

UP IN KNUDSEN'S ATTIC: SOME PRIVATE PAPERS OF VERN O. KNUDSEN

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This article is about a pioneer and a giant. An educator, researcher, administrator, facilitator, author, and mentor—who I never met in person, but came to know only by happenstance and circumstance. (See Fig. 1)

I started to collect books on acoustics, engineering, mathematics, and related subjects and became familiar with two books by Vern Knudsen—*Architectural Acoustics*¹ and *Acoustical Designing in Architecture*,² the second written with the late Cyril Harris. My awareness of Dr. Knudsen grew during the intervening years in a more or less disinterested way until one day in the spring of 2004 when I received an e-mail message from a Mr. James Knudsen. He asked if the Acoustical Society of America (ASA) had a historian who might be interested in looking at some papers that were found while cleaning out his grandfather's home in preparation to donating the house to UCLA. His grandfather was Vern O. Knudsen.

I made an appointment and went to see what possibly could be left, 30 years after Dr. Knudsen's death—perhaps a few items of interest. During my initial visit, I found many boxes of his technical books, architectural project files, corre-

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spondence, and his ASA Gold Medal as well as other honors.

Another appointment was set and, along with my friend and fellow ASA member Mark Gander, we spent a day sorting through the boxes of books and papers. We left with six or seven large boxes of papers as well as some architectural drawings. These papers and drawings are now part of the Special Collections at the Charles E. Young Research Library at the University of

California, Los Angeles (UCLA). They were indexed in 2010 by Masters degree student Julia Morton under the direction of UCLA Archivist Charlotte Brown. With the indexing and cataloging of the trove from Dr. Knudsen's Pacific Palisades home, the Vern Oliver Knudsen archive³ has grown by about a third to 57 boxes of material and 8 drawing folders.

An updated finding guide for the Knudsen collection at the UCLA archive is now available on-line.⁴ The finding guide includes the recently archived documents and allows for word searches within the guide. The complete holdings, however, are not available on-line but must be viewed in the Special Collection reading room at the Young Library by special arrangement.



Fig. 1. Vern O. Knudsen in laboratory (undated).

