western engineer

Volume 69, Number 6

June 1985

ROBBIE... A LIFE OF ACCOMPLISHMENTS

Story on page 8

1884 1984

A CENTURY OF ELECTRICAL PROGRESS

COLORADO SOCIETY OF ENGINEERS

PRESIDENT'S MESSAGE

John E. Boring
President — Colorado Society of Engineers

Unless I'm impeached by the time you read this, I will be the 1985-86 CSE President, having been installed at the May 7 meeting. Several things have happened recently which you should all be aware of.

The first matter is a move of our office. Roberta Bourn and IMI moved on May 1 to new quarters at 2150 West 29th Avenue, Suite 310, Denver, CO 80211. This is just north and west of I-25 and Speer Boulevard. There is a map showing the location on page 14 of this issue. The new phone number will be 433-3133. Since the new quarters will be smaller, we had to get rid of some of our furniture. The small dining table and four chairs, the refrigerator, a credenza, table, typing stand and a wardrobe cabinet have been sold. The couch, chair, coffee table and three orange side chairs are stored at Dougan Construction's warehouse and we plan to set an auction at the May 7 meeting. We are keeping the large conference table and chairs, the bookcases and bar.

The second matter concerns the future of CSE. A committee of Jim Dougan, John Boring, Fred Dumler and Gib Rindahl met to consider the future of CSE, if any. Several alternatives were considered. Ironically our financial situation clouds this issue. We have enough money to continue for several years, even at a loss. The real problem is apathy. Newer members don't seem to be interested in becoming active members. Of course there are exceptions and the new faces on the Board of Directors are examples. Meetings and golf outings have paid for themselves this past year so the big financial drain has been the magazine. The publications committee assures us this is coming to an end because advertising has increased tremendously.

It was decided to continue CSE at the present time, to embark on a good memership campaign and to enlist new members' assistance in activities. If this is successful, so will CSE be. If not, CSE will probably degenerate into a "good ole boys" get-together occasionally to reminisce old times.

Continued on page 5

National Bureau of Standards Short Course on EMI METROLOGY

This course is designed for engineers, scientists, technicians, and managers from industry, government, and academia who are concerned with accurate measurement of electromagnetic interference (EMI). The course will be taught by the National Bureau of Standard's staff of experts and will combine lectures on the University of Colorado campus with equipment demonstrations at the nearby NBS Boulder Laboratories. A special feature will be a presentation by a representative of the Federal Communications Commission on FCC required practices and measurements. Topics will include open site measurements as related to FCC requirements, TEM Cells, shielding effectiveness, anechoic chambers, NBS measurement services, probes, reverberating chambers, EM environment, conducted EMI, and outband EMI.

Location: University of Colorado
Boulder, Colorado

Dates: August 6 through 8, 1985

Registration: $595

Contact: Registrar, (303) 492-8630
Office of Conference Services
Campus Box 153
University of Colorado
Boulder, Colorado 80309

WESTERN ENGINEER

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UNCLE JOHN'S FILE

by John C. Kreiling, P.E.

A great evening at the University of Colorado, last month. John Peebles, past society president, received a Distinguished Engineer Award. Those, among some 180 in attendance, were Leo Novak, Hugh Hempel, Tom Holleran, Gib Rindahl, Herbert Prouty, Lawrence Robertson and himself. Would liked to have seen more of members — caught only two bowties in the Ballroom, Jackson Fuller's and mine.

Fred Dumler, in an American Society of Civil Engineers presentation received a Life Membership award. The Bob Dougans moved back to Denver early in April, then back to Southern California because the weather was so inclement and prior to this writing, the heat at the desert proximity is about to reverse the nomadic sojourn — if only the weather here would settle. The Chet Andersens are in North Carolina assisting with the household chores as daughter Ann is recovering from surgery.

Wish we had some news of the younger member and juniors. However, I do have this list of NEW MEMBERS:

January
Molden Alvin Louis
Randolph F. Fleming
February
Michael Salazar
March
Emmy Booy
James R. Johnson Jr.
April
Richard Cox

Visited the Society's new office, of course to be shared with our executive secretary Roberta's IMI, Inc. activities. A turn-of-the-century six-story building that has been remodeled for today's occupancy. The site to me is more centrally located with convenient parking available in the rear and across the street.

We have lost our centenarian member Dan. W. Ormsbee, he had enjoyed his hundred and first birthday in March. He died April 3. Dan came to Colorado in 1933 as an Engineer for the Colorado Highway Department with residency at Lamar, and promoted to Highway Construction Engineer for the State in 1935. With the forming of Denver Metro Highway District, he became the District Engineer with the chief responsibility for design and construction of the Valley Highway. However, he did retire in 1955 for health reasons prior to completion of the route and as the construction of I-70 began. The family suggests donations to the Society or the Denver Public Library Engineering Division.

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RETROSPECT

By Fred Nagel

10 YEARS AGO

The May 1975 issue of **Western Engineer** carried on its cover a picture of the "Nation's first artificial white water chute to be built on the South Platte River in Denver. Ron Mason and Bill Simmons work on the hydraulic model at Bureau of Reclamation Laboratories." The feature article of this issue was "Platte River to be site of first man-made white water chute" by Tom Logan, USBR and Geoff Taylor, McCall-Ellingson & Merrill, Inc.

"The Platte River Development Committee (PRDC) appointed by Mayor William H. McNichols, Jr., and chaired by State Senator Joe Shoemaker, plans to develop a continuous park along the South Platte River within the city limits." Now in 1985 this has largely become a reality. Those of us who can remember the old tires, chunks of concrete and just plain junk that used to mark, or really mar, the river certainly owe Joe Shoemaker a great debt of gratitude. Thanks, Joe, for your great effort.

