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The Current Source

April 2014 Newsletter of the Schenectady Section of the IEEE

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Upcoming Events

The Basics of MRI, by Ezra van Lanen, Philips Healthcare
When: Apr 25, 2014, 12 pm – 1 pm
Where: Niskayuna Reformed Church 3041 Troy-Schenectady Rd (Rt. 7), Niskayuna, NY
Reservation: Please contact Lou Tomaino at schdyieee@yahoo.com to reserve. This event is free for IEEE members, $10.00 for non-members to help cover the cost of the room and food.

Symposium on Engineering and Liberal Education
Union College will be hosting the Seventh Symposium on Engineering and Liberal Education on Friday, June 6 and Saturday, June 7, 2014. The symposium website is: http://ele.union.edu. IEEE Schenectady members are invited to attend the symposium. Members may be particularly interested in the Friday evening keynote speech (from Harvey Mudd President, Maria Klawe) followed by dinner at no charge.
When: Fri Jun 6 – Sat Jun 7, 2014
Where: Union College, Schenectady, NY
Reservation: Attendees are asked to register at: http://muse.union.edu/engineering/ele-symposium/register/
Contact Shane Cotter at cotters@union.edu

The next Issue of Newsletter will be published on 9 June 2014. Article ideas are welcome!

Charles H. Holley
1919 – 2012

Elected in 1976

"Pioneering contributions to the evolution of turbine-generator design."

By James M. Fogarty

Chuck Holley, who passed away in 2012, was elected to the National Academy of Engineering in 1976. The following is a Memorial Tribute to Chuck Holley to be published by the NAE in 2014.

CHARLES H HOLLEY, active throughout his career in the electric power industry, died on October 9, 2012, at the age of 93.

Charles, or simply "Chuck" as people really knew him, was born in Pittsburg, PA and raised in nearby Ford City. Chuck attended Duke University and graduated in 1941 with a degree in electrical engineering. A tall man for the times, he was recruited by Duke to play basketball and was the starting center for the Duke Blue Devils during his years in Durham. A lifelong Duke fan, he returned to campus for several years in his 70's and 80's to play in the annual Duke alumni basketball games.

Upon graduation, Chuck joined the General Electric Company on GE's "Test Program" with assignments in Lynn, MA and Philadelphia before taking a position as a field engineer in Pittsburgh. Chuck came to Schenectady in 1945 and joined the Generator Engineering Section, which was responsible for the design and development of the large steam turbine driven generators used for electric power generation.

In the early 1950's, Chuck along with Charles Kilbourne,

also of GE, developed the concept of cooling the high voltage AC windings of power generators with liquid (oil) flowing within the copper conductors themselves. This approach allowed a step change in power density that all other manufacturers have since copied. The first unit, placed in service in 1956 at the Cleveland Electric Illuminating Eastlake plant, remains in service today.

In 1962, he was promoted to Manager of Generator Engineering and led a team for more than a decade that saw the size of power generation units increase from 300 MW to 1400 MW. In that period, Chuck led the development of new rotor cooling methods, extended the use of high-voltage water-cooled electrical windings to new levels, improved mica-based insulation systems, and introduced several new excitation systems. Many of those steam turbine-generators placed in service in the 1960's remain in service today - a testament to the thoroughness of the engineering and testing supporting those machines.

In 1974 Chuck was recognized for his leadership and technical capabilities by being promoted to General Manager of GE's Electric Utilities System Engineering Department. His stature and reputation within GE enabled him to extend the influence of this department. He was again promoted to Manager-Turbine Technology Assessment Operations, what a modern business would call a Chief Technology Officer. He retired from GE in 1983 after a stellar 42-year career.

Chuck was a Fellow of the Institute of Electrical and Electronic Engineers (IEEE). In 1978, he was awarded the IEEE Nikola Tesla Award for "For contributions to the evolution of turbine generator designs with achievement in performance and reliability."

Chuck served as a member of the US State Department/National Science Foundation delegation on Energy Development and Commercialization to the Soviet Union in 1979. He was also a US Delegate to the International Congress on Large Electrical Systems (CIGRE) for nine years and served on many industry technical and standards committees.