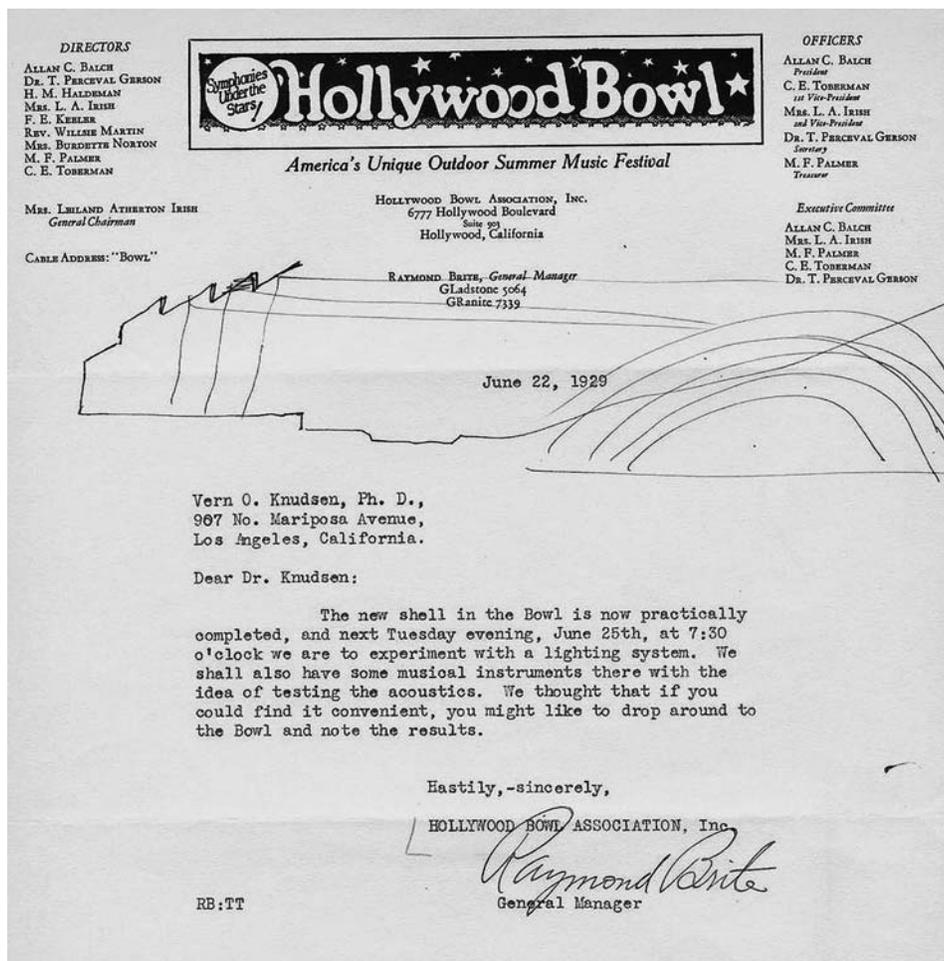


Fig. 2. 22 June 1929 letter from Hollywood Bowl Association.

Vern Knudsen, a founder of the Acoustical Society of America (ASA), was involved with many aspects of the field. Among these were: Architectural Acoustics, Physical Acoustics, Engineering Acoustics, Speech, Hearing, and Underwater Acoustics. He is cited in many collections and compilations, such as the Physical Acoustics series edited by Warren Mason,⁵ and contributed articles and features for trade magazines⁶ (as did Wallace Clement Sabine), popular magazines,⁷ technical periodicals,⁸ proceedings, and special lectures.⁹ He is also known for his textbooks, noted above, the latter available from the Society. *ECHOES*, the Society's newsletter, presented a cover story about Dr. Knudsen in 2004¹⁰, which provided an excellent and concise review of the dates and highlights of his career. The encomiums offered when he received the Society's Wallace C. Sabine medal in 1958 and the Gold Medal in 1967 (by Leo P. Delsasso), an honorary membership in 1952 and the John A. Potts (now Gold) Memorial Award in 1964 from the Audio Engineering Society, and from his appointment as Chancellor at UCLA in 1960, and the dedication of Knudsen Hall in 1964 (by Simon Ramo), are other resources¹¹ that describe and enumerate Dr. Knudsen's achievements and contributions.

We examine some of the history from the 1920's to the 1970's that is revealed in the first person narrative of Knudsen's correspondence and other papers. In 1922 two events set the professional course for Vern O. Knudsen. These were a request by Professor Albert Michelson of the

University of Chicago, where Knudsen was finishing his doctoral studies, "to look into the acoustics of a high school auditorium in Chicago...and coincident with that, the collected papers of Wallace C. Sabine...had just been published. The reading of this book by Wallace C. Sabine was a turning point in my life..."¹²

Performance venues

The 1920's were exciting times to be in Los Angeles. Los Angeles was becoming a modern city with the growth of the silent film industry. Civic organizations were also growing and the local Philharmonic, founded in 1919, initiated its official seasons at an outdoor venue called the Hollywood Bowl in 1922.

Dr. Knudsen, a freshly-minted Ph.D. from the University of Chicago, also arrived in 1922 to take on a faculty position at the UCSB, that is the University of California, Southern Branch, as it was known at the time—the small downtown Los Angeles campus on Vermont Avenue. Dr. Knudsen's interest in acoustics became known and he was called in to help improve the acoustics at the Bowl after some renovations did not quell criticisms of the facility—some of which are still familiar to us today. In a letter from the Associated Architects Association of Los Angeles to Knudsen, the writer voiced the vain hope that some "plantings" might be used to solve the problems described therein. The wish for mitigation by foliage still finds root in the minds of many architects.