The article went on to describe how a study of a white water course in Augsburg, Germany was of great value to designers McCall-Ellington & Merrill, Inc. Ron Mason, an architect and nationally-ranked kayaker, was retained as a boating consultant. The chute was to provide a bypass, for boating, of the Fabridam, owned and operated by Public Service Company, to impound cooling water for the Zuni Power Plant at 13th Avenue and Zuni Street, near the Colfax viaduct.

"The PRDC requested and was granted permission to use facilities at the U.S. Bureau of Reclamation's Hydraulic Lab in Lakewood, where construction and testing of a model was done." It was heartening for this writer to read of such cooperation between the government agencies.

Also in this issue, the new officers and directors for CSE were announced for 1975-1976. They were President, Gib Rindahl; Vice President, Bill Borchelt; Secretary, Bob Bisgard; and Treasurer, Don Sutherland. The Directors were Prouty, Peterson, Hodgkin, Vail, Abdun Nur, Abel, Zimbelman, Haimowitz, Flook, and Howat.

20 YEARS AGO

An important item noted in **Western Engineer** for June 1965 was that entitled "Engineering Bill Passes Colorado Legislature; Two Years of Work by CEC Rewarded by Action." The article continues: "Through a massive effort of individual engineers and the various societies, the Colorado legislature has passed and sent to the governor a new Engineering Registration bill.

"Climaxing more than two years work, the Colorado Engineering Council spearheaded a drive to push the Engineering bill through the house of representatives, and through two separate committees in the senate, before securing favorable senate action within hours of cutting off debate on all bills.

"It is hard to believe that 30 years ago . . . the Interstate Highway system . . . with I-25 and I-70 . . . did not exist."

"Early in February, the bill appeared to be defeated when the Senate Business Affairs committee refused to release the measure for floor action. Proponents of the law argued it was necessary to pass the bill to 'upgrade' the Profession of Engineering in Colorado. Lawmakers were made aware the new law was badly needed, so Colorado Engineers, registered in the Centennial state, could have standards as high as other states and achieve reciprocity without additional examination.

"Among the hundreds of engineers who worked long and hard in getting legislative passage of the law were Emerson Ellett, S. Mark Davidson, Hugh Hempel, Sam Hawkins, and Hugh Stapp. Members of the board of registration and staff members attended hearings and were instrumental in explaining the points of the bill to the legislators."

Representatives George Fentris and Don Friedman, and Senators Joe Shoemaker and George Brown championed the bill against a small group of legislators who argued against registration of any type.

30 YEARS AGO

It is hard to believe that it was 30 years ago, only, when the Interstate Highway system as we know it today, with I-25 and I-70 everyday words, did not exist. In fact, in an article, "People — Cars — Money," written by John Kreiling of the Colorado Department of Highways, he intimated at things to come as if gazing into and reflecting on a crystal ball.

"Apparently tied in directly with the President's program is the plan of extensive improvements to the Federal Interstate Highway System. At the present time, Colorado has three such roads on that system — U.S. 87 running from the New Mexico line to the Wyoming border; U.S. 6 from Nebraska to Denver, and U.S. 24 from Kansas to Denver. **This State has no highway on the Interstate System west of U.S. 87.**

"Just recently, Utah has agreed to one of our east-west roads as an Interstate Highway, and Governor Johnson now is in Washington for the purpose of obtaining such designation. The Department of Highway is hopeful his mission will be successful.

"There's one more item — a tunnel under the Divide. As you know, the General Assembly has authorized the Department to proceed with the location of a site and the preparation of plans for such a highway tunnel. All such information must be submitted to the legislature at a future date, and the bill recently passed limits a bond issue for a tunnel to a total of $16 million. Whether a tunnel can be built for this amount cannot be determined until detailed plans, specifications, and estimates have been prepared. Core drilling of various sites, to determine the nature of the rock to be encountered, will be started by the Department as soon as snow is off the ground, and a report will be readied for the General Assembly as quickly as possible."

The above in retrospect might teach us a lesson to review as we consider Denver's plans to build a new airport, a new convention center, and perhaps a new baseball stadium.

UNCLE JOHN

Continued from page 3

OBSERVATIONS: The key punch telephones are like car door handles. About the time you get figured out whether to punch or reach you start using different equipment.

Stan Brown of KOA-KLZ radio fame, states "If you have a choice between the true love and AIDS, choose true love because it doesn't last as long."

I liked this by the late Fran Polsfoot of the Bronco football staff. "Hey none of us know how much longer we got, but we are all much better off fighting like hell for all we can get."

Then picking the following as a matter of amusement. I am firmly convinced that if the good Lord had been aware of the income tax, Moses would have come down from Mount Sinai with Ten Deductions.

Signs of time: Easter, at Mass several young ladies attended church wearing jeans — not new either. I've previously admired the enthusiasm of young ladies in their Easter finery — in this I am sure it wasn't a matter of such clothing being all they had. Slovenliness sure isn't a virtue for either parents or child

The time for "Auld Lang Syne" is here and I feel a pleasant emotion in that someone to take over with a similarity of continuance in mind is availabe. My grammar has never been perfect nor have my words always been pleasing to the Society Members, however, for more than thirty years as Fred Nagel's "Retrospect" stated in March issue, helping to provide a monthly personal touch to an otherwise stuffy professional publication has generally been a pleasure for the likes of me and may there always be such a column. August will be the beginning, rather than an end. We hope to see you all occasionally.

PRESIDENT'S MESSAGE

Continued from page 2

At the present time I ask two things of you all. First, call Jim Dougan, or write a note, thanking him for his efforts this past year as president. He has done a lot for CSE, getting our financial affairs in order, trying some new activities, getting meeting attendance increased, increasing revenue and improving our magazine. Not all these efforts have been successful but until we find what turns engineers and CSE members on, many will not be. Thank you, Jim, for all your time, effort, ideas and willingness to complete projects.

The second thing is to ask for your help - your time, effort and ideas to get CSE membership active in projects. If we don't do anything, potential members have no reason to join and current members have no reason to continue.

