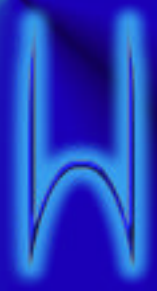

HPS-4000®

HIGH PERFORMANCE STEREO

Sound IS the Experience !™

MODERN SOUND SYSTEMS

BY

JOHN F. ALLEN

HIGH PERFORMANCE STEREO™

HIGH PERFORMANCE STEREO™
NEWTON, MA 02459 USA • TEL: 1-617-244-1757

MODERN SOUND SYSTEMS

by
John F. Allen

Modern sound systems are obviously a major factor in today's theatres. I have been pleased to watch the grosses increase in every theatre where one of our sound systems has been installed.

Last month I described the largest most powerful (6000 watts, 31 speakers) Dolby stereo-Kintek-Klipsch system ever built. I am privileged to announce that I have been asked to design the sound system for next month's National Association of Theatre Owner's convention to be held at Miami's Fountainebleau Hotel. Because of the 200 x 136 foot size of the Grand Ballroom, this system will be even larger and more powerful.

Some months ago, Wometco was selected to supply the projection equipment required for the product screenings at this year's convention. Hoping to perhaps improve these presentations, Kintek Vice President Dan Taylor suggested that a Kintek system might be a good idea.

It is a good idea. Since all the program material is monophonic, the Kintek stereo synthesizer can turn the sound into a full 5 channels. (See BOXOFFICE September, 1981 for a complete description of the Kintek system). The quality of the enhancement that this processor provides makes listening to single channel sound systems down right irritating.

The problem is that the room is so large. The ceiling is as low as 22 feet. Any behind the screen sound system would have to be very carefully designed. As a result, I now have Mr. Taylor to thank for choosing to hand me the biggest challenge I've ever faced.

Though I hope and expect that I will never encounter an actual theatre of such awful proportions, there are some cinemas wide enough to present similar difficulties. How does one cover such a space with a center channel's single speaker system? The answer is that you can't. If you use a speaker with wide enough dispersion to cover the 136 foot wide front row, the volume level 200 feet away at the rear would not be enough unless you blasted those in front. If you select a system which will reach the rear half of the room without overpowering those in front, such a system will necessarily have a relatively narrow dispersion pattern. The front corner areas will not be covered.

In these situations a sound system designer has basically two choices; a distributed system (usually lots of ceiling speakers), or an array of several speakers at the front. Since in this case we wish the sound to come from the screen, we use the second approach. The array is then simply a combination of the long throw speaker used to cover the majority of the room including the rear, and two additional short throw systems to fill in the front corner areas. These units are all placed in the same location behind the screen but are fed by separate amplifiers. This way we can control the volume levels reaching the different areas of the room so that no one suffers from sound levels which are too loud or too soft.

We will be using such an array for the center channel at the Fountainebleau. The center channel is the most important since it delivers the dialog. A stereo system uses left and right channels as well. In such a large room however, stereo is very difficult. True stereo coverage for both the front and rear areas is impractical if the information in the two channels is very different. For instance, those sitting at the far right will be much closer to the right speaker than the left and the balance will be off.

The Kintek system is actually easier to use here because it is not true stereo but rather synthesized stereo. Hence both the left and right channels will deliver different spectrums of the same thing. The entire audience basically hears everything though not always the same way. If you wish to hear the full effect of this system, sit near the center of the middle third of the room.

Each screen speaker will be powered by a Kintek KT-102 400 Watt amplifier. The additional systems used for the front will be fed by two 100 Watt amplifiers. The speakers will be the three way fully horn loaded Klipsch TMCM-3's. The front fill units will be Klipsch TLSI-HF systems. These are essentially the high frequency sections of the Klipsch La Scala system, a smaller system than the TMCM.

The fifth channel in the Kintek system is an enhanced bass channel. A subharmonic synthesizer is employed to fill in the lower bass octave usually missing in monophonic sound mixes. If the bass extends to 60 Hertz, the system will play it and synthesize a similar signal at 30 Hertz. The difference can be dramatic or subtile depending on the program material. The synthesized portion of the sound is played through Kintek's KT-90 subwoofer. These units contain their own 500 Watt amplifiers. We will be using four of them in this installation.

Kintek derives a surround effect by allowing non dialog sound to be played through the surround speakers. So even though we will be playing monophonic recordings we need surrounds.

Designing a surround array for this room presented my most difficult problem. The place is just too big. Surround speakers even with the dispersion patterns of the Klipsch's still need to be 30 feet above the floor in order to provide proper coverage. By definition a surround channel should be an omnipresent sound source coming at you from the sides and rear. This means that one should not be able to localize to or pinpoint any of the speakers producing the sound. A distributed system with lots of speakers and amplifier power is required.

When I developed the Allen Surround Array™ formulas in 1980, I based them of a mathematical relationship between certain aspects of a speaker's radiating pattern and the dimensions of the room. Systems built according to these formulas (the first of their kind) work quite well, providing exceptionally even surround coverage, ±1/2 dB within the surrounded area, without localization. But in a case like this one when the surround speakers can only be 2/3 rds of their ideal height, coverage near the center of the room will be somewhat lower. I was also told that the rear half of the room would be closed off half of the time.

These unusual conditions forced me to develop a special set of my surround array formulas. Using my original mathematical derivations I reprogrammed the computer to maintain the lack of localization and maximize even coverage from the 22 foot height available to us instead of the ideal 30 foot height. Using the now expanded program, I designed separate surround arrays for both the front and rear ballroom sections. Each array will contain 13 speaker systems. Two arrays enables me to provide yet more even coverage for both sections as well as the ability to shut down the rear array when that part of the room is not used. The surround speakers will be the three way Klipsch Heresys. Each of the speakers in the front section will be powered by 200 Watts. Those in the rear will not have to work as hard or throw quite so far, so they are each powered by 100 Watts. The 11 surround amplifiers will also be the Kintek KT-102's.

The system totals up as a $52,000.00, 7,000 Watt assembly containing a mile of wire, a Kintek KT-305 mono enhancement system, 15 KT-102 power amplifiers and 33 Klipsch loudspeakers. With only the few days prior to the convention to install it, I just hope it all works.

Clean sound is essential. Audiences do appreciate it and, best of all for theatre owners, sound systems are a good investment. We are very pleased to see NATO's commitment to bring convention delegates the best in sound technology and are proud to be a part of it.

John F. Allen is the founder and president of High Performance Stereo in Newton, Mass. He is also the inventor of the HPS-4000® cinema sound system and in 1984 was the first to bring digital sound to the cinema. John Allen can be reached by E-mail at JohnFAllen@aol.com.