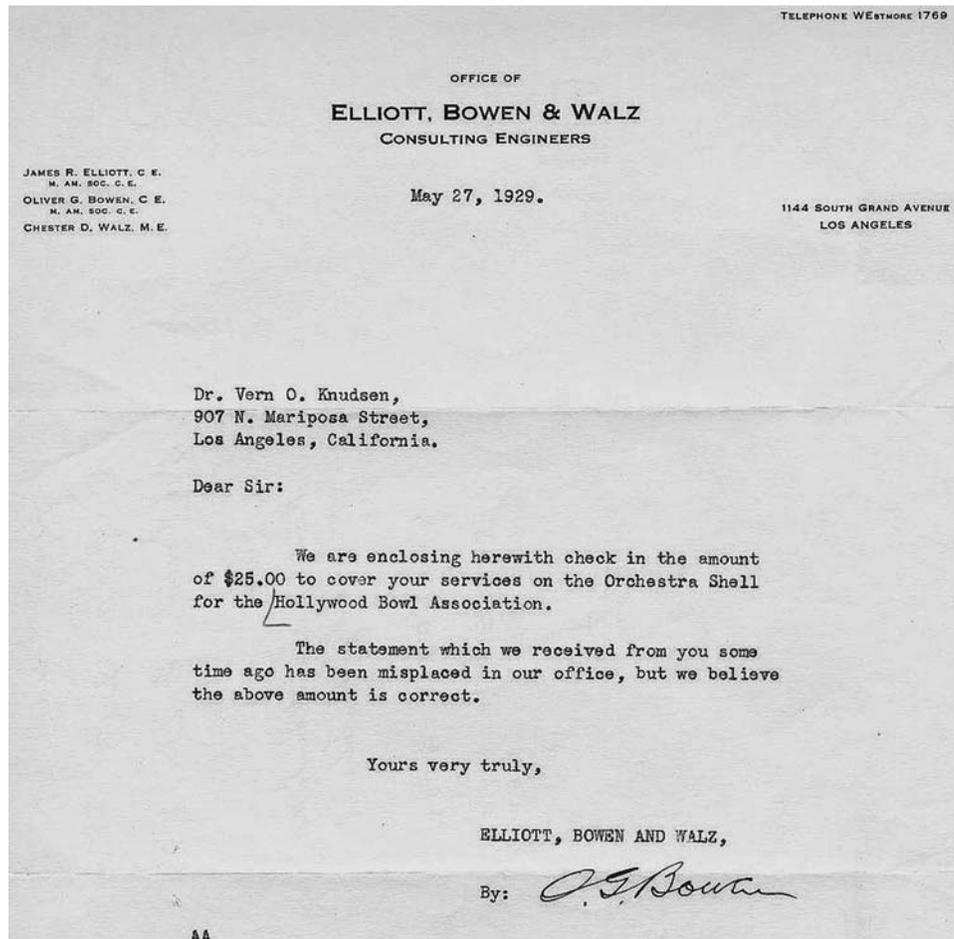


Fig. 3. 22 May 1929 letter from Associated Architects of Los Angeles.

This was the start of Knudsen’s association with the Bowl, which continued for almost fifty years, during which time he served as consultant, member, and President of the Hollywood Bowl Association. His final commission with the Bowl was in 1972.

One very interesting item about the documents, especially some of the letters, is that Dr. Knudsen appears to have been an inveterate “noodler”—that is, he used any paper on hand to sketch or make notes as needed. On one from the Hollywood Bowl Association, dated 22 June 1929 in which they invite him to visit, (the latest shell renovation was just about done), there is a rough ray diagram and transverse section sketch covering the letterhead. (See Fig. 2)

On the back of another letter, from 22 May 1929, which accompanied a \$25.00 check for his services in regards to the 1929 shell project, he has calculated the volume of the earth in cubic feet; there is a note “Transmission Thru Wall and Floor Structures, Bur Stds. Jour. Res. Mar, 1929 RFP #48 Chrysler + Snyder”; a notation “OX 5601 Rodeo Drive at Santa Monica Kennedy Pritchard” with a volume and an absorption calculation; a notation for an “Open Buy” for two stocks; and another, reading, “Pardoes Monday 7:00 Santa Monica.” (See Figs. 3, 4)

What does this tell us about him? He was busy, interested in many things, and was relentless.

Although venues for classical music were important to Dr. Knudsen, popular music venues were also part of his

portfolio. A 25 September 1958 letter from Harry James includes a “note to tell you how magnificent the acoustics are here in the Flamingo lounge...thanks to you, acoustically the lounge is one of the finest rooms that we’ve ever played in.”