Help CSE take another step forward in 1985-86 (or perhaps two or three steps.)

Reverting to a Trade?

Engineers Technically Trained But Poorly Educated, Says Engineer/Philosopher

By Peter L. Porteous

Reprinted from ENGINEERING TIMES, April 1985.

Fearing that within his own lifetime engineering may "revert back from a profession into a trade," noted engineering philosopher Samuel Florman has called for the creation of "an engineering elite" to pursue excellence in the profession and leadership for the nation.

"I regret to say that I consider this [reverting back] a danger, a real danger, in this age of diminished idealism, vocational education, and corporate domination of engineering activity," Florman told consulting engineers at their first annual expo and management conference in Washington, D.C.

"We engineers are serving the national interest and serving it well," said Florman, himself a PE and vice president and co-owner of Kreisler Borg Florman Construction Co. in Scarsdale, N.Y. "But as the profession has grown and flourished and contributed, the social status of the engineer has declined and the likelihood of engineers' becoming leaders has diminished.

"I envision an engineering elite, a cadre of engineers who will concern themselves with matters beyond the purely technical — with politics, history, economics, and esthetics, with philosophy in its broadest sense."

Florman, a contributing editor of "Harper's" and columnist for "Technology Review" who has written there books and numerous articles on the relationship of technology to the general culture, continued:

"When Tau Beta Pi, the engineering honor society, was founded in 1885 — exactly a century ago — the preamble to its constitution spoke of 'distinguished scholarship and exemplary character,' of both 'attainments in the field of engineering' and a 'spirit of liberal culture.' Those forebearers of ours weren't afraid to set their sights high and I don't think we should be afraid either."

Consulting engineers already form a sort of elite within the profession, Florman told his audience, and they should strive to broaden their influence. They are, he said, a link with the great, independent engineers of the past. As an example of a current engineer/leader, however, Florman chose a member of a large industrial company, Erich Bloch, who until his recent appointment as head of the National Science Foundation, was IBM's vice president for technical personnel. This just points out, Florman would surely say, that the entire engineering profession must provide more individuals who, like Bloch, take an active role in professional societies, meetings, conferences, study groups, and task forces, something Bloch has done throughout his career.

Decision Making

"It is important to have engineers in decision-making roles so that the decisions are timely, not belated; rational, not frenetic; and sensible, not ill-considered," said Florman. "Occasionally engineers are called upon to give advice, but giving advice is not the same thing as participating in a decision.

"Our nation is run by lawyers and businessmen, bureaucrats and economists, PR men and wizards of the media.

"And, if we would be honest with ourselves, we must admit that this is partly because we do not seem to care. We do not seek positions of leadership. Most engineers are content to solve technical problems and leave the driv-

ing — the driving of society — to others.

"Some engineers are so deeply involved with theories and numbers and spatial concepts that they have little energy left to devote to other matters. But I don't think that [this] explains more than a small part of engineering apathy. A more significant cause, I believe, is the lowly position that so many engineers occupy in the industrial world.

"Many of these employee-engineers feel exploited and far removed from the wellsprings of creative professionalism . . . A generation ago polls showed that most engineering students chose the field because it offered 'interesting work.' Today one hears more and more about engineering as a way to make a good living."

Florman added that American engineers today are still burdened by historical traditions inherited from the British, who stressed practical experience, the "shop culture," at the expense of science and formal education. In contract, he noted, the French tied engineering to science through great polytechnic institutions and elevated it to a learned profession, a tradition that spread to Germany and the rest of the continent.

"To this day," Florman said, "I hear arguments between those who wish to elevate the status of engineering in every way possible — educationally, professionally, ethically, and socially — and those who scorn what they call an elitist stress on credentials."

Few Get Licensed

"We certainly want to preserve the best of our tradition of craftsman ship . . . But carried to extremes, it leads to an anti-intellectual attitude that has deplorable effects. It leads to a so-called profession in which less than half the members bother to get a professional license or even to join a single professional society, and less than a quarter consider taking more than a bare minimum four-year bachelors degree.

If we wish to see engineers respected, and hope to see engineers among the ranks of leaders, then we will have to keep in mind the other part of our heritage — the elite tradition of the French polytechnic . . . Whenever engineers are addressed with respect — for example in Latin America — it is the continental tradition that is at work, as opposed to the British."

The problem of low status in the U.S., Florman declared, begins with American engineering education. Whereas entry into other professions — from law and medicine to dentistry and veterinary medicine — takes seven years and more, entry into engineering remains basically at the four-year mark. Schools that introduce five-year programs usually drop them under the pressure of economic competition, Florman said.

"Incredible as it may seem, Dartmouth is the only school in the nation that requires engineering students to acquire a B.A. degree enroute to a B.E. in a program that takes five years to complete," said Florman, a Dartmouth College graduate.

Don't Rock the Boat

The reason? "In engineering there simply is no constituency for change," Florman believes. Large corporations are happy to hire the current graduates and to use many of them in subprofessional jobs; students are anxious to begin earning money as soon as possible, and engineering schools are reluctant to rock the boat, according to Florman. The average engineering student, he noted, takes a four-year course with a 12½% accreditation requirement in the liberal arts.

"While more and more Americans are getting college educations," he declared, "most engineering graduates are essentially high school graduates with technical knowledge. Thus vis-a-vis our fellow citizens, we engineers are every year less and less educated."

To Florman, "the worst of it is that because they bypass an education in the liberal arts, engineers are largely unable to communicate well. They lack understanding of people and their passions, they lack knowledge of history, philosophy, esthetics, and politics. Add these handicaps the other factors I mentioned — the intense concentration with which some engineers approach their technical work, the increasingly subservient position of engineers in large corporations, the lowly place of engineers as inherited from British prejudices, and we have what appears to be a pretty grim situation."

