

= Dan Dugan ( audio engineer ) =

Dan Dugan ( born March 20 , 1943 ) is an American audio engineer , inventor , and nature sounds recordist . He was the first person in regional theatre to be called a sound designer , and he developed the first effective automatic microphone mixer : the automixer . Dugan 's sound design work was acknowledged in 2003 with a Distinguished Career Award by the United States Institute for Theatre Technology .

In his youth , Dugan was fascinated by the technical aspects of theatre . He worked as a lighting designer then transitioned to sound design in 1967 . Dugan became interested in achieving the automatic adjustment of sound controls after a frustrating experience staging the musical Hair . His first automixer design was not fully practical but his second design was successful ; it used a reference derived from a total of all of its microphone signals . Dugan devised a third improvement which helped prevent audio feedback in the presence of sound reinforcement loudspeakers . Dugan next produced an automixer design that could be inserted into an existing mixing console . This proved popular for broadcast and live sound applications . Each of Dugan 's subsequent automixer models has been of the insertable type .

Dugan first recorded sounds in the late 1960s to augment his sound designs . He continued making recordings , concentrating on capturing the sounds of nature . Dugan records outdoors in a variety of locations including national parks and nature preserves . He has assisted in research related to the harmful effects of human @-@ generated sound in nature . Dugan is a co @-@ founder and current secretary of People for Legal and Nonsectarian Schools ( PLANS ) , a California non @-@ profit organization incorporated in 1997 .

= = Early career = =

Daniel W. Dugan was born in Los Angeles , California , on March 20 , 1943 , after his father , U.S. Navy Commander P. F. Dugan , had been activated for service in the Pacific War . " Dan " Dugan was raised in San Diego where his parents took him to the Old Globe Theatre and summer musicals at the Ford Bowl ? he always wanted to go backstage to see the lighting control equipment . As a young man he sang bass in the church choir , in the San Diego Bach Chorus , in choral workshops under Roger Wagner at San Diego State University , and in madrigal groups for " Dancing on the Green " , an Elizabethan @-@ era folk dancing event held in front of the Old Globe . Dugan obtained a four @-@ year scholarship to the University of San Francisco and majored in physics and math . He dropped out in 1963 to pursue stagecraft , specifically lighting design . His early lighting designs include ones for the San Diego National Shakespeare Festival at the Old Globe Theatre , the San Diego Opera , and the Actor 's Workshop in San Francisco .

= = Sound design = =

Dugan changed from lighting design to sound design in 1967 . The state of sound design at the time was mostly occasional sound effects performed live or played back on record players or tape machines . Dugan 's first efforts in sound involved designing sound solutions for the Shakespeare festival in San Diego and for the American Conservatory Theatre ( ACT ) in San Francisco . Dugan 's complex and atmospheric theatrical soundscapes led to a new title : during ACT 's 1968 ? 69 season , he was the first regional theatre person to be called a " sound designer " . He presented a paper about his sound design to the Audio Engineering Society ( AES ) at their 37th convention , and his paper was published in the Journal of the Audio Engineering Society in December 1969 . Dugan described a system in which the signals from three stereo tape players were routed to ten loudspeaker zones in the theater .

Dugan designed sound for three regional productions of Hair , the musical : ones in Chicago , Las Vegas and Toronto . The Chicago production ran in 1969 and 1970 at the Blackstone Theatre , operated at that time by The Shubert Organization . Dugan was able to design sound but not allowed to operate the mixing console because he was not in the stagehands union : International

Alliance of Theatrical Stage Employees ( IATSE ) .

When Margrit Mondavi founded the Mondavi Summer Music Festival in 1969 at the Robert Mondavi Winery , primarily featuring jazz artists , Dugan supplied sound services at the outdoor venue in Napa , California . He recorded independent record albums , including Kate Wolf 's first two : Back Roads ( 1976 ) and Lines on the Paper ( 1977 ) and designed sound for the Sacramento Music Circus .