Knudsen’s work on spaces for performance includes the Dorothy Chandler Pavilion at the Music Center–Performance Arts Center of Los Angeles County, the Mormon Tabernacle, Grady Gammage Auditorium, the Coconut Grove in the (now demolished) Ambassador Hotel in Los Angeles, the Kennedy Center in Washington, DC, the Seattle Opera House, the War Memorial Opera House in San Francisco, the Carmel Bach Festival Shell, and more than four score more.

There were also some acoustical consulting projects on facilities that are not usually considered performance spaces. These include the Los Angeles Criminal Courts building, various and sundry academic buildings for UCLA, University of Southern California (USC), UC Berkeley, UC Santa Cruz, the University of Montana, Akron University, and many sacred worship spaces.

Motion pictures

Talking motion pictures had their start in 1927 and thereafter all the studios were building new sound stages or upgrading their silent stages for the production of “talkies.” Dr. Knudsen helped many of the studios with their sound stages as well as the cinemas, which were owned by the studios at the time. Among his clients, mainly during the period

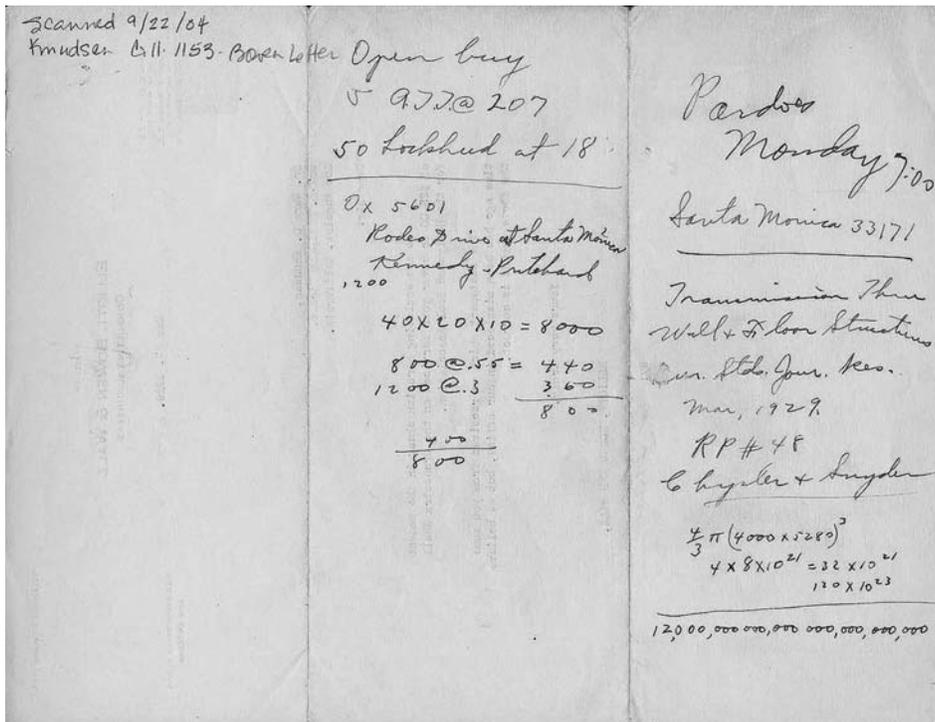


Fig. 4. Notation on back of 22 May 1929 letter.

from 1928 to 1939, were Metro-Goldwyn-Mayer (MGM), Paramount Pictures, Fox, Universal, United Artists, and Warner Brothers.

He suggested that one of the larger theater chains retain an acoustical consultant. He was able to do this as he was already working for MGM in the design of their sound stages. An early letter, from 21 May 1928, discusses the ambient noise level next to the site for a new sound stage (expressed in transmission units, or T. U., that, in 1923, replaced the “standard mile of cable” used by the telephone industry to describe the gain or loss in telephone lines), as well as his recommendations for the construction of the exterior envelope and the treatment of the interior surfaces. He suggests that the envelope of the building be constructed so that it has “an insulation of 60 T. U.” He also says T. U. “is ten times the common logarithm of the energy in the sound compared with the amount of sound energy that is just barely audible.”

