

# An Overview of American Technology Corporation's HyperSonic™ Sound Technology



## *What is HyperSonic Sound Technology?*

### **What is HSS?**

HyperSonic Sound Technology, under development in the labs of American Technology Corporation, is simply the most revolutionary sound reproduction system of this century. Not since the development of the "cone" loudspeaker more than 75 years ago has any technology provided such significant departure from conventional speakers and such a remarkable approach to the reproduction of sound.



### **How does it work?**

The basic operating principal of HSS uses a property of air known as "non-linearity". A normal sound wave (like someone talking) is a small pressure wave that travels through the air. As the pressure goes up and down, the "non-linear" nature of the air itself causes the sound wave to be changed slightly. If you change a sound wave, new sounds (frequencies) are formed within the wave. Therefore, if we know how the air affects the sound waves, we can predict exactly what new frequencies (sounds) will be added into the

sound wave by the air itself. An ultrasonic (beyond the range of human hearing) sound wave can be sent into the air with sufficient volume to cause the air to create these new frequencies. Since we cannot hear the ultrasonic sound, we only hear the new sounds that are formed by the non-linear action of the air.

### **The HSS System**

A HyperSonic Sound system consists of an audio program source such as a CD player or microphone, an HSS signal processor, and an ultrasonic emitter or transducer that is powered by an ultrasonic amplifier. The music or voice from the audio source is converted to a highly complex ultrasonic signal by the signal processor before being amplified and emitted into the air by the transducer (emitter). Since the ultrasonic energy is highly directional, it forms a virtual column of sound directly in front of the emitter, much like the light from a flashlight. All along that column of ultrasonic sound, the air is creating new sounds (the sound that we originally converted to an ultrasonic wave). Since the sound that we hear is created right in the column of ultrasonic energy, it does not spread in all directions like the sound from a conventional loudspeaker, instead it stays locked tightly inside the column of ultrasonic energy. In order to hear the sound, your ears must be in line with the column of ultrasound, or, you can hear the sound after it reflects off a hard surface. For example, if you point the ultrasonic emitter toward a wall, you will only hear the audible sound after it has reflected off the wall. This is similar to shining a flashlight at a wall in a dark room. You do not see the light from the flashlight, you only see the spot of light on the wall. HSS works the same way, except instead of seeing the spot of light on the wall, you hear the "spot" of sound reflected from the wall. For stereo, a separate ultrasonic emitter is required for each channel of audio, one for the left channel and one for the right channel.

## Why HSS?

There are many reasons. The first and most important is the ability to direct or focus sound into a tight beam, similar to the beam of light from the flashlight described above. No other audio reproduction device available today provides this unique ability. The opportunities for applying this characteristic to the reproduction of sound are limitless. Think about the surface of a future computer monitor with HSS speakers directing sound only at the operator, not at the person next to him. How about the potential to reflect the rear channels of your surround TV from the rear wall of your living room, by focusing HSS speakers mounted on the TV itself – no rear speakers, no rear wiring. Think about the ability to focus sound into a crowd of people on a football field and talk only to a selected few.

The following contains a brief list of other uses made possible by HSS:

- Museums - describe each exhibit to only the person standing in front of it
- Automobiles - HSS announcement device in the dash to “beam” alert signals directly to the driver
- Audio/Video Conferencing - project the audio from a conference in four different languages, from a single central device, without the need for headphones
- Paging Systems - direct the announcement to the specific area of interest
- Retail Sales - provide targeted advertising directly at the point of purchase
- Drive Through Ordering - intelligible communications directly with an automobile driver without bothering the surrounding neighbors
- Safety Officials - portable “bull horn” type device for communicating with a specific person in a crowd of people
- Military Applications - ship to ship communications, ship-board announcements,



## HSS Technology Advantages

- o ***Focus sound where you want it and no place else***
- o ***Revolutionary new concept in sound reproduction - technology paradigm shift***
- o ***Ultrasonic emitter devices are thin and flat and do not require a mounting cabinet.***
- o ***Its characteristics allow it to perform in ways conventional loudspeakers cannot***
- o ***The focused or directed sound travels much farther in a straight line than conventional loudspeakers***
- o ***Dispersion can be controlled – very narrow or wider to cover more listening area***
- o ***Reduce or eliminate feedback from live microphones***