PART I

LAWRENCE M. ROBERTSON — AN AUTOBIOGRAPHY

I was born January 20, 1900, so my mother said my birth came "just 20 days after the Twentieth Century." I was born at 946 11th Street in Auraria, which was on the west side of Cherry Creek in Arapahoe County, at the junction of Cherry Creek and the Platte River.

There were many small towns in the area so over the years I have had a good opportunity to see the growth of these communities including an Indian camp on the bank of the Platte River about 1,000 feet south of Colfax Avenue, on the south side of Auraria.

My grandfather, William M. Robertson, was born in Ohio in 1844, to parents whose grandparents came to the U.S. from Scotland. In 1861, at age 17, my grandfather enlisted in the U.S. Iowa Cavalry and served through the Civil War. He attended school for a year and a half studying medicine at the College of Physicians and Surgeons at Krabush, Iowa. He graduated in 1870 and practiced until the fall of 1882 when he went to Chicago's College of Physicians and Surgeons. He took a post-graduate course and graduated March 10, 1883, then came to Denver in 1884.

A son, Hugh L. Robertson, my father, was born September 14, 1873. He became a Rock Island Railroad fireman in 1898 and an engineer in 1902. We lived in a two-story brick house built in 1890 located at 946 11th Street in Auraria.

Eleventh Street ran northwesterly, parallel to Cherry Creek, to the north side of town and also at right angles to the main street, Larimer, which was named after a founder of Denver. There was a two-story building with very thick walls on 11th Street. Lord's Drug Store was on the first floor of this building and my grandfather's office was on the second floor. Once I asked my grandfather, "Why the thick walls?" He replied that if the Indians went on a rampage it would be a place of refuge.

Harry Huffman also had a drug store down the street at Colfax and Lipan Street and there we attended the first motion picture theater, The Bideawee, for a nickel!

About two blocks farther north on Larimer Street were the Rio Grand Railroad tracks and a gas manufacturing plant, built in 1880 for the city's first street lights. Combustible gas was produced by baking coal and the coke was removed from the ovens, then raked into water troughs to quench the hot burning coke. Tremendous volumes of steam and smoke filled the air. This contributed to the smoke from coal-burning furnaces, cooking ranges and water heaters in residences, buildings and industries. The pollution was very severe but it could not be relieved until natural gas was piped in from Texas. Gas was used for street lights and in some residences. My grandfather's house had lighting fixtures with double outlets for gas or electricity. He never used gas but we later lived in another house which had gas lights.

"Once I asked my grandfather, 'Why the thick walls?' He replied that if the Indians went on the rampage it would be a place of refuge."

In 1885, the Electric Company obtained a franchise for street lighting.

Coal had to be brought into our house from a wagon in the street with a wheelbarrow, dumped down a chute into a room in our basement, then shoveled into the furnace by hand. The ashes were raked out and hauled away — more dust and dirt. In my younger years, I had to help with the housecleaning — a big job done twice a year.

At this time the railroad locomotives were steam driven and burned coal. Power generating plants also burned coal. This meant there was a lot of pollution in the air but I never thought people suffered much as a result. My grandfather lived to be 87 years old and he smoked cigars incessantly; my grandmother was 75 when she died, but she was injured in a buggy accident; my father was 86, my mother was 92; my sister is 83, and I am 85.

I believe some factors contribute to our longevity. We all worked hard, were not involved with drugs or liquor and we took trips to Idaho Springs for hot mineral, radium baths and also drank the water. Of course, we now have pollution control measures so conditions are greatly improved.

Eleventh Street was the first street on the west side of Cherry Creek which had flash floods. At times, these floods washed out bridges and in 1862 the Rocky Mountain News shop was washed out.

My grandfather was elected to the board of supervisors of Denver, the forerunner of the City Council, at the time when Mayor Speer had plans for a boulevard on the bank of Cherry Creek and my grandfather worked on this project. Dan McQuaid, consulting engineer, (PE Registration Number 154), studied the floods and proposed that walls be built on each side of the creek to contain the waters, to reduce property damage and save bridges. He also proposed a series of small dams to improve the creek bed appearance. This plan was hard to sell but it was eventually completed from Market Street to Downing Street. He continued to try to sell the idea of clearing out the channel beyond the city limits east of town. Several floods occurred. The Army Engineers built the Cherry Creek Dam in Arapahoe County. McQuaid still tried to get the channel cleared and he was involved with many large construction projects as well. McQuaid and I were very close friends. He was within six months of turning 100 years old when he passed away on May 22, 1983. I had the honor of being asked to make a statement at his Mass of Christian Burial in the Most Precious Blood Catholic Church in Denver. Applause followed after I made my remarks. This was my first such assignment.

From 1906 to 1914, I attended elementary school through the eighth grade at Franklin School located at West Colfax and Lipan. My parents moved to 217 West 11th Avenue in

1914 and I went to the Broadway Latin School at Broadway and 14th Avenue. This school was for students preparing to go to college. I had made up my mind to pursue an engineering career. The last three years of high school were held in the main building of East High School at Champa Street and 19th Street.

I played violin for three years in the high school orchestra and was leader in my senior year (1918). In 1968, I was chairman of East High School's 50th Reunion held at the Brown Palace Hotel.

May of 1918 would mark the end of high school. I had planned to enroll in an engineering school in an electrical engineering program. However, World War I was raging and the draft was in effect, so I wanted to join the engineers in the military. I enlisted in the Student Army Training Corps at the University of Colorado in the summer of 1918 and was discharged at the end of the war on December 16, 1918. Even though this was a short stint I learned about the Army.

I continued my education at the University of Colorado and received the B.S. (EE) with honors on June 12, 1922.

