A "Living Legend": Samuel F. Lybarger

By Marjorie D. Skafte, *editorial director*

Engineer, inventor, company president, developer of hearing aid standards for the United States as well as internationally, lecturer, author and industry leader–each title fits Samuel F. Lybarger. For 65 years, Sam's life has been integrally involved with the hearing healthcare field and throughout those years, a desire to help individuals with hearing loss hear better has been a motivating factor in all his activities.

That interest in hearing care began in February 1929 while Sam was still a student at Carnegie Institute of Technology (now Carnegie-Mellon Univ.) when he was asked to do some part-time laboratory work for E. A. Myers and Sons, manufacturer of Radioear hearing aids. Following his graduation from college in 1930, with a major in physics, he took a full-time job with that company, later known as Radioear Corporation, and remained there until he retired at the end of 1973. He was president of the corporation from 1970-1973, following the retirement of E. J. Myers, son of the founder of the company.

Born in 1909 in Wilkinsburg, PA, a suburb of Pittsburgh, Lybarger spent most of his growing up years in that area. Following the death of his father in the 1918 flu epidemic, the family returned to Wilkinsburg from the Philadelphia area to be near his mother's family. Sam always worked after school during his high school years, often on his Grandfather Curry's farm. There he says he learned a lot about farming, including handling a team of horses and milking cows. An excellent school system in Wilkinsburg instilled a love of learning in Sam, freeing him from the requirement of entrance exams to enroll in Carnegie Institute of Technology.

Lybarger's interest in the electronics field began at the age of 11 years when radio was just becoming a "hot" item. His future stepfather, a Navy inspector who had contacts at Westinghouse, brought him the parts for a crystal receiver. It was the kind, Sam relates, where a coil was wound on a Mother's Oats box and a crystal detector and headphones were added. He later built a one-tube radio receiver and while in high school, he became a radio "ham."

1994

Samuel Lybarger in 1930 modeling the first Radioear wearable hearing aid–Model B6.

Lybarger, the Inventor

"Hearing aids are very different today than they were when I started in the industry in 1929," Lybarger notes. "During the time that I have been active in hearing aid work, there have been parts of four general eras in hearing instruments: the Acoustic Era, from prehistory until about 1930; the Carbon Era from about 1903 until about 1941; the Vacuum Tube Era from about 1921 until 1954; and the Transistor Era beginning in 1952 and continuing."

Most of Lybarger's design experience was with unamplified and amplified carbon aids, vacuum tube body aids, transistor body aids and transistor headworn aids such as eyeglass and behind-the-ear aids. He retired about the time that in-the-ear instrument production got fully started.

When Lybarger started with E. A. Myers and Sons, the company manufactured only large vacuum tube hearing aids, primarily for schools for the deaf. They also made some special equipment including a large research audiometer for Mayo clinic. This instrument was designed by George L. Haller, the company's chief engineer. The company began research in the area of producing wearable hearing aids of the carbon variety.

After Lybarger had designed several carryable vacuum tube instruments which used carbon microphones instead of the original Radioear moving coil microphones, he was assigned the responsibility of designing a wearable hearing aid. The first instrument produced was the Model B-6 which had two carbon microphones, flashlight batteries, and a miniature receiver and earmold. He later designed a number of unamplified carbon aids with improved characteristics, several amplified carbon instruments and, when vacuum tubes small enough for wearable aids became available, a number of models utilizing this technology.

Space limitations prevent listing of all of the patents in which Lybarger was either the inventor or co-inventer.

This is the second in a series of tributes by The Hearing Review *magazine to outstanding pioneers in the hearing healthcare field.*

Influential patents

Many of Lybarger's patents played an influential role in the progress made in the development of the new types of hearing aids introduced in the '40s, '50s and '60s, and their influence is continuing even today. Patents *#2,345,761* and *#3,382,321* dealt with means of preventing "motorboating" in vacuum tube and transistor amplifiers with very simple circuitry. The idea of an off-center drive for a hearing aid receiver or microphone diaphragm, with appropriate adjustment of diaphragm stiffness around the edge to obtain a leverage action, is disclosed in *#2,367,726*. This general principle is used today in many hearing aid receivers and microphones. Patent *#2,444,302* shows a hearing aid construction system that sectionalizes the hearing aid in such a way that units can be replaced for servicing using only a screwdriver. Patents *#2,530,621* and *#2,656,421* cover the use of an inductive telephone pickup coil self-contained in a wearable hearing aid–the first such wearable device commercially produced. The first magnetic microphone commercially used in a hearing aid is described in *#2,552,800*.

