June 27, 1988

To: Norman Wessells, Dean of H&S
Peter Stansky, Associate Dean of H&S
From: Karol Berger, Chairman, Music
John Chowning, Director, CCRMA

Subject: Three year "vision statement" for CCRMA

This is an update of the January 7, 1988 memo sent previously to Norm Wessells and Peter Stansky regarding the future of CCRMA.

I. THE FIELD OF COMPUTER MUSIC

Just less than thirty years ago, Max Mathews first programmed a computer to generate sounds at Bell Labs. In the early sixties this work was noted by a few composers which led to beginning activities in computer music at Princeton and at Stanford. In 1966 I began teaching a course in the department to a few composers. In ensuing years the field has flourished as it has attracted increasing numbers of composers (most notably Pierre Boulez) and scientists who have found music an important domain of application for their research. As a result of such broad multi-disciplinary participation there is an inherent richness in computer music research that includes the following areas.

- musical acoustics - especially computational physical modelling
- room acoustics analysis and simulation
- psychoacoustics and perceptual psychology
- signal processing analysis and digital filtering
- composition - computer environments
- performer computer interface - new musical controllers
- early music - tuning systems, instrument simulation

It is important to note that some fields of interest have "migrated" from one discipline to another according to changes in the discipline, funding practices, etc. For example, acoustics, including musical acoustics, was once a part of physics, but is now most often found in engineering sciences, except for musical acoustics. The latter, then, as a field of research, is now most often associated with computer music. But for new "homes" these fields would disappear as has architectural acoustics much to the detriment of concert hall design. Twenty years ago, music departments in major universities considered computers and music a most unlikely alignment, at best irrelevant and at worst dehumanizing. As noted above, only two faculties were willing to support in their departments the first tentative investigations. Indications that the field of computer music is now accepted by the larger academic community are several:

- Computer music is a part of music programs in major universities, e.g. Princeton, MIT, Illinois, Michigan, UCSD, Eastman- Rochester, Juilliard. Of major importance is that U.C. Berkeley has announced the opening of a center as will Yale next year.
- The interest in graduate level study in the field is on the increase as undergraduate faculties gradually accept and communicate the importance of new technology to composition, research, and teaching.
- The annual International Computer Music Conference is alternately held in Europe and North America. In North America, the host institution is always a university .
- There are many journals in the sciences and engineering sciences that publish articles from the field of computer music and one, the Computer Music Journal, MIT Press, is dedicated to the field.

One further indication of the robust nature of the field is the attention paid it by the "real" world. The music industry has shown great interest in computer music research and has in some cases established close associations with university based activities. CCRMA has established an Industrial Affiliates Program to facilitate this interaction and the results have so far been very good. Industry is also a frequent employer of students from the field of computer music. Thus, some of the indications that point toward the current vitality and continued growth of the field seem to be positive.

II. CCRMA

The position of CCRMA within the field is unquestionably an enviable one. The center is well-integrated within the Music department, while maintaining strong links through teaching and common research interests to other departments. The ease with which these interdisciplinary links were established was much facilitated by the very nature of Stanford itself: strong schools and departments that are not so monolithic that their departmental boundaries cannot be crossed. Among the attributes of CCRMA are:

- A strong tradition of research coupled with music composition has led to important publications and discoveries.
- The research/teaching staff are diverse in their skills and knowledge, well-integrated, and extremely active in the field.
- CCRMA receives excellent applicants for graduate school and they accept.
- The interest of undergraduates in the field is growing rapidly, partly because of our new accessibility but more importantly, because of the increasing importance of computer music to the more general world of music.
- Graduates who have studied at CCRMA, including undergraduates, get jobs, both in academia and in the music industry.

III. CCRMA RESEARCH and TEACHING

With the addition of Max Mathews as Professor(Research) full time at CCRMA, Earl Schubert, Professor of Speech and Hearing Sciences, Emeritus (recalled to active duty and half-time at CCRMA) and CCRMA's increased accessability to the campus, there has been a substantial increase in interest and interactions with Stanford faculty and students, particularly in the area of psychology and electrical engineering. A proposal has been submitted to the National Science Foundation to fund a Center for Integrated Research in Communication Acoustics within CCRMA. The proposed research involves the intersection of several areas including speech, real-time control, physical modeling of acoustic sources, signal processing, machine recognition of acoustic signals and auditory cognition. Stanford faculty interested in this research include Roger Shepard, Herb Clark, and Michel Pavel in the department of Psychology and Stephen Boyd in Electrical Engineering. It is felt that, even if the NSF-STC proposal is not funded in its entirety, that these areas of research will still be pursued.