This was a wonderful experience in engineering education and also a broader education in professional, social and business activities. I continued my education with graduate school courses and earned the Professional EE degree, which is comparable to a Ph.D., in 1927. At this time a Ph.D. was not given in engineering. I also received my M.S. (EE) 1938; and the honorary degree Doctor of Engineering in 1955. All my degrees were from the University of Colorado at Boulder. I also earned the LL.B degree at Westminster Night Law School in 1930. The school later merged with Denver University, College of Law, and the LL.B degree is now J.D., 1979. I attended the utility executive training course at the University of Idaho in 1955 and took an advanced course in accounting from the National Electric Light Association.

While attending these universities I participated in numerous outside activities. I am a member of honorary engineering fraternities — Tau Beta Pi, Sigma Tau, and Eta Kappa Nu; Honorary Legal Fraternity - Sigma Delta Kappa; Social Fraternity - Alpha Tau Fraternity; and Sigma Xi, the Scientific Research Society, 1984.

My experiences at the University of Colorado were many and great. I became friends with Dean Herbert S. Evans of the College of Engineering. He was liked and respected by all and was always available for help and advice. He was a fine administrator.

Another acquaintance at CU, Professor Mervin S. Coover, was a fine teacher and very well versed in electric railroads. He went on to Iowa State University as dean. He and I had many associations in the National American Institute of Electrical Engineers and he became the national President. I was elected national Vice President and Director.

I was in New York City attending an AIEE Director's Meeting when Mrs. Coover was seriously injured. She was struck on her side by a man who had jumped off the Empire State Building.

Professor Coover and I always kept in touch. When he was dean, he appointed me a member of the Iowa State

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ENGINEER'S CALENDAR — JUNE 1985

ACM

Association for Computing Machinery.

Boulder Chapter: No information at this time. For more information, contact Joe Lachman at 538-3872.

Denver Chapter: No information at this time. For more information, call the ACM answering machine at 988-4265.

ACSM

American Congress of Surveying and Mapping.

No meeting for June. You may contact Duane Senn at 695-7550 if anything comes up that needs attention.

AEG

Association of Engineering Geologists.

No planned meeting. For more information contact Mike West at 985-3308 or Susan Steele at 623-2500 ext. 547.

AICHE

American Institute of Chemical Engineers.

There are no meetings for June, July, and August. The next meeting will be in September.

AIME/SME

Society of Mining Engineers of the American Institute of Mining, Metallurgical and Petroleum Engineers.

There are no meetings for June, July, and August. The next meeting will be in September.

AIME/SPE

Society of Petroleum Engineers of the American Institute of Mining, Metallurgical and Petroleum Engineers.

There are no meetings for June, July, and August. The next meeting will be in September.

AIPE

American Institute of Plant Engineers.

There are no meetings for June, July, and August. The next meeting will be in September.

AIPG

American Institute of Professional Geologists.

No information available. Please contact Steve Krajewski at 534-3667.

ASCE

American Society of Civil Engineers.

Colorado Springs Chapter: There are no meetings for June, July, and August. The next meeting will be in September.

Western Chapter: For information, call Dave Sorenson at 320-6400.

ASHRAE

American Society of Heating, Refrigerating, and Air Conditioning Engineers.

There are no meetings for June, July, and August. The next meeting will be in September. The Energy Conservation meeting will continue to meet the 1st Wednesday of each month throughout the summer and next year. Meetings are held at 12:00 noon at King Soopers Headquarters, 65 Tejon. For more information, contact Steve Hultin at 433-6721.

ASME

American Society of Mechanical Engineers.

There are no meetings for June, July, and August. The next meeting will be in September.

ASPE

American Society of Professional Estimators.

There are no meetings for June, July, and August. The next meeting will be in September.

ASSE

American Society of Safety Engineers.

No information available. Please contact John Mayerle at 740-1680. June will be the last regular meeting until September.

CCSSE

Colorado Chinese Society of Science and Engineering (formerly CCEA).

Annual Meeting, June 8th and 9th. June 8, technical discussion. June 9, Golden China Restaurant, 1:00-9:00 P.M. Program includes agenda and the banquet. The cost is $15.00 for the dinner. Also membership dues will be due at the time. Please contact Dr. Paul Cheng for reservations and more information at 977-1871.

CEC

Colorado Engineering Council.

Installation of New Officers, June 12th. Cocktails at 6:30, dinner at 7:00, and program at 8:00. To be held at the Landmark Inn. For more information, contact Denise Goddard at 692-4185.

CECC

Consulting Engineers Council of Colorado.

Board of Directors meeting, June 25th, 4:00 p.m. General meeting, June 25th. To be held at the DAC. Cocktails at 5:30, dinner at 6:30, and program at 7:30 p.m. For information, call the CECC office at 757-3379.

CSA

Colorado Safety Association.

Events for June include:

2nd-8th — National Safe Boating Week.
4th-5th — Defensive Driving Course, 5:30-9:30.
5th — Industrial Committee meeting — "Transportation of Hazardous Materials."
6th — Back Prevention Seminar — Dr. Evans and Dr. Burton.
11th — Construction Committee meeting — "Drugs in the Workplace — How it Affects You."
12th-13th — DDC 8 — Instructor Development Course, 8:00-4:30.
14th — DDC 4 — Instructor Development Course, 8:00-3:30.
20th — Reinforcing Supervisory Skills, 8:30-4:30.
21st — Traffic Division meeting.
25th — Video Terminal Display — Training Program for Managers and Supervisors, 8:30-12:00.
27th — Motor Fleet Accident Investigation and Reconstruction Workshop, 8:30-4:30.
28th — Oil and Gas Committee meeting.

For more information, contact Bob Hopper at 629-6255.

CSE

Colorado Society of Engineers.

There will be no meeting in June. For more information, call the CSE office at 433-3133.

CSNHR

Colorado Society of Natural Hazards Research.

For meeting information, please contact Roy Spitzer at 744-7105.

DFCPEG

Denver Federal Center Professional Engineers Group.

For information please contact Floyd Summers at 231-1147.

EXTRACTIVE METALLURGY CHAPTER OF DENVER

(ASM-AIMR/SME)

There are no meetings for June, July, and August. The next meeting will be in September.