Dugan occasionally delivered speeches at conferences of the United States Institute for Theatre Technology ( USITT ) in the 1980s and 1990s . In 2003 the USITT honored Dugan with the Harold Burris @-@ Meyer Distinguished Career in Sound Design Award , given for " a lifetime spent establishing the field of sound design for the performing arts , as both artist and innovator in audio engineering and technology . " Previous winners of the award were Abe Jacob , John Bracewell , Charlie Richmond and Tony Meola .

= = Automixer = =

While designing sound for the musical Hair , Dugan began to appreciate the human operator 's inability to act quickly enough to control multiple microphones . He saw the show 's audio mixing person " working rotary knobs for 16 area mics , 9 hand mics , and 10 mics in the band " . Dugan thought that a microphone should not be turned on unless it was getting some worthwhile signal , more than just the room ambiance . His frustration with microphone mixing led him to experiment for a few years with microphone signals controlled automatically by voltage @-@ controlled amplifiers ( VCAs ) , finally developing the " Dugan Music System " , shown to the AES at their 49th convention , held in New York in 1974 . This system used a novel proportional gain algorithm whereby the total gain was divided between all active microphones . The microphones were " continuously and automatically adjusted " by a set of VCAs to bring each microphone up or down in the mix , based on how much signal it was sending relative to the signal received by a reference microphone placed somewhat distant from the other microphones . Dugan 's patent application for a " Control Apparatus for Sound Reinforcement Systems " was accepted and published on June 4 , 1974 . This was the first useful automatic microphone mixing algorithm , the basis for all of Dugan 's later systems .

Though the algorithm was good , the reference microphone was an unpredictable variable : it had practical placement problems . If it was near the audience , audience noise would skew the algorithm . If placed backstage , crew and equipment noises could be a factor . Thus , the Dugan Music System was not immediately developed into a product . Dugan studied the problem , researching alternative solutions . In 1975 , Dugan filed a patent for the " Dugan Speech System " , and in 1976 produced 60 copies of what he named the Dugan Model A. The automixer with serial number 1 , a unit Dugan fabricated by hand , " was installed in the conference room of Bell Labs by Harvey Fletcher " . Significantly , the external microphone reference of the Dugan Music System was replaced by a reference composed of the total signal received from all of the active microphones . Dugan described the process some three decades later :

" I was messing around with logarithmic level detection , seeing what would happen if I used the sum of all the inputs as a reference . That 's when I accidentally came upon the system . It was really discovered , not invented . I didn 't really know what I had , just that it worked like gangbusters . "

Dugan licensed this more practical system to Altec who produced 4- and 8 @-@ channel automixers for commercial installations such as hotels , conference rooms , courtrooms and city council chambers . The Dugan Speech System was the first commercially successful automixing algorithm . Over the next 15 years , other manufacturers designed competing automixers , and the market segment was born .

In the late 1980s , Dugan developed a gain limiting improvement to the automixing algorithm . The Dugan Gain Limiting System was patented in September 1989 and presented to the 87th AES convention in October . Dugan described for the AES his prototype of an automixer to be inserted into selected microphone channels of a mixing console , operated by a person , to help in mixing multiple live microphones to have less reverberation and noise , more focus on the desired sound ,

eliminating the mixing engineer 's problem of too @-@ slow human reaction time . The gain limiting system provided smooth , continuous control over the equivalent number of open microphones ( NOM ) that the automixer would send at its outputs . The NOM could be set anywhere between 1 and 10 , with higher settings sounding more natural for a recording in a studio , and lower settings offering greater control of acoustic feedback in the presence of sound reinforcement loudspeakers . An embodiment of Dugan 's three patents was produced as the Model D Automatic Mixing Controller , a 3U rack unit handling 8 channels which could be linked with up to 11 other Model Ds to automatically mix as many as 96 channels simultaneously .

