Z-Systems z-K6 K-Surround Processor

If ever there was a Holy Grail of multichannel audio, it is a simple, easy to use device that will magically transform a stereo mix into a 5.1 audio stem. Somebody, somewhere coined the term 'up-mixing' to describe this process, and so began the quest. Sir JON THORNTON of the 'pool doth ride out in search.

IN A SENSE, UP-MIXING is nothing new. In the old days, any stereo mix could be fed into a matrix surround decoder, and multichannel information recovered. This 'magic surround' effect wasn't always predictable or desirable, but it is still exploited by many pseudo-surround devices to add an extra dimension to a stereo mix. However, when it comes to 5.1 audio, opinion is very firmly divided between two camps. One sees the only acceptable way to generate a 5.1 mix as a return to the original multitracks, and a completely new mix. The other camp is actively seeking a quick and easy solution to re-mastering stereo sources to 5.1, and in the meantime is using a variety of techniques to achieve this, including matrix-decoding techniques to extract a centre signal, and the use of reverb and other psycho-acoustic processing to provide ambience in the surround channels.

Leaving aside the economic issues that underpin both schools of thought, it's clear that in some cases original multitracks simply aren't available, and that repurposing legacy or archive material is only going to be possible with an up-mix process of some description.

Z-Systems' z-K6 K-Surround Processor (try saying that after a long session) is one of the newer entrants to this particular fray, and could very well be the magic box that some people are looking for. The mouthful of a name is attributable to the fact that this device is the result of a long-standing collaboration between Z-systems and renowned mastering engineer Bob Katz (the 'K' in K-Surround). What sets the K6 apart from some other devices is its use of sophisticated DSP to extract ambience information from a stereo signal, using psycho-acoustic techniques developed by Bob Katz over the last ten years, and in applying this ambience to create a natural sounding surround field without resorting to the use of artificial reverberation.

Before jumping into a more detailed explanation of this process, it's worth just standing back and taking a look at the processor. At 4U high and finished in silver, it's certainly an imposing beast, and features a large

green fluorescent display with soft-keys and three hefty data entry knobs providing most of the user interface. It is also very firmly a processor for the digital world, having no onboard A-D conversion at all. The back panel reveals three pairs of AES-EBU I-Os on XLR connectors, a MIDI In and Out, and a 9-pin socket for RS-422 connection. Curiously, I couldn't find any reference in the manual or in the operating system to the use of this RS-422 connection; (You won't see it in the picture either. Ed). Perhaps it's for future software versions.

While the three pairs of digital outputs logically account for six-channel output (L, R, LS, RS, C, LFE), the K6 also requires that you feed the same stereo input signal to all three digital inputs in order to maintain synchronous timing between channel pairs. The manual suggests that this is achieved using an AES-EBU distribution amplifier of some description, but it seems strange that this could not have been achieved by the unit itself, as it does make configuring the unit that little bit more time consuming. I'd hazard a guess that perhaps Z-Systems has recycled parts of the architecture from its 6-in/6-out processor range, or that it wants to ensure that any problems with jitter can be firmly attributed to external sources.

Having managed to distribute a stereo digital source to all three inputs, and then hooked up the outputs to a digital mixer and thence to a 5.1 monitor system, it's time to sit back and prepare to be amazed. Except that nothing happens. A quick scurry around, and we establish that the K6 doesn't auto-detect the sample rate of incoming audio data, and needs to be set manually to match this. That done, and finally the unit

passes audio. And still nothing notable happens, apart from some gentle down-mixing of the LR signal to generate a feed for the LFE channel. If by this stage you're detecting more than a little frustration mounting up, you'd be right. Yet this only serves to underline just how good the K6 really is, because at the end of the day it still managed to bowl me over.

The problem is that although you can save 50 user presets – and can even store these externally using MIDI sys-ex bulk dumps or recall them via MIDI program change commands – out of the box the K6 comes with a grand total of one factory preset. And this preset does precisely nothing (other than a gentle down-mix of LR to LFE). Which means that there's nothing for it – you have to read the manual, and more importantly, you have to grasp exactly how the K6 works its magic.