IEEE

Institute of Electrical and Electronics Engineers.

June 5-7, Mining Industry Technical Conference at the Colorado School of Mines. For more information, please contact Fred Leffler at 273-3672.There are no meetings for July and August.

IES

Illuminating Engineering Society.

This will be the last meeting until September. The meeting will be June 21, 1985 — Annual Golf Outing at the Foothills Country Club. Please call Gerry Kuhel at 426-8871 for reservations and more information.

ISA

Instrument Society of America.

There are no meetings for June, July, and August. The next meeting will be in September.

PEC

Professional Engineers of Colorado.

Boulder Chapter

June 12th - "Annual Summer Picnic" — Robert Patterson, P.E. Family event at Devil's Thumb Townhouse Complex, Bethaven Place off Lehigh and Table Mesa Drive. 6:00 P.M., potluck. Barbeque, fun, games, and swimming. The next meeting will be in September.

Comanche Chapter

There are no meetings for June, July, and August. The next meeting will be in September.

Jefferson Chapter

There are no meetings for July and August. The Jefferson Chapter would like to encourage everyone to attend the PEC Annual Meeting in Boulder, June 7th and 8th.

Metropolitan Chapter

There are no meetings for June, July, and August. The next meeting will be in September.

Northern Chapter

There are no meetings for June, July, and August. The next meeting will be in September. The Northern Chapter, however, would like to encourage everyone to attend the PEC Annual Meeting in Boulder, June 7th and 8th.

Pikes Peak Chapter

Joint meeting with Southern in Pueblo. June 5, 1985, LaRenaissance Restaurant, 217 East Routt Avenue. Social - 6:30 P.M., 7:15 P.M. dinner, meeting will follow. Please contact Dick Worrel at 590-7070 for more information and reservations.

San Juan Chapter

Picnic, June 20, 1985. Please call Jerry Zink at 259-2869 for more information. There are no meetings for July and August. The next meeting will be in September.

Southern Chapter

Joint meeting with Pikes Peak Chapter in Pueblo. June 5, 1985, LaRenaissance Restaurant, 217 East Routt Avenue. Social - 6:30 P.M.; dinner at 7:15 P.M.; meeting will follow. The announcements of new officers will take place at this meeting. Please contact Mark White at 545-5660 for reservations.

Ute Chapter

June 15, 1985, Installation of New Officers. There will be an "All You Can Eat" Barbeque, western style food. The cost is $6.00. There will be really good food! All PEC members and their spouses are invited to attend. For reservations, location, and discount motel information, please call Bryant Rose at 243-2242. The next meeting will be in September; there are no meetings for July and August.

PES

Pueblo Engineers of Colorado.

There are no meetings for June, July, and August. The next meeting will be in September. For information, contact Mark Koester at 1-594-4200.

PI/USA

Packaging Institute of America.

There are no meetings for June, July, and August. The next meeting will be in September.

PLSC

Professional Land Surveyors of Colorado.

There are no meetings for June, July, and August. The next meeting will be in September.

RMAG

Rocky Mountain Association of Geologists.

For information, contact Bill Precht at 779-0079.

RMWPCA/AWAA

Rocky Mountain Water Pollution Control Association/American Water Works Asociation.

There is a joint technical activity, monthly luncheon seminar at 11:30 A.M. at Holiday Inn North, I-70 and I-25 on June 4, 1985. Discussion will be on Ground Water Contamination. Call Suzanne Gainey at 771-0900 for more information and reservations. This will be the last meeting until September.

SAE

Society of Automotive Engineers.

For information please contact Cathy Sherepita at 744-4647.

SAME

Society of American Military Engineers.

Family Picnic. Date, time, and location to be announced. For more information, contact Tom Hicklin at 431-6100.

SSS

System Safety Society.

For information, contact Rich Tower at 977-9292.

SWE

Society of Women Engineers.

There is no meeting in June.

WIM

Women In Mining.

Georgetown Loop Tour, June 8th. Leave at 9:30 a.m. for Silverplume. For more information, contact the WIM office at 298-1535.

AACE 29th ANNUAL MEETING TO BE HELD IN DENVER

The Rocky Mountain Section - Colorado is proud to host the 29th Annual Meeting of the American Association of Cost Engineers in Denver, June 30 through July 3, 1985. The Radisson Hotel Denver has been chosen as the site, with its excellent facilities, for this special occasion.

The goal for this meeting is to bring people together who have a common interest in Cost Engineering and to provide a forum for the discussion of technical cost engineering matters. The meeting is intended to implement the basic objectives of the AACE, namely, to advance cost engineering through the application of scientific principles and techniques to problems of cost estimation, cost control, business planning and management science, profitability analysis, project management, planning and scheduling.

The outstanding speakers selected this year will present **over 75 papers and numerous workshops and panel discussions** on all facets of cost engineering to generate stimulating discussions and to provide ideas and knowledge for problem solving techniques for use in your future work. **Eleven continuing education seminars** will immediately precede the meeting. During the meeting vendors to the cost engineering profession will demonstrate the latest products and services available in **estimating, cost control and project management.** This meeting will be INFORMATIVE and EDUCATIONAL!

For more information contact Ben Curtis (303) 232-8952.

LAWRENCE M. ROBERTSON

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University-Marston Medal Board of Award, as AIEE representative.

Professor Frank A. Eastom came back in 1921 from a full term of service during World War I. He was in Europe in a machine gun company. When he returned to Boulder he was put in charge of the Electrical Power Laboratory at the University of Colorado at Boulder. Professor Eastom was a born teacher, loved and respected by all, and especially be me. He later worked several summers for me and did an excellent job as an engineer in the engineering department of the Public Service Company of Colorado. Once he wrote a story about the Eastom family's saw mill operation at Fraser, Colorado. He also wrote stories about the Civil War — which was one of his specialities. I was asked to preside at his retirement party. That was a great honor for me and I also received a very valuable letter.