One notes in the MGM letters, starting early in 1929, that Dr. Knudsen uses the abbreviation dB per the adoption of the decibel as the base 10 replacement for the transmission unit.¹³ The neper was adopted as the replacement for the base e unit.

Another letter to MGM, dated 1 March 1929, discusses the acoustics of motion picture theaters. In this letter Knudsen talks about sound isolation, reverberation, and heating, ventilating and air conditioning (HVAC) noise. One would think that these design issues would have long since been defeated, but recent experiences in some cinemas prove otherwise.

The Academy of Motion Picture Arts and Sciences (AMPAS) contacted Knudsen, after the first meeting of the Society in 1929, asking that he keep them abreast of advances of interest to them. He had a long relationship with

the Academy—working with the technical side as well as with the constituent members—the studios. Dr. Knudsen was consulted by the Society of Motion Picture Engineers (SMPE; the Television came later) about set-up and tuning of the loudspeaker playback system, the B-chain, in theaters. In 1939 a committee, consisting of Vern O. Knudsen, Paul A. Sabine, George T. Stanton, Hugh S. Knowles, Keron C. Morrical, and John S. Parkinson, was appointed at the Society’s Iowa meeting to work with the AMPAS Research Council on establishing acoustical measurements in theaters. As with the acoustics of cinemas, this area is still being investigated, currently by the SMPTE ST-SG Theatre B-Chain study group.

Vern Knudsen worked with many cinema pioneers, among them Lester Cowan¹⁴ of AMPAS and Douglas Shearer.¹⁵ The late 1920’s and 1930’s were heady times for the industry and Knudsen was in the thick of it with acoustic analyses of motion picture set materials, reverberation time recommendations for studios and theaters, measurement methods and equipment (with Ludwig Sempeyer and the Delsasso brothers), reports on sound playback, sound isolation, and human hearing.

Knudsen’s evaluation and application of various materials for use as finishes and in the construction of buildings was a practical application of acoustics for production and exhibition spaces. It was still in its beginning phase in the late 1920’s and early 1930’s. Many of the materials and methods now in use had their first acoustic investigation with Dr. Knudsen’s research, as detailed in his correspondence with Harvey Fletcher, William P. Snow, Wallace Waterfall, Paul E. Sabine, Floyd R. Watson, Warren P. Mason, and Floyd Firestone (who is credited with coining the phrase “Lamb Waves”), among others.

The Acoustical Society of America

Vern Knudsen had close associations and enduring friendships with other acousticians. This led to the formation of the ASA during a meeting at a beach club in Santa Monica during the summer of 1928. This meeting is referenced in a 10 October 1928 letter from Wallace Waterfall, of The Celotex Company, to Vern Knudsen and Floyd Watson, which says he is ready to take initial steps in the formation of the "Society of Acoustical Engineers." One could suppose that we became the ASA as SAE was already taken by the Society of Automotive Engineers.

In the annotated transcript of his interview with the American Institute of Physics found in the documents retrieved from his home, he talks about this meeting at the beach and says "I invited Waterfall and Watson to have lunch with me at the Gables Beach Club, of which I had just become a member. I thought it made a very fine investment because the original membership fee of \$500 included lifetime dues. I figured I had maybe 40 or 50 years of life and \$500 didn't seem very much to pay for both initiation and life dues. Well, the Beach Club lasted only a few days after we had this meeting, but it lasted long enough for us to have this meeting...at which we decided there should be an organization known as the Acoustical Society of America." Ms. Brown did some research and found a clipping in the Los Angeles Times archives from 1 September 1930 concerning the fire that swept through the club and destroyed it. This article mentions "the club's financial failure some time ago," prior to the fire.

Dr. Knudsen maintained a long series of technical correspondences with Watson, Waterfall, Harvey Fletcher of the Bell Telephone Laboratory, as well as Richard Bolt, one of Knudsen's students. Among the contents of the Watson file were the many holiday cards that Floyd Watson sent picturing

Watson in exotic locales such as the desert, mountains, forests, and seashore. Another example of how closely intertwined the acoustics connections were back then is that Wallace Waterfall was Floyd R. Watson's student at the University of Illinois.

