Fine-tuned New digital hearing aid is ‘Cadillac of the field’

Researchers at Washington University have developed a revolutionary digital electronic hearing aid that will provide the most advanced, comfortable device on the market for the nation’s 20 million people with mild to severe hearing loss.

Robert E. Morley Jr., D.Sc., associate professor of electrical engineering at Washington, and A. Maynard Engelbertson, D.Sc., a speech researcher at the Washington University Medical Center’s Central Institute for the Deaf (CID), have developed a digital electronic system involving 30,000 transistors contained in two small chips. The chips will be encased inside a moisture-proof plastic aid, similar to conventional units, that can be worn either inside or outside the ear.

The aspirin-sized chips perform all the mathematical functions needed to convert and adjust sound for a comfortable “fit” between a patient’s hearing and pain threshold curves. 3M Corporation plans to mass-market the hearing aid within a few years. No digital aid is currently available to consumers.

“Each year 30 percent of all hearing aids sold in the United States and Canada go to people who already have a device,” Morley says. “It’s a restless market looking for a good solution, which we think we can provide.”

The advanced electronic circuitry of the new aid, which has been tested extensively on patients, will make music sound better, eliminate background noise and allow users to distinguish tones far greater than they have been able to with conventional aids.

Customer dissatisfaction is at the root of the repeat-buyer syndrome in the hearing aid market, says Morley. Analog, or conventional systems, while often adequate in boosting the hearing capabilities of those severely impaired, are notorious for their limitations in distinct amplifications of sound and their annoying feedback oscillation — a screeching sound familiar to anyone who has been near a misadjusted public address system with excessive overamplification. And analog components, like body parts on an automobile, age with time, changing the fit of the hearing aid.

The parts of the new digital device are fine-tuned by the digital signal processor, which recognizes that the library can better understand the resources we have available and how they should best be used,” he added.

A native of Herculaneum, Mo., Evens received his bachelor’s degree in economics and then his medical degree from Washington University. Graduating first in his medical school class, he trained at Barnes Hospital and Mallinckrodt Institute of Radiology, where he was chief resident, and later completed a Picker fellowship in the graduate schools of business administration and education at Washington.

In 1971, at the age of 31, Evens was named head of the Department of Radiology at Washington’s School of Medicine. He has served as president of the Society of Chairmen of Academic Radiology Departments, the Missouri Radiological Society, and as a member of many committees for the American Medical Association, the National Academy of Sciences, and the National Institutes of Health.

He was the first Missourian to head the medical radiation advisory committee of the U.S. Food and Drug

Continued on p. 2
Minority high schoolers to study entrepreneurship at business school

The John M. Olin School of Business and the Urban League of Metropolitan St. Louis will sponsor a Minority Youth Entrepreneurship Program for St. Louis region high school students. Robert L. Virgil, D.B.A., dean of the school, has announced.

The purpose of the program is to encourage minority youths to seek careers in business and eventually to become owners and operators of their individual enterprises.

Approximately 30 juniors from area high schools will participate at no cost in an eight-week program that will begin June 15, 1988. Each student will receive a modest stipend.

James H. Buford, president and chief executive officer of the Urban League, and three prominent black business leaders were instrumental in establishing the Minority Youth Entrepreneurship Program in St. Louis.

The group includes: Ronald L. Thompson, chairman of the board and president of General Railroad Equipment and Services Inc. and a Washington University trustee; Paul L. Miller Jr., president of P. L. Miller & Associates Inc. and a Washington University trustee; and James Rivers, a franchise owner of International Trucking Equipment and Services Inc. and a Washington University Medical Center. Due to his interests in business and radiology, Rivers has served as a consultant to industry, medical centers, universities and governmental organizations including the National Institutes of Health, the states of New York and California, Congress, and the province of Ontario, Canada.

As a past-president-elect of the Washington University Medical Center Alumni Association and the American Roentgen Ray Society and president of the Association of University Radiologists. He is also chairman of the University's provost search committee.

Beginning her career at Washington University in 1967, White first served as associate director of the Upward Bound Program, and then was promoted to director of the office of special programs, and the career counseling center in the program the following year, a position she held until 1974.

In 1972, White was named the University's affirmative action officer, and in 1975 she was promoted to director of personnel. Later that year she was named assistant vice chancellor for personnel and affirmative action, and in 1980 she became associate vice chancellor.

White is a leader in university human resources management, and has served as president of CUPA, and is now completing a term as past-president. She recently was appointed to a three-year term on the TIAA-CREF board of directors. She also serves as a trustee of Blue Cross and Blue Shield of Missouri Inc., and on the board of directors of the St. Louis Rotary Center for Older Adults.

White received her bachelor's degree from Harris-Stowe Teacher's College and in the St. Louis public schools from 1950 to 1957. She earned her master's degree in counseling and guidance from Washington University in 1963 and then a master of jurisprudence from the University's law school in 1964.

