Acoustical Balance in Recording

EDDISON van OTTENFELD, Mus. D.*

A musician expresses his viewpoint on the old and continuing controversy between engineers and musical directors—but with an understanding of the problems of both.

EVER SINCE the turn of the century—when the introduction of mechanical devices for the recording of sound captured in evolutionary degrees the tremendous musical contribution of the world's greatest composers—there has been a division of opinion as to what constitutes acoustical balance in recording. On the one hand we have the questionable opinion of music directors and on the other the adamant viewpoint of the recording engineer. Actually, it is a battle between the music director trying to obtain the inspiration he hears in the music and the recording engineer working with his equipment to keep what he records in balance. Neither of these viewpoints is necessarily correct. There has been much progress in engineering, but a lot more can be added to the art of recording.

The interest in acoustical balance has been gradual because the knowledge of the science of acoustics has been incomplete. All evolution, as we know of it, is a gradual process of unfoldment and better understanding. Engineers in the recording industry have spent countless hours in improving their techniques; those who are best informed spend just as many hours in understanding music. A progressive engineer knows his music as well as his profession. This is evident in all recording studios of repute.

Invaluable research has contributed to the development of the telephone, radio, radar, recording, and motion picture sound, as well as in all forms of acoustical reproduction. Many times progress has been made through chance discoveries and through a genuine cooperation among engineering contributors to perfect their scientific medium. Unfortunately, there is no scientific evaluation of inspiration or the creative process of the individuals who have given their lives to compose the world's music. If there were such a thing as a yard stick with a scientific approach, creative music could be analyzed. Because of this, the engineer must take a different approach to the subject and put as much study and application to individual musical selections as he does in maintaining and perfecting his equipment.

Conflicts

I am always amused when a serious conflict ensues between the music director and the engineer. Each assumes that he knows his subject better than the other fellow, and the atmosphere becomes charged with slightly veiled insults. The conflict begins, of course, with a lack of knowledge by the parties concerned. However, the practice of riding gain and knocking the top off of climactic passages in music is not the answer to proper acoustical balance. It might, in some instances, smooth over a rough situation, but the problem as a whole lies in the scoring and use of instruments. There is no such thing as a perfect music score that can be recorded with the same results when used for radio, commercial recordings, motion-pictures, or choral work. These separate techniques are well established in themselves, and the engineer is obligated to know how each medium is handled. Without this knowledge, nothing but a questionable recording result is attained.

The phenomena of sound is particularly satisfying as a branch of physics, but sound in a tonal sense is not necessarily measured accurately. Tonality is often unpredictable. What is true with reed instruments is not necessarily true with brass instruments, especially where the many types of mutes are concerned. The same is true with the various stringed instruments—even individual instruments of the same type—although they may be playing the same musical passage. With human voices we have the greatest challenge.

The engineer must do more research of his own. Much has been accomplished with reflection and absorption of sound in the recording studio, but it is not enough. The real problem is in interpretation of the music, and this demands a full working accord between engineer and music director. The engineer should be able to analyze the musical score to determine if it is acoustically correct for recording. If perfection is the goal, the engineer and music director can discuss their problem intelligently and iron out their difficulties before the recording is attempted.

In all of our work, we check the repertoire thoroughly before we attempt a recording. We know the problems involved and we are prepared to meet them. Ironically, there is no problem that cannot be met when musical knowledge and scientific engineering get together. The inspiring end result is a contribution to our culture, for through recording, countless thousands of listeners are able to audit music which they normally have no opportunity to hear.

Arrangements

In general, concert arrangements in music do not necessarily adapt themselves to radio, phonograph recording, or motion pictures. The problem lies in the score and the use of instruments—mainly on how they are used. Much of our work is in *a cappella* recording. As a result, our first approach to this medium is the analysis of the physical mechanism which produces speech as a sound-producing vibrator in resonance chambers for acoustic waves. We know, for example, that during speech these waves are changing constantly. This is basically true with instruments. The only manner in which proper diction in singing has been attained is to get the chorus to think and act as a unit. The simplest way to overcome diction problems is to agree on the emphasis of the vowel itself. When this is accomplished, the end results in soft and loud passages are the same.

When the engineer understands that the bass, tenor, baritone, alto, or soprano sections are subject to tonal variations, he is usually able to correct problems of tone and diction by having each section sing as a group, alone, and with the director monitoring the results. A director invariably is impressed with these peculiarities in tonal variations between individuals as well as groups. On-the-spot corrections can then be made or a different scoring applied to the problem.

The engineer should understand the relative intensity of vowels when sung by different sections of the chorus. The intensity of bass will frequently overshadow the soprano, for example. If the soprano section is singing in consecutive thirds, it frequently causes "shattering," both in tone and diction. Inversion of tones then should be applied to overcome the problem if the singers themselves are unable to control their tones. No juggling of equipment will iron out this problem.