In 1993, in yet another recognition of his lifelong service, Duke University's Pratt School of Engineering bestowed upon Chuck its Distinguished Alumnus Award.

In addition to all his technical skills and accomplishments, Chuck was an astute manager of people. More than one individual has said that, "If you called him Mr. Holley, he would say, 'I don't see my father here. My name is Chuck.'" People he worked with over the decades each has a different story of how he would reach out to young engineers, engineers new to the US, and even those of long service. People who never even worked with him said, "I respect him." He set the overall tone in the organization to be one of cooperation, respect, and support of others - believing that that led to success and it was simply how people should be treated. When it came to developing people, Chuck took the long view, recognizing that building strong teams must take precedence over the inevitable ups and downs of the economic cycle.

And people always mention Chuck's sense of humor. It could be dry and witty, but always disarming. He used it along with his smile to send messages, lighten conversations, or simply put people at ease. He found that "a man hiding under his desk clutching a teddy bear" was just the right image more often than you might expect. His humor was with him to his last days.

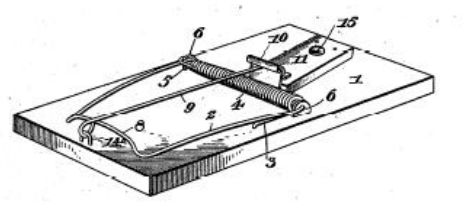
Chuck is survived by his wife, Mary (Polly), his daughters Barbara and Catherine and his son Kevin as well as six grandchildren, several great grandchildren and nephews and nieces. His wife, Winnie (McGinn) Holley, and his son, Richard, predeceased him.

Improvement Patents
John Hershey

Editor's Note: John Hersey will be writing articles related to "Patents" throughout 2014. His first article appeared in February 2014 Newsletter.

Improvement

The Olympics has a Latin motto: "Citius, Altius, Fortius," which means Faster, Higher, Stronger. A similar motto would befit patents as improvements continue to be made. With the inexorable progress of electronics, chemistry, and materials, it is quite rare to find an invention that is not significantly improved or changed over time. The only one that comes to my mind is an invention by William C. Hooker that was patented on November 6, 1894. Titled "Animal Trap," the following is a diagram from his patent:



Mr. Hooker's invention is inexpensive to build and continues to be highly efficacious as the mouse has not changed.

Often improvement inventions are motivated by changing demands on large infrastructures. When you think about it, from the moment an infrastructure project is completed, its components are fixed, in place, and they start to age while technology marches on. Because a large infrastructure is ponderous, complex, costly, and generally cannot be torn down and replaced as it is in vital use, improvements are piecemeal. I like to think of the process as similar to the petrification of wood. The wood sits in a mineral rich medium and gradually soft portions are replaced by hard and beautiful minerals.

I suggest that one of the best examples concerns US traffic lights. The country has on the order of 50 million traffic lights and gradually the incandescent lamps are being replaced with arrays of LEDs. This is the substitution of a new technology of lighting for an older one.

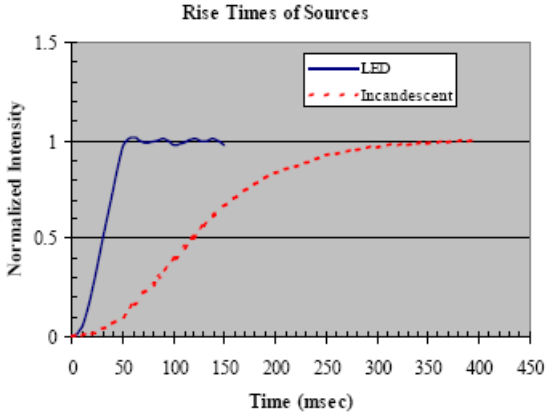
The conversion of traffic lights is a huge undertaking and is part of a revolution in lighting. But why such intense interest in what appears to be a simple, natural technological progression? The answer is in the impressive utility advantages gained by the improvement invention of substituting LED technology for incandescent light technology in traffic signals. Consider:

- Operating LED traffic signals requires less electrical power, on the order of a fifth of what it takes to run an incandescent signal.
- LED signals are brighter than the replaced incandescent bulbs.
- LED signals require less maintenance than incandescent signals.

