The Future of Home Theater Immersion: Crowson's "*Linear-Direct-Drive*™" Tactile Technology

by Randolph Crowson and John Yi, Crowson Technology

Crowson Technology's TES 100 (Tactile Effects System) is taking Home Theater by storm. Patent-pending *Linear-Direct-Drive*™ tactile technology adds exciting new realism to the home theater experience that manufacturers have previously attempted but failed to achieve. The TES 100 is the first tactile product to use this patented method of transferring energy to home theater seating. *Linear-Direct-Drive*™ (LDD™) technology efficiently delivers the most realistic and accurate tactile effects available for home theater/audio today.

Achieving realistic and immersive sight and sound is the ultimate goal of every home theater enthusiast. In years past, commercial theaters set the mark for high-impact, earth-quaking sound. With the advent of 5.1 surround sound, home theater audio has become a formidable competitor. Now, with the introduction of LDD™ technology, uniquely developed for the home, we can confidently say that commercial theater sound actually *pales* in comparison! An amazing feat, accomplished through a device that is not much larger than the palm of your hand.

The TES 100 Tactile Transducer measures less than six (6) inches^2 and stands approximately one (1) inch tall!

How does Linear-Direct-Drive™ technology work?
The basic principles are simple:

First - low frequency sound, in the real world, is accompanied by vibrational motion, or tactile effects. That is, at frequencies between 1 and 500Hz, we actually "feel" sound in addition to "hearing" it. Think of the last time you were pulled over on side of the highway, and a large semi-truck drove by. Not only did you hear the roar of the engine, but you also felt the sound, transferred to your body through the concrete and ground

beneath it. This is true for all low frequency sounds, and can be replicated to a very limited degree by the booming bass available through subwoofers today. "Limited degree?!" you might be saying, "My subwoofer has enough tactile feedback to rumble my whole house!" This is a very dangerous statement...

Using a subwoofer alone to create significant tactile effects is extremely hazardous to the human eardrum. Occupational Safety and Health Administration (OSHA) guidelines require that workers exposed to 85dB (over an 8hr average) use hearing protection. At only 110-115 dB over short periods, you may already be causing irreparable damage (and probably annoying your neighbors and/or spouse!) As you can see, a subway train registers around 90 dB in the real world. Trying to reproduce the feeling and sound of this train with speakers alone can easily surpass 110-115dB.

Second, the most efficient way to transfer motion to home theater seating is not by bolting a "shaker" device to it. Popular "shaker" devices, largely unimproved for the past two decades, all rely on one thing: being strategically attached to a rigid structural member within the seating's frame or to a custom-built platform/riser. The transference of energy from the "shaker" to the seating relies on the rigidity of the points at which the device is attached, often resulting in unevenly dispersed, unrealistic localized vibration.

> Imagine sitting in a "muscle car" and revving the engine. If the car has the kind of power we're thinking of, your seat (and the entire frame of the car) would be rumbling with the vibrations. The more you rev, the more rumble you get.
>
> Now, imagine handing the wheel to a friend, who waits as you actually get out, pop the hood, and sit directly on the engine. Of course, we are not recommending that anyone actually try this (engines are usually greasy and hot!). As your friend revs the engine, you really feel the motion, because the transfer of energy is *direct*. Rather than feeling the vibrations as a second-hand effect, transferred through the engine's mounting brackets and after traveling the length of the car, you would feel the motion immediately and hence, more accurately.
>
> Linear-Direct-Drive™ technology transfers energy more efficiently and evenly to the entire seating structure through the points that were naturally designed to carry its weight: *the feet*. This direct approach increases efficiency, reduces power requirements, and makes installation amazingly simple and quick.

Finally, LDD™ technology incorporates a proprietary "electromagnetic short throw linear actuator." It's a mouthful, we know - but again, the basic principles are simple: Because the transfer of motion is direct, the excursion required for the actuator to create significant tactile effects is very small. Think of a headphone driver - the amount of air moved by the small cone is miniscule, yet it can deliver booming and accurate sound because it is transferred almost immediately and directly to your eardrums. Similarly, because the excursion required by the TES 100 is very small, the ability to produce incredibly quick and accurate motion increases dramatically. "Shaker" devices, as one of our recent product reviewers put it, "just shake..."Compared to the TES 100, "...they provide a less-than accurate buzzing that adds some excitement, but do not deliver realistic tactile motion."

Where do we go from here? Crowson Technology has many exciting, innovative projects in store. Linear-Direct-Drive™ tactile technology is truly a force to be reckoned with; one that delivers what no other technology has - remarkably linear, realistic and powerful tactile effects that integrate seamlessly into home theater/audio systems.

For more information please visit: www.crowsontech.com or call (805) 962-9004.
Crowson Technology: Moving Home Theater to the Next Level...