



*Yours Truly*

# LOUIS D. SMULLIN

1916–2009

Elected in 1970

*“For contributions to microwave electronics and to engineering education.”*

BY PAUL PENFIELD JR.

LOUIS DIJOUR SMULLIN, electrical engineering educator and specialist in radar and microwave systems, died June 4, 2009, at the age of 93. During most of his career he was on the faculty of the Massachusetts Institute of Technology in the Department of Electrical Engineering and Computer Science.

Lou (or Louie, as some called him) was born in 1916 in Detroit, Michigan. After two years at Wayne University in Detroit, he transferred to the University of Michigan in Ann Arbor, where he received the BSE degree in electrical engineering in 1936. Following two years of industrial experience, he enrolled at MIT, where he earned an SM degree in 1939; his thesis, “The Acceleration and Focusing of Electrons in Multi-Stage Tubes,” was written under the supervision of John G. Trump. In June of that year he married Ruth Frankel, starting almost 70 years of married life (she died in 2011).

His early industrial experience spanned what was at that time a broad range of electrical engineering. After a few months in 1936 as a draftsman at Swift Electric Welder Company in Detroit, he worked for two years for the Ohio Brass Company, in Barberton, conducting and analyzing impulse tests on transmission-line insulators at high voltage. He also operated a radio-interference testing station, subjecting transformer bushings to voltages up to 150 kV.

With his new MIT master's degree he went to Farnsworth Television Company, Fort Wayne, Indiana, to design and test photomultiplier tubes. In 1940 he joined the Scintilla Magneto Division of Bendix Aviation Corporation in Sidney, New York. While there he designed instruments for testing ignition systems and the VHF radio interference they caused and worked on various aspects of magneto design. It was in Sidney that the first of his four children, Susan, was born.

Like many of his contemporaries, Smullin altered his career to fit his country's needs during World War II. He was called to the MIT Radiation Laboratory in 1941 by Prof. Trump and served as head of the Radiation Laboratory TR and Duplexer Section. This group developed methods for testing microwave TR (transmit-receive) tubes for 3 GHz and above, most of the radar duplexer systems in use at the end of the war were based on its designs. Lou coauthored one of the 28 books in the famous MIT Radiation Laboratory Series.

After the war, in 1946, Lou moved his family (now including two sons, Frank and Joseph) to Nutley, New Jersey, and joined the Federal Telecommunications Laboratory. As head of the microwave tube group, he supervised the development of a continuous wave (CW) 5 GHz magnetron and other microwave components for communications systems.

Then, in 1947, he returned to MIT to organize and head the Microwave Tube Laboratory in the interdepartmental Research Laboratory of Electronics. Later he joined the newly formed Lincoln Laboratory, a federally funded off-campus MIT laboratory, as head of Division 4 (Radar and Weapons). He served there for three years before returning to MIT as an associate professor in 1955. By this time his family was complete with the birth of the fourth child, David.

At MIT Lou was promoted to professor in 1960 and served as department head from 1966 to 1974. In 1973 he was named Dugald C. Jackson Professor, filling a chair named for an earlier, very influential MIT Electrical Engineering Department head. After retiring in 1986, he remained actively involved with departmental affairs until he suffered a stroke in 2001.

Smullin was one of the last of a dying breed: faculty members without a doctorate. Today this would be unusual at any leading American research university, but in the 1950s and earlier it was not. During his years on the faculty, including when he was department head, his ideas were never questioned for this reason. His industrial and wartime experience more than made up for any lack of paper credentials. He was held in such high esteem that although he was a stutterer his entire life, people always listened to him attentively, never impatiently, knowing that his ideas were well worth waiting for.

When Lou joined the faculty in 1955, his technical expertise was in microwave systems, especially vacuum tubes. His style was to combine a sound theoretical base, excellent experimental skills, and an appreciation of practical needs, so that problems chosen for research would be sure to be important. In subsequent years, he expanded his technical interests to include high-power radar systems, noise in electron beams, high-bandwidth high-power microwave amplifiers, and highly ionized plasma dynamics. His ability to exploit novel theoretical ideas experimentally allowed him to make important contributions to all these fields. His group's work on high-temperature plasmas helped define the subsequent international effort on fusion energy.

In 1962 he led a group that bounced a laser beam off the moon and detected the reflection in a project they whimsically called "Luna See." A year later, his laser radar observations of the upper atmosphere were found to be consistent with the theory that the Earth continually receives small meteors that do not burn up but instead fragment into smaller particles that eventually settle to earth.

As department head, Smullin led the discussion of what was probably the most important strategic issue the department ever faced. Recognizing that he could not, with his background, effectively lead a department as broad as his had become, he appointed two associate department heads to help him, one from the electrical engineering side of the department and one from the computer science side. Then, considering

the growing interest in digital systems, computer technology and applications, and discrete mathematics, he asked whether it would be better to remain as one department or split into two, one for the growing field of computer science. There were arguments on both sides, but in the end a departmental consensus developed that the two fields would not drift apart but instead retain their strong ties. (This conclusion was repeatedly validated in subsequent years by advances in digital circuits and digital signal processing in the 1970s, very large-scale integration [VLSI] in the 1980s, networking in the 1990s, embedded computing in the early 2000s, and today's proliferation of smart consumer products.) It was therefore deemed prudent to remain one department and encourage the growing computer activities. The name of the department was changed to Electrical Engineering and Computer Science, and subsequent department heads followed Smullin's example of appointing two associate department heads.

During his later career, as elder statesman, Lou produced a series of short, thoughtful unpublished positions on such topics as undergraduate engineering education, national energy policy, continuing education, and the professional status of engineers. He was a member of the IEEE Economic Analysis Committee in 1971. He tried to understand a few controversial technical topics, including electromagnetic radiation hazards and cold fusion, so he could be a resource for those contemplating working on them. His reasoning was that, at this stage in his career, he had nothing to lose if his research was not successful, but his perspective might be useful to junior colleagues.

Lou shared his wisdom broadly. The Smullins spent the 1965–1966 academic year in India, where nine US universities including MIT helped set up the academic and research programs of the newly established Indian Institute of Technology in Kanpur. From 1969 to 1992 he served on the board of governors of the Technion, from which he received an honorary doctorate in 1986. Between 1969 and 1973 he was on the board of trustees of the Cambridge School of Weston, a private school near Boston.

Smullin received many honors during his career. Besides being a member of the NAE (elected in 1970), he was a fellow of IEEE, APS, and AAAS (American Academy of Arts and Sciences), and a member of Eta Kappa Nu and Sigma Xi.

Lou always took an interest in those he worked with. People in his research group—colleagues, students, technicians, and support staff—appreciated the annual tradition of time with Lou and Ruth at their vacation home on Cape Cod. Many of his students viewed him as a father figure and kept in touch long after graduation.

For 15 years after his retirement Lou continued to ride his bicycle between home and office, a distance of 5 miles. In this and many other ways he was a source of admiration and inspiration, both to his children and grandchildren (and great-grandchildren) and to his many colleagues and friends.