They encompassed many areas of hearing product design. The earliest related to carbon aids and included a design that allowed a telephone receiver to be efficiently coupled to a carbon microphone via holes in the back of the case that could be closed with a shutter for general speech reception (*#1,928,669*). An early patent (*#2,112,569*) described a master hearing aid fitting device that controlled response in different frequency bands that was manufactured as the Radioear "Selex-a-phone." A number of patents were obtained on bone conduction receivers (*#2,230,499, #2,230,500, #2,463,786*). The last of these covers a design that has proven to be very reliable for audiometric bone vibrators and it is still in extensive current use.

In addition to conceiving ideas relevant to the construction of the hearing instrument itself, Lybarger also developed a "Method of Fitting Hearing Aids" on which he applied for a patent. The patent examiner, however, said this was a "medical procedure" and was not patentable. This method included the "one-half gain rule," a concept that has been widely applied in hearing aid fitting in recent years.

Lybarger's continued interest in the developments of the '90s is evidenced by the fact that he still writes short reviews of new patents issued in the areas of hearing aids and audiometry for the *Journal of the Acoustical Society*.

Lybarger, the Standards Committee Member

Sam Lybarger's involvement in the development of hearing aid standards began very early in his career. In 1935-36, he remembers attending meetings with engineers from Acousticon, Sonotone and Western Electric, then the largest manufacturers of hearing aids. Efforts were made at these meetings to standardize test methods for instruments, but no documents were produced at that time. Even at this early date in the history of development of hearing care, cooperation between various disciplines interested in the promotion of improved hearing care was evident. Lybarger remembers that representatives present at the meeting included J. B. Kelly of Western Electric, Sterling Sears of Acousticon, Dr. Vern O. Knudsen of UCLA and Howard Carter who was then secretary of the Council of Physical Therapy of the American Medical Assn.

In 1940, a "Tentative Code for Measurement of Performance of Hearing Aids" was produced by the Technical Committee of the American Hearing Aid Assn. This standard was published in the *Journal of the Acoustical Society* in 1945. This committee was chaired by Fred W. Kranz of Sonotone with Lybarger serving as a member of the committee.

The American Standards Assn. Z24.14 Method for Measurement of Characteristics of Hearing Aids was published in February 1953. Lybarger was chairman of the writing group for this important standard with Fred W. Kranz and Stanley K. Webster also members of the writing group. Since that time, the American National Standards Institute (ANSI), successors to ASA, have published some eleven additional standards useful for hearing aid purposes. Working Group S3-48 developed most of these standards. Lybarger was chairman of the ANSI standards hearing instrument committee from its birth up until 1983, during which time S3-48 standards were published in 1960, 1967, 1976 and 1982. David Preves, vice president of research and development, Argosy Electronics, has served as chairman of the committee since that time. Five standards have been published during this period. Wayne O. Olsen of Mayo Clinic has served as secretary of S3-48 working group for the past 20 years. Lybarger was given special honors at the group's April, 1994, meeting. (See *The Hearing Review*, Vol. 1, No. 6, pg. 4, for details.)

In addition to serving as a leader in standardization of measuring bone vibrator characteristics for audiometry, Lybarger also has served as chairman of ANSI working group S3-43 which developed measurement methods for calibrating audiometer bone conduction receivers.

Active as well in the establishment of international hearing aid test standards, Lybarger has participated in meetings of the IEC TC29 WG6 meetings in many countries since 1961.

Sam and Alberta Lybarger observed their 60th wedding anniversary, May 19, 1994.

Lybarger, the Industry Leader

Believing strongly in involvement in industry affairs, Lybarger was an active member of industry's association of manufacturers, the Hearing Aid Industry Conference (now Hearing Industries Assn.). He was a member of the Board of Directors of HAIC from 1960 to his retirement in 1973. During this time, he was chairman of the association's Standards Committee and in this position acted as the industry's liaison for both American and International standards activities. Several important reports written by the HAIC Standards Committee during this period included the HAIC Standard Method of Expressing Hearing-Aid Performance that specified 500, 1000, and 2000 Hz averaging for gain and output and the Interim Bone Conduction Thresholds for Audiometry, reportedly the first set of

Lybarger was honored on his retirement by Hearing Industry Assn. board members and officers at the HAIC 1973 Annual Meeting at the Palmer House in Chicago. Pictured are Back Row (left to right): Samuel Lybarger, Radioear; Milton Bolstein, Hearing Aid Journal*; James Johnson, Zenith; Robert Winslow, Dahlberg; John Kojis, Maico; and Richard Burger, Qualitone. Front Row (left to right): Ralph Campagna, RCI; Ansel Kleiman, Telex; Richard Scott, Siemens; Marjorie Skafte,* Hearing Instruments*; and Chester Barnow, Beltone.*

The Hearing Instruments *Appreciation plaque was presented to Sam in 1984 by Marjorie D. Skafte, then publisher / editor of* HI.

threshold levels for bone conduction.

