1969 to the present. This has been a very active group and provides interesting work.

I was also a member of the Denver Chamber of Commerce from 1949-1968 and Director in 1949. These were very active assignments and gave me an opportunity to meet prominent people in Denver, get acquainted with the problems and work being done in the area and help contribute to the community.