In our senior year (1921-1922), two students and I rigged up a "CU" (voice) radio transmitter. With Frank's (Eastom) permission we had it on a table on the balcony in the d.c. lab. There we had communication with the first broadcasting station in Denver. The CU football stadium was immediately west of the lab building and we had a notion to broadcast a live description of the game from the field by moving the equipment from the lab over to the field. We could use the antenna on the building and supply power from the lab by running cables through the window to the station on the field. We got permission from Frank and made the move. Wallace "Tiny" Cassell was the announcer, Robert "Bob" H. Owen was the engineer and I was the engineer responsible for the power. This was the first broadcast of a football game. All went well until something happened to short circuit the power cables, which burned out the generator in the lab. This stopped the broadcast. Frank was very understanding. He had us checked out and he had the machine repaired. Then he said, "That's what you get for fooling around with 'sneak circuits'." That was his standard description of radio.

"The CU football stadium was immediately west of the lab building and we had the notion to broadcast a live description of the game from the field by moving the equipment from the lab over to the field."

Upon graduation, Cassell (who was very tall but was called "Tiny") taught at CU for a while. Then he went to Iowa State and taught radio. Bob Owen joined RCA in Washington, D.C. and I went to the Denver Gas and Electric Light Company.

I had heard that Frank had a great Army record during the war. When he was working in the office we would go to lunch together. One time I asked him about his record because he would never mention it. He said that he enlisted in the Army Engineers at the start of the war and was put into a machine gun company. He was shipped to Europe with the first units and was in the major engagements of American forces. Frank mentioned they went into the Argonne with a company of 200 men and came out with 13. He was one of the 13 and came out without a scratch, although they were in the front lines.

Professor Charles A. Hutchinson came to the University of Colorado in 1918 during our freshman year. He was Professor of Engineering Mathematics. I took all my math classes except one and also minored in mathematics in the Master's degree program under "Hutch". He and I were very close friends.

He started with some amazing performances. On the first day of class he had us write our names on a piece of paper. He then read our names and had each of us hold up his hand. He observed who was who and from then on knew us without the list. He assigned work from the book but he knew the problems and did not need the book. He could work out the problems on the blackboard with either right or left hand. He always had the answer if he was asked how certain mathematics applied to engineering. Obviously, there were no smart-aleck questions asked.

I worked hard during my first two years to get good grades and stay in school. In the last two, I became active in other activities.

I was Sports Editor of the engineer edition of the school paper. I tried out for

LAWRENCE M. ROBERTSON

the Player's Club and had parts in the plays performed by the English Literature Department. Three professors — Dr. and Mrs. George F. Reynolds and Professor Francis Wolle put on a group of one-act plays in each of the three quarters. Professor Wolle gave me parts. He had charge of the scenery and had me help out in the stage lighting and setting. This was quite a job since there were details we had to work out after the rehearsals. This was particularly true of the operettas. The woman had their May Fete in 1921 (odd numbered years) and could not participate in the operetta, so it was an all men's operetta. We had to round up costumes for the women's parts. Professor Wolle wrote and directed the entire show "Up in the Air" and the chorus line. Ham Beresford wrote the music and directed the orchestra. The operetta was a lot of work but it was a lot of fun.

My first job was as an office messenger at the Western Union office downtown at 17th Street and Champa in the summer of 1913, delivering messages to telegraph operators. They had Morse code sending keys, sounders and some multiplex receivers connected to lines to various parts of the country. I was very interested in the system and learned about electric circuits. This experience and my physics class in high school guided me to determine my objectives in engineering.

My next job was in the summer of 1914. My grandfather found me a job as office boy at the new building, built in 1910, for the Denver Gas and Electric Light Company offices. The building had outside lighting consisting of 13,000 bulbs and was a prominent landmark from 1910 to 1962. There were two large motor generators installed in the basement to provide 250/500 volt, direct current service to power equipment, such as elevators, pumps, fans and motors in a downtown power network that was also supplied by motor generators at the West Station at Colfax Avenue and the Rio Grand tracks on the west side of Auraria. This d.c. system was replaced with an a.c. network in the 1950s.

In 1910, I went with my parents to see the ceremony where the lights were first turned on by a pushbutton on a platform at the corner of the building. There was a large crowd for the event and great excitement. I was greatly impressed.

There were also ventilating openings on the side of the building on the sidewalk level for warm air to escape from machines in the basement. The sounds of rotating machines also came out these vents. My curiosity was aroused as I did now know what was going on inside the building. I found out when I went to work there in the summer of 1914.

A crew consisting of a head office boy and about four other boys was located at the rear of the ground floor behind the cashiers. There were pushbuttons at the officers' and department heads' desks as well as an annunciator board with numbered indicators for each caller and a signal for when a call was made. The head boy routed us to the origin of the call.

"The women had their May fete in 1921 . . . and could not participate in the operetta, so it was an all men's operetta."

This experience was a fine opportunity to meet and know outstanding people. We assisted when they wanted an errand run or needed messages and articles delivered. These great men included Wm. J. Barker, General Manager (Call 19); Chas. N. Stannard, Vice President (Call 127); John Mulvihill, our boss and head cashier (Call 9) — He later became manager and owner of Elitch's Gardens; Henry Kerr, Chief Engineer, Treasurer, Accounting and others.

I rode a bicycle to work, so I could take items to West Station. There I got to see the power plant and equipment in operation. The crews saw that I was interested since I asked many questions. They were great — always explaining and answering my questions. I was learning a great deal about the operation of electric plant equipment and meeting great men. My errands were usually directed to the chief engineer of the plant, John Brannan. He was a fine man and I got to know him better later when I was employed full-time by the company. It has been my privilege to know them all. These friendships remained for the rest of my life.