The establishment of the new Center for New Music and Audio Technology at UC Berkeley under the direction of Richard Felciano and with David Wessel from IRCAM as technical director will further cooperative interaction between Stanford and Berkeley in the field. It is envisioned that courses and research at the two centers will complement each other and that graduate students will benefit from courses taught at both centers. With David Wessel at Berkeley there will be a strong psychoacoustic component that will complement the work at CCRMA now that the department of Speech and Hearing at Stanford has been disbanded.

CCRMA continues to attract high quality graduate students in music, electrical engineering (signal processing), psychology and computer science. The interest of undergraduates in the field is growing rapidly. CCRMA currently is teaching three graduate seminars: Music 220: Computer Generated Music, taught by John Chowning, and Music 320 and 420: Seminar in Signal Processing for Music Research, taught by Research Associate Julius Smith. Two courses aimed at undergraduates have been added since 1986. Music 154: Introduction to Computer Music and Music 120: Introduction to Music Synthesis and Programming Using Midi-Based Systems both taught by Research Associate Chris Chafe. With growing interest by students coming to Stanford in the area of computer music, plans for additional courses, both for general music students and computer music students will be drawn up this year. A small amount of funding has been allocated by the Provost for teaching at CCRMA for this

year. The teaching component at CCRMA has to be considered and funding for this area needs to be built into the CCRMA operating budget.

IV. CCRMA FACULTY

There are several conditions which I feel should be met if CCRMA is to maintain its preeminence in the field:

- The critical staff should be given positions which correspond to their accomplishments. Otherwise they will be hired away. Positions are currently listed for composers-computer music theorists at Columbia, Univ. of Pennsylvania, U.C. Berkeley, Yale.
- An Associate Director of CCRMA be named beginning in the academic year 1989-1990 to help me with the responsibilities associated with the academic and research direction of CCRMA.
- An additional tenured position be given to CCRMA. The size and scope of CCRMA's activities seem to call for more than one faculty billet. In addition, this position would allow for a graceful transition to a new director. (I have no intention of detaching myself from CCRMA and am willing to assist the new director, but I must have more time for teaching, composition and research.) A new position might be obtained through an endowed chair acquired through the Centennial Campaign. Such a chair would help us attract the very best candidate.

I request that Chris Chafe, Julius Smith, and Bernard Mont-Reynaud each be considered for the position Associate Professor (Research) beginning the academic year 1989-1990 They have all made important contributions to several fields and as PIs could bring in research funds to help support CCRMA.

Mont-Reynaud is responsible for a National Science Foundation contract and should have PI status. There is every likelihood that the current three-year NSF contract can be continued and Mont-Reynaud's continued participation is essential.

Julius Smith is one of the few experts in signal processing as applied to acoustics. He is currently working with Steve Jobs (4/5ths time) on the NEXT computer and will return to near full-time at CCRMA in September of this year. Smith has introduced six new courses in the music department which are fundamental to much of the doctoral research.

Chris Chafe is currently the Technical Coordinator for CCRMA in addition to maintaining his prominence in research, composition and teaching. I consider him to be a most likely candidate for the eventual leadership of CCRMA. He possesses a rare combination of technical and musical insight in addition to a personal manner that would preserve the special feeling of common purpose which exists at CCRMA. I would ask that, granted the requested promotion, Chafe be made Associate Director of CCRMA beginning in 1989-1990.

V. CCRMA FUNDING AND SUPPORT

Since 1982, operating support for CCRMA has been provided by a 5-year grant from the System Development Foundation. This grant allowed the establishment of CCRMA as a viable and robust program at Stanford. With the end of the System Development grant, support for CCRMA must now be found from other sources. In February of 1987, a proposal was submitted to the Centennial Committee to fund an endowment to operate CCRMA. During the past year, discussions have been held with Dean Wessells, Susan Schofield, John Chowning, Patte Wood, and the Music Department Chair (Al Cohen, Karol Berger) regarding the establishment of an operating budget for CCRMA. It has been recognized that the operating budget for CCRMA will be comprised of funding from several different sources. It was decided that for the 1987-88 academic year that support for CCRMA not covered by the remaining System Development Foundation funds would be covered by Yamaha Royalty Income and a one-time request for funds from the provost for teaching support. John Chowning's FM patent should produce income until 1994. Other technology from CCRMA should also produce income in the future. Research funding from NSF continues but is not substantial. Support for teaching at CCRMA must be considered. The question of continued operating support and funding and the establishment of an endowment for CCRMA remains as a priority.