I believe it is useful to think of the inventive process as concerned with the "dimensions of invention." What I mean by *dimension* is not limited to height, length, width, and maybe time, but rather all of the distinct major components or features of a device or method. Dimensions may therefore comprise weight, power consumption, speed, basic technology, or just about anything that is a feature of the device or method that may be improved. In the case of LED replacements of incandescent traffic lights, we seem to achieve advantages in three dimensions: (1) lower operating power, (2) optically brighter signals, and (3) lower maintenance costs.

An Unexpected Dimension and Possible Implications

There is an additional benefit to using LEDs in traffic lights. They may promote increased safety in an unexpected fashion. As it turns out, LEDs turn on faster, that is reach peak brilliance faster, than incandescent bulbs. The figure below is from the FHA/DOT.



The faster rise time will alert drivers more quickly. The European Lamp Companies Federation reported that LEDs "illuminate 99% faster than incandescent car lamps resulting in a reduced stopping distance of 8 m at 100kph. Eight meters equals the length of up to 2 cars and can be the difference between life and death in a head-tail collision."

This last benefit is extremely significant as it intimately touches upon public safety and might become a candidate for regulation. The basic question aligned with technology is this. If you can significantly reduce the risk to the public, or better shield your customer or client from risk, and there is a reasonably affordable technological means to do so, do you have an imperative to act?

The T. J. Hooper Case (1931-1932) considered such a question and has provided case law impact that has rattled down the decades. An operator of the tugboat T. J. Hooper was sued on the loss of two barges and cargo in a gale. These were the case elements:

- The barges were in transit off the coast of New Jersey.

- The charges were based on the tug's not having a reliable radio that would have facilitated reception of gale warning that had been timely broadcast.
- Other tugs that were so equipped had responded by putting themselves out of exposure.
- The T. J. Hooper was found unseaworthy as it lacked a reliable radio.

At that time, tugs were not required to have radio sets on board for this purpose but the judge ruled that the "standard of seaworthiness changes with advancing knowledge, experience, and the changed appliances of navigation."

On appeal, Judge Learned Hand, often called the tenth judge of the Supreme Court, affirmed and commented: "… a whole calling may have unduly lagged in the adoption of new and available devices. It never may set its own tests, however persuasive be its usages." This is a great question to pursue with your firm's attorney.

Improvement Invention Never Stops

Invention is often characterized by the emotional sequence: "Ah! Oh! Ah! Oh! …" as solutions and problems alternately appear to the inventor. Sometimes the "Oh!s" come out of very unexpected places. Consider the tragic case ABC News reported in 2009:

"During a snow storm last year, Lisa Richter of Oswego, Ill., had a green light and was turning left. But police say a driver in the oncoming lane blew through his red light and plowed into her, killing her instantly.

"This wasn't a regular accident. Police said this traffic light, blocked by snow, contributed to the crash. The light was an LED signal, which doesn't emit heat, so snow doesn't melt like it would with a regular incandescent bulb."

Take this as a homework problem. What can you do? What should you do? How would you do it? How much would it cost? Might your fix open you to any additional "Oh!s"? And, since we now know how to search the patent database, has there been IP generated to address this problem?

* *

John Hershey has a PhD in electrical engineering. He holds 191 US patents. He was elected a Fellow of the IEEE "for contributions to secure communications." He has authored or coauthored 8 technical books the last being The Eureka Method: How to Think Like an Inventor published by McGraw-Hill. He is not a patent attorney or a patent agent. He does not presume to give legal advice.

IEEE Resume Lab

IEEE ResumeLab – has been launched for member use!

ResumeLab allows IEEE members to use customized templates to create resumes/CVs, letters related to the employment process, portfolios of past work, skills profiles, and video resumes. The product also provides members with the ability to conduct mock interviews. Finally, everything created in the product can be shared with colleagues, mentors, potential employers, the public, or social media via publicly-available links. Visit www.ieee.org/resumelab to see information about the product.

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If not, we need you.
A Society with no Events/Talks/Meetings for 3 years will be dissolved by IEEE.

IEEE-USA Legislative Update:

The IEEE-USA web site offers timely summaries of legislation that concerns you! Check IEEE-USA's Legislative Action Center (www.ieeeusa.org/policy; look in the upper right).