Among the many awards and recognitions she has received include the following: Who's Who of American Women, 1981-84; Who's Who Among Black Americans, 1980; CUPA's Achievement Award for Creativity, 1980-81, and citations from President's Council on Youth Opportunities, 1976; Urban League of Greater St. Louis, 1976; and from the Association for Affirmative Action, Region VII, 1976.

She is a member of the American Medical Women's Association, the Industrial Relations Association, and holds licenses as an Accredited Executive, and a member of the Human Resources Management Association.

Memorial service set for Oliver Wagner

A memorial service for Oliver W. Wagner, former director of admissions and registrar at Washington University, will be held at 11 a.m. Friday, June 3, in Grawemeyer Chapel. Wagner died on May 21 at the age of 79.

Wagner joined the University in 1945 as admissions officer. A year later, he was promoted to director of student records. In 1952, he became director of student records and placement. He became registrar and associate dean of admission in 1960 and five years later became director of admissions and registrar. He retired in 1973.

Wagner received a bachelor's degree in 1931 from Parsons College, and a master's degree from the University of Iowa in 1936.

E.H. MacDonald, acting dean of admissions, worked for Wagner. "He was a true professional in every sense of the word," he said. "He was instrumental in helping the University bridge the gap from being a streetcar college to a national university." He was active throughout his career on the College Entrance Examination Board (CEEB) and the CEEB Educational Test Service Committee concerned with admissions testing of minorities.

He also held offices in the National Association of College Admissions Counselors and the American Association of Collegiate Registrars and Admission Officers (AACRAO). He was an honorary lifetime member of AACRAO. Wagner was chairman and member of the Westlake Scholarship Foundation Educational Committee.

He is survived by two sons, Stephen H. Wagner was chairman and member of the College Entrance Examination Board (CEEB) and the CEEB Educational Test Service Committee concerned with admissions testing of minorities.

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He is survived by two sons, Stephen H., and a sister, Mary Alice Gillispe of Iowa, and four grandchildren. Memorial contributions may be made to the Upward Bound Program at Washington University, Box 1082, One Brookings Drive, St. Louis, Mo. 63130.
Herb Weitman
Photographer of the decade

Grand Gold tops decade of excellence

From moving-in day at the dorms, to Commencement ceremonies in Brookings Quadrangle, Herb Weitman, director of Washington University’s photographic services, has been on hand to capture these important moments for all the University to see. His work over some 38 years here has brought him national recognition and acclaim. His most recent honor is being named the Grand Gold Medal award winner in the “Photographer of the Decade” competition sponsored by the Council for the Advancement and Support of Education (CASE). Participants in the competition were the leading university photographers in the nation.

Weitman, who also is associate editor of the award-winning Washington University Magazine and adjunct professor at the School of Fine Arts, received a similar honor in 1967 by the American Alumni Council, when he was presented with a special award “for a decade of distinguished photographic achievement in alumni and university publishing.” The following year he founded the School of Fine Arts’ photography program.

Weitman will receive the Grand Gold Medal July 11 during the CASE Annual Assembly in Anaheim, Calif. The 25 black-and-white and color photographs of Weitman’s that were submitted for the CASE competition will be on display at the assembly. Several of these pictures, all taken during the past 10 years, appear here and on the following three pages.

CASE is the international professional organization for university and college officers in communications, development, government relations, alumni, publications, periodicals and photography. It is the largest of all the higher education associations, with 3,000 member institutions.
Then School of Fine Arts senior Ann Lofquist in her Bixby Hall painting cubicle. This color photo appeared in the winter 1986 Washington University Magazine.

In the winter 1986 Washington University Magazine, Dr. Matthew L. Weinberg, who leads the school's research on Alzheimer's disease, is shown examining an operation in the School of Medicine's Pathology Lab.

Leonard Berg, M.D. (left), professor of neurology, tests an Alzheimer's patient who was a participant in the Memory and Aging Project. The project, in the spring 1985 issue of the Washington University Magazine.
A professional model and a piece of jewelry created and designed by metalsmith Heikki Seppa, professor of art. The photo was included in a photo essay on Seppa's work that ran in the spring 1981 Washington University Magazine.

Nobel Prize-winning biologist Francis H. C. Crick, Kieckhefer Research Professor at The Salk Institute, discusses new developments in the study of human DNA. The photo appeared in the spring 1980 Washington University Magazine.

James F. Jones Jr., Ph.D., professor and chair of the Department of Romance Languages and Literatures, was the subject of the photo essay "One Week in a Teacher's Life," which appeared in the winter 1986 Washington University Magazine.