One letter in the file states volumes about Vern Knudsen. F. V. Hunt was awarded the Society's Gold Medal in 1969, two years after Knudsen was so honored. In his response to Dr. Knudsen's 16 October 1969 letter of congratulation, Hunt writes "Your thoughtfulness is typical and reminds me of an incident in the middle 1930's that you have probably long since forgotten. In our corridor discussion of a paper I had presented, you patted me on the back and said, 'We ought to make you a Fellow of the Society.' I was flattered of course, and convinced that this was one of your startling ideas expressed ahead of its time. But sure enough, I did get made a Fellow shortly thereafter and I have always felt that I had you to thank for it. I can't say that the promotion was crucial in shaping my future, but it did provide warmth, encouragement, and incentive." This is but one of many letters expressing this sentiment.

Lastly, a note about the Society's first meeting is in a 22 March 1929 telegram (See Fig. 5) from Harvey Fletcher telling Dr. Knudsen that the meeting will be delayed one week to be coincide with the SMPE meeting which reads "PROF V O KNUDSEN= UNIVERSITY OF CALIFORNIA LOSANGELES CALIF= HAVE CHANGED DATE OF MEETING OF ACOUSTICAL SOCIETY TO MAY TENTH AND ELEVENTH STOP MOTION PICTURE ENGINEERS MEET IN NEWYORK SAME WEEK STOP HOPE THIS DOES NOT UPSET YOUR PLANS STOP THOSE THAT I COULD REACH BY TELEPHONE THOUGHT IT ADVISABLE STOP EXPECTING A NUMBER FROM HOLLYWOOD= HARVEY FLETCHER."

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Fig. 5. 22 March 1929 telegram from Harvey Fletcher.

Books and book reviews

Several files were devoted to Dr. Knudsen's correspondence with his publisher and to his review's of, and correspondence with the authors, of books on acoustics and related subjects. In his correspondence with his publisher, John Wiley & Sons, we find that there was a book long in the making, *Acoustics of Music Buildings*, that did not make it to press, while the exchange of letters also discusses a book by Leo L. Beranek initially titled *Acoustics of Music Halls*, but tentatively re-titled *Acoustics of Halls for Music*.¹⁶ Mercantile considerations discussed in some letters discuss copyright treaties and illegal translations while other letters deal with authorized translations.

His reviews are illuminating in that they not only present a synopsis of the contents of the books, but also Knudsen's witty, interesting, and eclectic style.

From the file copy of the review of *Introductory Acoustics*¹⁷ by George W. Stewart, Knudsen wrote, "Quite apart from Professor Stewart's scientific accomplishment, he has succeeded in this book in making available to the non-mathematical student or reader a perspicuous and thorough exposition of the fundamentals of modern acoustics." Where this review was published is not indicated.

From the review of *Acoustics*¹⁸ by Leo L. Beranek "Those who learned their acoustics from textbooks dated before about 1915 will gasp when they compare this up-to-date-text with those of yesteryear...Beranek's book begins where the classical books ended; it is primarily a treatise on modern acoustics...Acoustical engineers, as well as students and others interested in acoustics, will be greatly indebted to Beranek for this useful and well written book."

From a letter to John Wiley & Sons, Inc. dated 21 February 1955 regarding *Sonics* by Richard H. Bolt and Theodor Hueter, Knudsen mentions that he is part of the Wiley "family" of authors and that Dr. Bolt "did his doctoral dissertation under my direction: "It is natural for you, therefore to expect wholesome praise from me. The book deserves even more than that...The book succeeds admirably well...I have felt for many years that there was a need for a good book covering this general field, and this book more than meets my highest expectations."

One last book related item: the Simon Guggenheim Foundation solicited Dr. Knudsen's "candid and critical appraisal" of a candidate, Henri Temianka, in regards to a proposed "compact music history book for colleges" as described in Maestro Temianka's application. Knudsen states in his 5 December 1973 confidential report that "Henri Temianka is well qualified in his purpose," but not before saying in regards to Maestro Temianka's "Let's Talk Music" series "Mr. Temianka does the talking—probably for a total of five to seven minutes at each concert. The music critics for The Los Angeles Times generally feel that he does too much talking. I personally appreciate his commentary and so do about 95% of the 1500 or more persons who attend each concert." Knudsen also says "I do not agree with our music critics that Temianka talks down to audiences, which rate above average in their musical sophistication."