Dugan 's original 1974 patent expired in 1991 , and the Dugan Speech System patent in 1993 . Other manufacturers began to sell automixers incorporating the Dugan algorithm . In 1996 , Dugan produced the Model D @-@ 1 , an automixer for speech @-@ only applications . The Model D @-@ 2 returned to having applicability for both speech and music , as did the Model D @-@ 3 . In 1997 , Dugan licensed his system to Protech Audio of Indian Lake , New York , yielding the Protech 2000 model series .

In September 2006 , Dugan produced the Model E , the E standing for economy . This half @-@ rack @-@ sized automixer was much smaller and less expensive than previous ones . It could be linked with another Model E to control up to 16 channels ; two units could be mounted side @-@ by @-@ side in only 1U of rack space . The Model E 's popularity came with many critical requests for features , and in May 2008 the Model E @-@ 1 was introduced ; an incremental improvement to replace the Model E. It allowed ADAT Lightpipe interconnections between linked units and a digital mixing console , helpful with Yamaha , Mackie and other digital audio gear containing ADAT inputs and outputs . Its user interface was a simple web browser page , accessible by computer connected with Category 5 cable .

In February 2011 , Dugan demonstrated an automixer card , marketed by Yamaha , to plug into the accessory slot of a Yamaha digital mixer such as the O1V96 , LS9 , M7CL or PM5D . This card , the Dugan @-@ MY16 , could mix up to 16 channels of microphone inputs , assigned to selected inserts in the mixer 's graphic user interface . Like the Model E @-@ 1 , the automixer could be adjusted through a web browser interface , allowing remote control with an iPad , touchscreen computer or laptop over wireless network .

= = Nature sounds = =

Dugan made his first sound effects recordings to augment his theatrical sound designs . As he grew more interested in field recording , he was attracted to the sounds found in pristine natural settings ? environments without human noise . A board member and webmaster of Nature Sounds Society , Dugan has conducted equipment training sessions since 1994 , and has given talks about his experiences in nature recording . He has traveled to New Zealand in pursuit of recordings , but mainly devotes himself to U.S. National Parks and Monuments such as Yosemite and Muir Woods . Other national parks and monuments at which he has recorded sound include Joshua Tree , Pinnacles , Lassen Volcanic , Yellowstone , Haleakala , Olympic , Zion , Bryce Canyon , Kings Canyon , Sequoia and Lava Beds .

Dugan and his wife Sharon Perry , the Nature Sounds Society chair , recorded the dawn chorus of Cathedral Grove in Muir Woods once each month for a year . He has partnered with the National Park Service and the California Library of Natural Sounds to document the various sounds heard in U.S. parks . Regarding his reasons for doing so , Dugan wrote in 2008 :

" There are three potential values in soundscape recording in a National Park . Scientific , to document the biophony at that place and time . Political , to document the anthrophony , collecting evidence that might be useful in policy @-@ making about aircraft and visitor traffic . Artistic , to use in natural sound compositions . "

In 2006 , Dugan assisted a group of researchers studying soundscapes and human use at Muir Woods . The researchers presented their findings at the Northeastern Recreation Research Symposium , produced by the United States Forest Service , a work titled , " From Landscapes to Soundscapes : Understanding and Managing Natural Quiet in the National Parks " . They concluded

that human @-@ generated noise " is a potentially important indicator of quality " of soundscapes in parks .

= = PLANS , Inc . = =

In 1998 an organization he co @-@ founded , People for Legal and Nonsectarian Schools ( PLANS , Inc . ) , filed a federal lawsuit against Sacramento City Unified School District and Twin Ridges Elementary School District in California arguing that their Waldorf @-@ methods @-@ inspired schools violated the First and Fourteenth Amendments of the United States Constitution and Article IX of the California Constitution . Dugan participated in the court proceedings . After years of litigation , the 9th circuit court dismissed the case on its merits in 2012 .

As co @-@ founder and Secretary of PLANS , Dugan has given media interviews and was quoted in the book The Flickering Mind : The False Promise of Technology in the Classroom and How Learning Can Be Saved . He said Waldorf schools are " faith @-@ based " and draw from an educational theory that is " frozen " in 1925 .