Sculptor Saunders Schultz, a 1950 fine arts graduate, in a display area of Scopia, a St. Louis studio that he co-founded. Photo appeared in the summer 1986 Alumni News.
"A Man for All Seasons," the cover story of the spring 1987 Washington University Magazine, features Viktor Hamburger, Ph.D., Edward Mallinckrodt Distinguished University Professor Emeritus of biology. This color photo of Hamburger was taken at his home.

Architect Leslie Laskey was included in the winter 1986 Washington University Magazine's special issue on teaching. This color photo of Laskey, now professor emeritus of architecture, was taken at his home.

Swimming pool consultant Ken Williamson surveys the Athletic Complex pool on a return visit to his alma mater. A story and photo on the 1952 architecture graduate appeared in the summer 1987 Alumni News.

William H. Matheson, Ph.D., professor of comparative literature, at his home, which he had built some 15 years ago. Photo appeared in the winter 1985 Washington University Magazine.
Jonathan D. Bortz, M.D., a fellow in endocrinology and metabolism, has been awarded the Post-Doctoral Research Award Prize from the Bernal Section of the American Physiological Society. Bortz's presentation, titled “Co-localization of Insulin-like Growth Factor I and Insulin-like Growth Factor I mRNA in Rat Kidney Collecting Duct,” was recognized at the 72nd annual meeting of the Federation of American Societies for Experimental Biology (FASEB), held in May in Las Vegas. Bortz works in the laboratory of Marc R. Hammerman, M.D., associate professor of medicine.

Nicholas C. Burckel, Ph.D., director of public services and collection development at Olin Library, has been appointed to a two-year term on the College & Research Libraries News Editorial Board for 1988-89. The journal is published by the Association of College & Research Libraries.

Ira M. Glassner, Ph.D., professor of economics, has been named a fellow of the American Academy of Arts and Sciences. He is also a fellow of the National Academy of Sciences and the Institute of Electrical and Electronics Engineers.

Richard A. Sutter, M.D., lecturer in industrial medicine and rehabilitation at the School of Medicine, has been named emeritus medical director of Lambert St. Louis International Airport.

Murray L. Wax, Ph.D., professor of sociology, and Joan Cassell, Ph.D., research associate in the sociology and anthropology departments, co-authored a paper, titled “Culture, Symbol, Symbion: An Anthropological Application to Anarxia,” at the Annual Meeting for Applied Anthropology, held April 22 in Tampa, Fla. Cassell also chaired the session on medical anthropology.

Murray L. Weidenbaum, Ph.D., Edward Mallinckrodt Distinguished University Professor in economics and director of the Center for the Study of American Business, gave the inaugural distinguished lecture on integrating economic and national security studies at the University of Maryland. On April 25, he addressed the plenary session of the Conference on Competitiveness at the Center for Economic Affairs.

Gerald M. More, M.D., professor of medicine, lectured on “Insulins as Cellular Messenger” and Michael Mueckler, Ph.D., assistant professor of cell biology and physiology, lectured on “The Glucose Transporter Gene and Its Regulation.”

Have you done something noteworthy?

Have you: Presented a paper? Won an award? Published? Got something else going on? Whatever is noteworthy?

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Business leader Goralnik honored

Stanley L. Lopata, left, president of the William Greenleaf Eliot Society, presented the society’s “Search” award to business and civic leader Oliver A. Goralnik, who was accompanied by his wife, Alina.

Sullivan, Ghidina promoted at law school

As part of an administrative reorganization, Susan Sullivan, Ph.D., assistant dean of the law school at Washington University, has been promoted to the new position of assistant dean for external affairs, according to Orson D. Ellis Jr., J.D., dean and professor at the School of Law. Ellis has also announced the appointment of Sue A. Ghidina to director of career services. Ghidina currently is associate director of career services and admissions at the law school. Both appointments are effective July 1, 1988.

As assistant dean for external affairs, Sullivan’s duties will include coordinating the school’s publications and working with the law school’s new National Council. She also will work closely with the University’s alumni relations staff and will oversee the career services office.

Sullivan has a bachelor’s degree from Drake University, a master’s degree from the University of Miami and a doctorate from the University of Missouri-Columbia. In addition to coordinating the day-to-day operations of the career services office, Ghidina’s responsibilities will include conducting career counseling for law students and managing student interviews with legal employers from across the country.

Ghidina has a bachelor’s degree from Illinois State University and a master’s degree from Bradley University.
The music department has announced plans to hold a summer orchestra. All qualified students in St. Louis are invited to audition.

Dan R. Presgrave, director of the Wind and Music Program at the University, will conduct the group, which he says will be the city's only summer orchestra for non-professional musicians.

To be called the Classic Summer Orchestra, the group's repertoire will consist of the standard orchestral works. Presgrave, who also has been appointed conductor of the Classic University Singers for 1988-89, says the Classic Summer Orchestra will perform three to four concerts during the summer.