These are but a few of Dr. Knudsen's book related activi-

ties, which merit a paper by themselves. The last section covers his interface with authors as diverse as Frank Massa, Michael Rettinger, S. S. Stevens, and C. E. Seashore.

La Joie de Vie

Living in Los Angeles offered many opportunities to enjoy the best that living in a metropolitan area, which as the center of the motion picture arts and music, can offer. Among the intrigues, in which Vern Knudsen was part, was the campaign to bring Arnold Schoenberg to UCLA. It appears that UCLA was in competition with USC to entice the developer of the twelve-tone technique to the Westwood campus. Professor Schoenberg finesses the situation by teaching at both schools! Dr. Knudsen was also involved with the unsuccessful attempt to bring Gregor Piatigorsky to UCLA.

The Knudsen's entertained and were entertained by many famous personalities in Los Angeles. Some of the private files are devoted to purely personal correspondence in regards to dinners, awards, events, and the help he offered in various endeavors. Among the letters to and from Knudsen are ones from Mr. Victor Gruen (a frequent guest and architect for the Charles River Park development in Boston, Northland Mall near Detroit, the first suburban open-air shopping facility, and Southdale Mall, the first enclosed shopping mall in the country in Edina, Minnesota), from William Pereira (architect for the Transamerica Pyramid in San Francisco, Los Angeles County Museum of Art, and Los Angeles International Airport), from Mr. Simon and Mrs. Virginia Ramo (the former of TRW, the latter the philanthropist), Jasha Heifetz, Norman Chandler (of *The Los Angeles Times*), as well as just plain neighbors, one of whom said "Here Ye! More kudos for our street!"

The Knudsen's dined well, and in a 3 February 1965 letter to his son Robert, a doctor living in San Francisco, Knudsen wrote about a dinner at Perino's (considered one of the top restaurants in Los Angeles during the 1960's, along with Chasen's and Scandia) in honor of Alfred Wallenstein (cellist and conductor) where he says "Both the service and cooking were excellent. The Chateau Petrus 1953 came in magnums and was very good. So was the champagne."

There is not room to delve into some of the other interesting projects that Dr. Knudsen worked on, among them work for the Shah of Iran, the Soviet Union, numerous collaborations with architects famous and not so, investigations by the House Un-American Activities Committee, and much more.

A cautionary note—more than 175 files and several dozen rolls of drawings were transferred to Edward Dennis Rowley in Utah in 1976. An unknown number of documents were taken by an ASA member from Orange County, California August 2004 when the family found some additional material while the author was on vacation. If any readers know of the whereabouts of the Knudsen files in Utah or who the Orange county ASA member may be, these documents will be a welcome addition to the UCLA Knudsen archive.

William W. Melnitz, who in 1939 was co-founder of the Los Angeles repertory theater group that became the resident dramatic company of the Music Center and who was the

founding dean of the UCLA College of Fine Arts, may have described Vern Knudsen best in a 25 February 1963 letter to him regarding the name for the new Physics building: “It is very rare that I find a real enjoyment in reading our *Daily Bruin*. But nothing has pleased me more...than the naming of the new Physics building. They couldn’t have found a ‘human’ name of greater significance than that of Vern Knudsen. The name stands for everything that is good and noble in the sciences as well as the humanities. No one I know has served the two often conflicting branches so wisely and unselfishly as you. The golden letters that will shine in front of the new building will always be a symbol of what you have done for this campus during the many years dedicated to your teaching, world-wide known research, and untiring service to all the arts.”^{AT}