The engineer is in an excellent position to determine what is wrong with a score if he knows why a music interval overlaps, as in the case of consecutive thirds. The same is true where overlapping of intensity occurs in each section of the chorus. If he can explain the physics of sound to music directors they are not only impressed but grateful for his knowledge and suggestions.

Choir Recordings

Some of the choirs which we have recorded have produced what we consider perfectly balanced recordings. St. Olaf Choir of Northfield, Minnesota, is one of these. It is under the direction of Olaf Christiansen. Little need be said about the St. Olaf Choir, so well known because of its concert tours and its radio broadcasts. Many observers feel that the

[*Continued on page 58*]

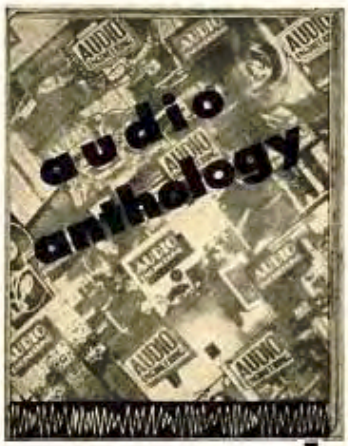
* *President, Vanna Records Inc., Hollywood, California.*

INDUSTRIAL TRAINEE PROGRAMS
ELECTRONIC and MECHANICAL
INSPECTION—PRODUCTION—OPERATION
CONSULTANT, RESIDENT and IN-PLANT
Services Available
by
Outstanding electronic and mechanical engineers
with
Educational, Industrial and Management backgrounds
Write for prospectus or presentation
Box DBT AUDIO ENGINEERING 342 Madison Ave., N. Y. 17, N. Y.

OVER **9000** COPIES SOLD

AND ***STILL GOING STRONG!***

audio anthology



Paper cover . . . $2.00

Distributors write for quantity discount

The long awaited compilation of reprints from early issues of AUDIO ENGINEERING, most of which are unobtainable.

Contains 37 articles on the following subjects:

- Amplifiers
- Speakers
- Noise Suppressors
- Phonograph Equipment
- Tone and Loudness Controls
- Dividing Networks

These articles have been of great interest to readers of AUDIO ENGINEERING over the past three years. *Assembled in one volume, they comprise the most authoritative reference work for the audio hobbyist.*

-----CUT OUT—MAIL TODAY-----

Book Division, Dept. A9
Radio Magazines, Inc.
342 Madison Ave., New York 17, N. Y.

Sirs: Enclosed is my ☐ check ☐ money order for _____ copies of the Audio Anthology.

Name (print carefully) .....
Address .....
City ..... Zone ..... State .....

ACOUSTICAL BALANCE

[from page 23]

choir, through Dr. F. Melius Christiansen, is primarily responsible for the impetus given serious choral music in America. When this dean of directors began by insisting on standards in performance and repertoire that made no compromise with supposed popular taste, he accomplished two objectives: first, the shattering of an old idea that the public must be played down to if the box office is to prosper; and, second, that students must be fed music of a difficult nature only in sugar coated doses.

Another choir is that of Dr. Charles C. Hirt, long a close associate of the late John Smallman. In addition to his church program of some 300 singers, Dr. Hirt is Professor of Sacred Music at the University of Southern California. He is a recognized authority on Russian Liturgical Music. His Cathedral Choir of sixty-five voices is dedicated to Christian Service through music. Many of his renditions include contemporary composers of today. Our most recent choral series is that of the famous Notre Dame Cathedral of Paris, France. This was recorded in the cathedral itself with sixty boys and fifteen men, with the great organ.[1]

Musical Education

For a well rounded education in music and its acoustic values, the engineer should study the following subjects to attain a better concept of music:

1. The development of musical instruments.
2. Production of sound in general.
3. The production of sound with strings, reeds and brass.
4. The production of sound by air.
5. The study of harmonics and overtones.
6. The human voice.

If the engineer studies these subjects as well as he does those of physics and engineering, he will be able to bridge the gap between engineering analysis and creative inspiration. The engineer must get rid of the idea that he is separate and apart from the production of music. Music is the universal language, and if the engineer fails to recognize this fact, he is unwittingly contributing a disservice to the recording industry.

Directors, on the other hand, must get rid of the idea that they have a corner on inspiration and interpretation. If what they produce doesn't get results, then they must find out why, and the only way they can do this is through a partnership with the recording engineer. A good slogan for both would be "Is it so? Does it work? Where do I fit into the picture?"

[1] These are but a few of the outstanding choral groups we have recorded. Many of our colleges and universities have inspiring musical organizations, and the trend toward serious *a cappella* singing is spreading throughout America.