After finishing my errands, I would return to the plant. If I ran into a shower I could go down to the motor-generator room in the basement and dry out in the warm air generated from the machines. Rainy days gave me another opportunity to learn about electrical equipment and more incentive toward engineering.

William J. (Bill) Barker was well known and well-liked in Denver. He was sent to Denver in 1881 as an engineer in charge of installing "Old Sally", a 250 h.p. Wright steam engine with two 35 h.p. Brush-Swan direct-current, constant-current generators for the arc lights in Denver's East Station. This was the first electric machinery west of the Missouri River and the third largest in the United States. The plant was built by the Colorado Electric Company. Barker liked Denver, the company and the people, so he stayed and worked his way to the top of the company. He had a son, Jack Barker, who became a purchasing agent for the Denver Gas and Electric Light Company. I knew Jack very well. His grandson, Bill Barker, was a famous radio personality here.

One Saturday morning I answered Bills' "bell" on call. He gave me a check for $1.00 since I was the new office boy and this was his custom. He also gave me two dollars to buy some bananas for a picnic that afternoon. I looked up and down 15th Street trying to find the best buy. Later, when I handed the huge sack of bananas to him, he broke out laughing, saying 'We are sure going to have bananas to eat."

My next job was during the summer of 1915. My family had moved to 211 West 11th Avenue near Bannock. Our next-door neighbor was a machinist in the Chamberland Machine Shop, about five blocks away on Santa Fe Drive. The shop had an excellent reputation for good work on job lots and on automobile engines. They started me as an apprentice operating a large drill press that produced carburetors for cars and also other odd jobs.

The shop was full of power machines. Power was supplied by a large electric motor at one end of the room. It drove a long shaft at the ceiling which extended the length of the room. Each machine had a "power take off" supplied by a

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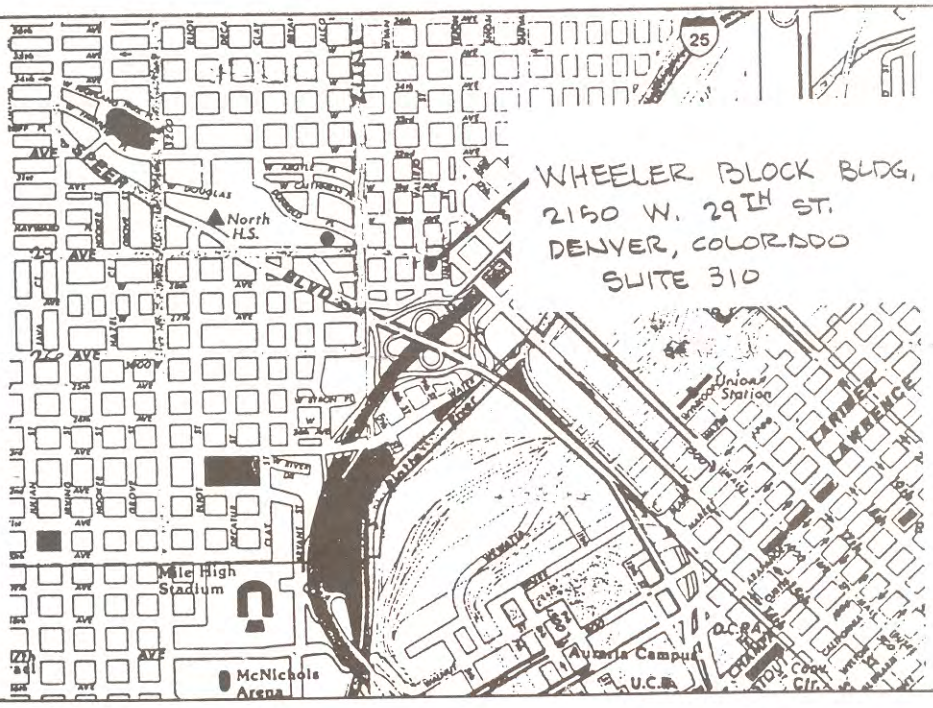
continuous belt from the power shaft down to the machine by pulleys. The shaft ran all the time, but there was a clutch, or shift, at each machine to stop it. This meant there was a belt and pulley running at all times. This was common practice at that time.

At 15 years old, I was the youngest worker in the shop, but there were machinists on each side. My operation was not too involved and I was shown what to do. One day when I did not have some work to do for awhile, I thought I would clean the oil and metal chips off the machine. I took a cloth and started to clean. I did not try to disengage the drive pulley since that looked too difficult. I apparently got the end of the cloth too close to the belt and it took the cloth away. I am sure the machinist next to me was watching because he was at my machine and with a bar took the belt off the pulley instantly. I was not injured but I was most thankful to him. He was a great craftsman and knew what could happen with the machinery and what to do and when. I learned about machines as well as men and their abilities and performance at the shop. I also was continuing my interest in engineering and people — they go together.

My next job was a two year stint (1916-1918, age 16-18) with the Denver Tramway Company. I was a conductor on trailers connected to powered cars. We were living at West 11th Avenue and Bannock so I was assigned to South Division which had headquarters at South Broadway and Alaska, a few blocks south of Alameda. The routes were from the downtown loop to Broadway, then Englewood and University Park or on South Pearl Street. These were long runs with heavy passenger traffic. Powered cars picked up trailers at the car barns at approximately 5 a.m. and ran for about three hours. The trailers were picked up again at about 4:30 p.m. on weekdays and dropped off at about 8:30 p.m The conductors and the motormen on the powered cars worked in shifts, but trailer conductors stayed on until the trailer was taken off. There were no paid vacations, overtime pay or sick leave, but it was a good job for high school and Denver University students. I obtained knowledge of electrical traction motors and controls. Also, this was great experience with the public. Many people with jobs were on a schedule and they would ride the cars at regular times. I got to know some of the regular passengers. Some were friendly, some were not, but I learned that you take it as it comes. I tried to help the blind, crippled and elderly people on and off the cars and received nice letters of recommendation.

To be continued next month.



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