References

- ¹ Vern O. Knudsen, *Architectural Acoustics* (John Wiley & Sons, New York, 1932).
- ² Vern O. Knudsen and Cyril M. Harris, *Acoustical Designing in Architecture*, John Wiley & Sons, New York, 1950). Reprint edition available from the Acoustical Society of America.
- ³ Special Collections, Library Special Collections, Room A1713, Charles E. Young Research Library, University of California, Los Angeles Box 951575, Los Angeles, California 90095-1575.
- ⁴ <http://www.oac.cdlib.org/view?docId=kt109nc33w&developer=local&style=oac4&s=1&query=utah&x=19&y=5&servlet=view> (last viewed 2/27/2011).
- ⁵ R. Bruce Lindsay, “Relaxation Processes in Sound Propagation in Fluids: A Historical Survey,” in *Physical Acoustics Volume XVI*, edited by Warren P. Mason and R.N. Thurston (Academic Press, New York, 1982).
- ⁶ Copies of magazine periodicals found in the Rancho Riviera files include “The Absorption of Sound by Acoustical Plaster,” *The California Plasterer* **VIX**, No.7, December 1932; “Ear Defenders,” *National Safety News* **V39**, No. 2 (February 1939); “Defense Against Noise,” *National Safety News* **V45**, No. 2 (February 1942); and, “How Sound is Controlled,” *Heating, Piping, and Air Conditioning* **VIII**, No. 10 (October 1931).
- ⁷ Vern O. Knudsen, “Architectural Acoustics,” *Scientific American* 209, No. 5 (November 1963). The article is clearly written and what Dr. Knudsen says is still true, the opening paragraph

proves the adage that he who knows not history is bound to repeat it.

- ⁸ Vern O. Knudsen, “The Measurement of Sound Absorption in a Room,” *Philosophical Magazine* **VV**, No. 33, 1240-1257 (June 1928).
- ⁹ For example: “Modern Acoustics and Culture - Faculty Research Lecture at the University of California at Los Angeles,” delivered 6 May 1936, published by the University of California Press (1937), price 50 cents. This lecture/paper is included in “Vern O. Knudsen, Collected Papers from The Journal of the Acoustical Society of America,” compiled by I. Rudnick and T. Bomba, Acoustical Society of America (September 1975).
- ¹⁰ Robert S. Gales, “Vern O. Knudsen,” *ECHOES* **14**, No. 1 (Winter 2004).
- ¹¹ Such as *Scop* **VI**, No. 2 (Spring 1947), the “Official literary-humor quarterly publication of the Associated Students of the University of California at Los Angeles;” and the *V34*, No. 2 (November 1959).
- ¹² Hand corrected draft of 18 May 1964 oral history interview with Vern Oliver Knudsen, page 22, by Leo Delsasso with W. J. King, for the American Institute of Physics.
- ¹³ W. H. Martin, “Decibel—The Name for the Transmission Unit,” *The Bell Telephone Technical Journal* **V8**, No. 1 (January 1929).
- ¹⁴ Mr. Cowan was Executive Secretary of AMPAS from 1931 to 1933 and the editor of “Recording Sound For Motion Pictures,” (McGraw-Hill, New York, 1931). His producer credits include “My Little Chickadee” (1940) with Mae West and W. C. Fields, “The Story of G.I. Joe” (1945) with Burgess Meredith and Robert Mitchum, and “Love Happy” (1949) with the Marx Brothers and Marilyn Monroe (!).
- ¹⁵ In 1929 Mr. Shearer, brother of the actress Norma Shearer, introduced playing the music during filming so that the dancing and singing would be filmed in sync with the music. He was nominated 21 times and won 12 Oscars for Best Sound Recording as well as 7 Scientific & Technical Academy Awards.
- ¹⁶ It appears that when this book was published: Leo L. Beranek, *Music, Acoustics and Architecture* (John Wiley & Sons, New York, 1962). The publisher, in a 2 August 1960 letter to Dr. Knudsen, says that the initial title, “Acoustics of Music Halls” was “a poor one, since in England this suggests musical spectacles of the strip-tease type.”
- ¹⁷ From typescript of Vern O. Knudsen’s review of *Introductory Acoustics* by George W. Stewart (Van Nostrand, New York, 1932).
- ¹⁸ From typescript of Vern O. Knudsen’s review of *Acoustics* by Leo L. Beranek (McGraw-Hill, New York, 1954).



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