In 1967, Lybarger was approached and requested to assume the position as president of HAIC. His response, he relates, was a definite "No," pointing out that he was an engineer and that he felt the president's position should more properly be filled by someone in sales or management. Board members continued to present persuasive arguments for Sam's accepting the presidency, noting that they had just hired a new executive secretary, James P. Ince, and that the presidency would involve little work and few problems. Sam finally agreed to fill the position.

As events developed, Lybarger's term as president of HAIC was anything but calm and is described by Sam in the following manner. "Right after my installation, in fact, while we were still in Chicago, things broke loose. We were meeting at the same time as the National Hearing Aid Society was holding their annual meeting. A hot subject in their meeting was the need for public relations. They proposed a plan that would get the funds for a PR campaign by requiring manufacturers to put a dollar for every hearing aid sold into a PR fund for the industry. The industry was already under governmental scrutiny at the time and on the advice of the HAIC legal counsel, the proposal was not entered into by HAIC. There was much dissatisfaction with that decision and the association (and the new president) took a lot of flak.

"The next year [1968], things got rough again in the form of Senate hearings by the Subcommittee on Consumer Interests of the Elderly. Both the HAIC and NHAS were called to testify. John Kojis, president of Maico, and I testified for HAIC and Raymond Rich, president of NHAS, for that association. Jim Ince's expertise in legislative matters was very beneficial and he guided us through the hearings pretty well. I remember that he asked Senator Hugh Scott, Pennsylvania, to introduce me at the hearing. I was, however, definitely disillusioned by this time that being president of HAIC was going to be a *Soft Job*!" Lybarger's term as president of HAIC ended in October 1969.

Lybarger maintains numerous professional association memberships. He has been a member of the Acoustical Society of America since 1932 and a Fellow since 1979. He is a senior member of the Institute of Electrical and Electronic Engineers, a charter member and Fellow of the Audio Engineering Society, a member of Tau Beta Pi, and a member and past president of the American Auditory Society.

Lybarger, the Author/ Lecturer

Sam Lybarger's diversified knowledge of subjects relevant to hearing instruments is reflected in a brief review of the same subjects on which he has written chapters in hearing care text books. The subject of Earmolds is covered in the following books: *Handbook of Clinical Audiology* by Jack Katz, four editions; *Acoustical Factors Affecting Hearing Aid Performance* by G.A. Studebaker and I. Hochberg; *Auditory and Hearing Prosthetics Research* by Larson, Egolf, Kirlin and Stile. The subject of hearing aids is addressed in: *Handbook of Clinical Audiology* by Jack Katz, two editions; *Interpreting Hearing Aid Technology* by Kenneth Donnelly; *A Bicentennial Monograph on Hearing Impairment Trends in the USA* by Robert Frisina; *Amplification in Education* by Bess, Freemen and Sinclair; and *The Vanderbilt Hearing Aid Report, Monographs in Contemporary Audiology 1982* by Studebaker & Bess.

Papers authored by Lybarger have appeared in a broad spectrum of publications, both professional and business journals. He also has lectured extensively at hearing healthcare meetings both in the United States and abroad.

Many honors have been bestowed upon Lybarger during his 65 years of service to the hearing care profession. Among them are: 1978 Distinguished Service Award from the American Speech, Language and Hearing Assn.; the 1984 Appreciation Award from *Hearing Instruments* magazine; the 1985 American Auditory Society Carhart Memorial Lectureship Award; the 1986 Acoustical Society of America Distinguished Service Citation; and most recently the 1993 ANSI Working Group S3-48 Appreciation Plaque which was presented on April 9, 1994.

Several very important anniversaries have been observed in 1994 by Lybarger...the observation of his 65 years of contribution to provision of better hearing for those with hearing loss and his 60th wedding anniversary on May 19. Lybarger was married in 1934 to Alberta E. Myers, daughter of E. A. Myers. "We would have liked to have been married sooner," Sam points out, "but the depression got in the way. Salaries were cut to the bone and two people just couldn't exist on the salaries that could be paid in those days. We were married in the Myers home near Pittsburgh by my uncle who was a Methodist minister and my wife's uncle, a United Presbyterian minister." They have one son, Edward, and four grandchildren. ◆