"The orchestra will offer area musicians an excellent opportunity to continue playing during the summer, when most community and school orchestras have ended their seasons," Presgrave says.

Auditions will be held until June 8. For information, call 889-5581.

Indian music concert set

The second in a series of Indian music concerts will be presented at 7:30 p.m. Saturday, June 11, in Simon Hall. The program will feature carnatic vocal music sung by T. R. Subrahmanyan. Carnatic music is performed in the South Indian classical style.

The concert is co-sponsored by the music department and Sangeetha, a non-profit organization devoted to preserving and promoting the classical music of India.

Subrahmanyan, an associate professor of music at India's Delhi University, will be accompanied by Vasantha Kannan on violin and Trichur R. Mohan on mridangam.

Admission for the concert, which is funded in part by the Regional Arts Commission, is $10 for adults, $5 for students and faculty, and free for students other than WU students.

Digital hearing aid — continued from p. 1

processor that is programmed only once to give a sort of mathematical "prescription" for the individual's hearing problem.

"The digital system makes fine adjustments automatically, and does more complicated things than a conventional system," says Engebretson. "For instance, it has the capability to adjust quickly to different ranges of noise. Let's say you move from one noisy room where there is a party going on to another where the atmosphere is much subdued. The digital device continually monitors and adjusts itself to adapt to these nuances of sound."

At check-up time, the new digital aid can be programmed by computer in about 15 minutes — a vast improvement over the two to three hours it takes to adjust a conventional aid. The result will be fewer trips to the audiologist for the nation's millions of hearing-aid users and more time for patients to "tune" into the world about them.

"When it comes to handling the curves tightly, our digital device is like a Grand Prix race car compared to the conventional aid, which is more like a Model T," Morley says.

It's all accomplished through the incredibly rapid mathematical calculations made possible by the semiconduc tor revolution.

A conventional hearing aid conveys sound levels through voltage; the digital system, true to its name, conveys continuous sound waves through a system that uses a sequence of digital numbers to represent samples of the sound waves.

The digital aid amplifies sound from 200 Hz to 6 kilohertz (kHz) compared with the lower threshold of the conventional aid, with a maximum amplification of 4 kHz. As a point of reference, the maximum range of sound of a telephone receiver is 3 kHz, and that, says Morley, "is actually totally inadequate for good hearing. The letters 'S' and 'F,' for instance, are often indistinguishable."

The vast majority of the nation's estimated 20 million people with hearing disorders go untreated. There are several reasons for this, says Donald R. Calvert, Ph.D., chairman of the speech and hearing department at Washington and director of the Central Institute for the Deaf.

"Older people often fear the stigma of aging associated with wearing a hearing aid," says Calvert. "Another group of people become dissatisfied with hearing aids and simply give up on them. And then there is a very large sector who are simply victims of the insidious nature of hearing loss. It creeps up on them over the years, and they learn to deal with the problem through avoidance or accommodation. This group gets used to quiet as a normal condition. When they try a hearing aid, they're often stunned by how loud the world actually is."

Calvert heads a research, teaching and service institute that prepares research scientists, audioligists and teachers of people with severe hearing problems. One hundred handicapped children of all nationalities — some who cannot hear or speak at all — are assisted with their handicaps through the latest technology at CID.

"I believe the digital device will be a great boon to all those who are reluctant to try a hearing aid," Calvert says. "And it will be helpful not only as a learning tool but a hearing aid for about three-quarters of our students."

Because vanity is so much a part of the reluctance to use a hearing aid, an increasing number of aids sold today are in-the-ear types. The digital hearing aid will be available as both an in-the-ear and behind-the-ear device.

"Cosmetics drive the market," Morley notes. "It's ironic that in our society, it's 'hip' to blast your ears out with a Sony Walkman or various other means, but when people pay the consequences with hearing loss, they don't want to wear a hearing-aid visible to the public."

Morley and the CID team patented their concept in 1985. Their original grant came from the Rehabilitation Research and Development Service of the Veterans Administration.

Motivated by his background in designing and manufacturing communications terminals for the deaf and hopeful of establishing a research program, Morley visited Engebretson shortly after joining the Washington faculty full time in 1981. Engebretson and his colleagues at CID were working on an advanced analog hearing aid at the time.

"I looked at their system and thought, 'why not do it digitally?'" he says. "We proposed the project to the Veterans Administration a short time afterward."

The electronics of the hearing aid have shrunken over the years from a totally impractical suitcase-sized box to a body-worn unit the size of a portable radio to the current microchip.

While conventional hearing aids presently cost about $500, those interested in the latest in hearing aids should not expect the digital device to come cheaply.

"The hearing aid will cost a little more for all the extras it provides," Morley says. "We envision it as the 'Cadillac' of the field."

Tony Fitzpatrick