The unit's processing can be broken down onto two functional blocks. The first takes a stereo input and extracts the front channels from it. The second block takes the stereo inputs and extracts the surround channels and the LFE channel. Looking in detail first at the front channel extraction, the stereo signal is initially passed through a high and low shelving filter. This filtered signal is then passed through some sophisticated DSP that extrapolates an ambience-enhanced stereo signal. This is where Bob Katz's research and experience comes into play, as the unit enhances the ambience of the stereo material without the addition of artificial reverb. Users have control over the type of ambience that is derived by changing algorithm types (for example, wide, deep, small), and have some additional control over the tonal quality of the extrapolated ambience courtesy of a 3-band equaliser. Depending on the algorithm chosen, the unit
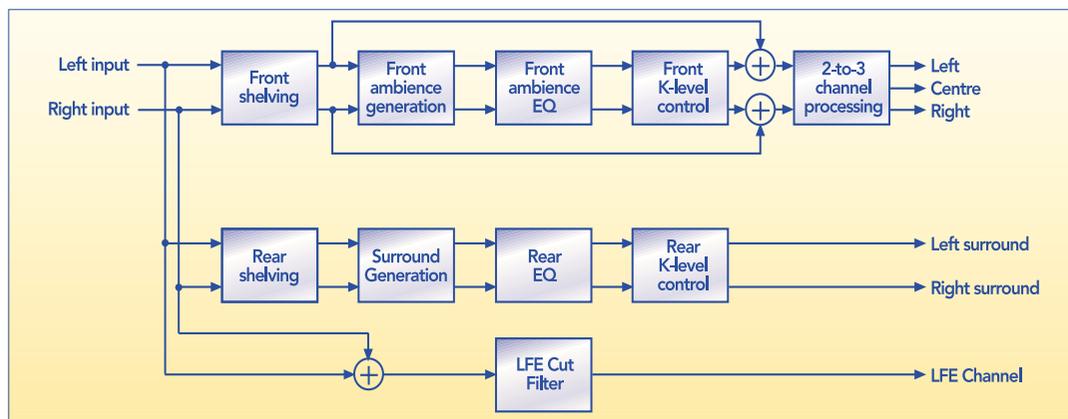
can then derive a centre channel, with the ability to adjust how much the image pulls towards the centre via a 'focus' parameter. The level of the extrapolated ambience in relation to the original stereo source can also be controlled.

The surround channel extraction is fairly similar. Again, the stereo input signal is passed through two shelving filters before being passed through the DSP to extrapolate ambience, and then through a 3-band equaliser and level control. The significant difference here is that the extrapolated ambience is not added to the original signal, but is directed straight to the surround outputs. Finally, and reasonably conventionally, the stereo input signal can be summed and a low-pass filtered LFE signal derived from it.

Even if all of this so far sounds like so much digital voodoo, at least it allows you to navigate around and start adjusting some of these parameters. This is relatively easy once you get used to the slightly bizarre, and sometimes inconsistent, relationship between using the soft keys to select parameters, and then using one or more of the large data entry knobs to adjust them. All this can be forgiven, because when you start feeding audio into the device the effect is magical. Almost every musical genre is instantly transformed into a hugely wide soundstage, and repeated pressing of the master bypass button reminds you just how good 5.1 really can be for music. After a few minutes, it becomes clear that for best effect, some serious tweaking needs to be done from genre to genre, and even from track to track. What is most impressive is the consistent tonal similarity between the up-mixed output and the original source. You'd expect to hear more phase-related tonal artefacts, but they aren't at all obvious.

After a couple of hours, I found that achieving the best results lies in the manipulation of three main areas – the ambience extraction algorithm employed, the 'focus' setting for centre channel extraction, and the settings for both front and rear ambience EQ. The last of these has perhaps the biggest effect – removing HF content fairly aggressively helps to push the whole soundstage forward from the listener, while enhancing the HF content and removing some of the low frequency content brings the listener and the programme material into a very 'live' space.

Some input sources produce more pleasing results than others. Complex, layered, modern pop music with vocal processing all over the place doesn't fare very well, with the front ambience extraction tending to reveal shortcomings in performers and vocal processing. Simpler arrangements with well-recorded acoustic instruments sound much better, with the processor adding a pleasing sense of realism to most sounds. Classical music probably fared best of all, with small ensembles and orchestral recordings finding a whole new dimension to individual timbres and the overall sense of space.

It's easy to become seduced by a device like this – and it really is extremely good at what it purports to do. It's not what you'd call cheap though – and is even probably stretching the definition of reasonably priced. There are some irritations – the need to give it three simultaneous digital sources, the lack of sample rate detection, the (at times) slightly clunky user interface.

But, has the quest ended, and is this the Holy Grail? Well, sort of. For once, both camps in the debate are right. You are never going to fully maximise the potential of 5.1 with an up-mix device such as this one – certainly not if you consider dynamic control of individual sound sources within a space. For using 5.1 to add an extra sense of space and realism though, the

z-K6 is as good as I've heard, and certainly a whole lot easier than a complete remix.

For anybody in DVD authoring who finds themselves repeatedly repurposing stereo mixes for 5.1, or somebody with a large back-catalogue of legacy recordings to remaster, I dare say it would pay for itself in a couple of weeks. For everybody else, it's probably back to those multitracks… ■

PROS Very realistic, natural sounding and flexible up-mix processing; flexible and useful range of parameter adjustments; looks fantastic; equally useful for stereo and multichannel mastering.

CONS User interface not always completely intuitive; ambience extraction algorithms better suited to some recordings than others; expensive.

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