



UPM-1
Stereo to 5.1
Converter



SoundField

UPM-1

GERRY FURSDEN finds that a unique hands-free approach by Soundfield could mean its UPM-1 becomes a popular and practical industry essential.

With the increasing promotion and availability of HDTV receivers and services, the demand for HD programming has never been higher, and with it comes an expectation of surround sound. For newly commissioned programmes that is usually relatively straightforward to achieve, but there is a lot of HD-compatible archive material on the shelves that was mixed with a stereo soundtrack, and a lot of current programmes often include stereo archive material. Most broadcasters specify limits on the duration of non-HD archive footage within an HD programme, but few are so precise about the soundtrack. Nevertheless, most sound supervisors and dubbing mixers would agree that integrating stereo material within a surround programme is challenging. Once an enveloping surround sound stage has been established within a programme, it is very distracting and disturbing for the audience if everything suddenly collapses into a flat frontal stereo image. And as we all know, a soundtrack that draws attention to itself is not usually a good thing – it can wreck the sensory illusion that the programme is trying to create.

There are lots of ways of 'spoofing' up a surround soundtrack from a stereo source – it's something dubbing mixers have been doing for the last sixty years or so. With sufficient time and resources there are some well established and very effective techniques – such as finding or generating matching wild-tracks or reverbation to fill out the rear channels in an appropriate and convincing way. Thankfully a lot of HDTV programming does pass through a formal dubbing process, and so such techniques can often be applied – but increasingly the HDTV channels are carrying more live source material and clearly such labour intensive and non real time processes

are simply not practical.

In those situations some kind of instant 'up-mixing' process is required, and again there is a variety of techniques and products available. Most are based on some form of matrixing idea – the simplest being to take the stereo difference signal and route that to the rear channels. In some cases even this very simplistic approach can be surprising effective, but it is very dependent on the nature of the source material.

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Various manufacturers offer more sophisticated and versatile approaches, such as TC Electronic's 'Unwrap' algorithm on the System 6000 platform or Studer's 5.1 Width mode in the Vistic consoles, to name just two. However, in my experience all of these systems require very careful configuration and although they can generate

very convincing and acceptable surround sound stages, they can also be caught out occasionally, sooner or later sending something inappropriate to the rear channels.

Step In SoundField

SoundField is a British company boasting a long and honourable association with surround sound since taking up the production and development of the SoundField microphone in all its incarnations. The latest versions – the DSF-1 and DSF-2 – integrate digital signal processing with a greatly enhanced analogue front end to produce what are undoubtedly the finest single-point surround sound capturing microphones in the world, and these products have been widely adopted by HDTV broadcasters working on live sports and music events.

In developing these microphones in close association with various leading broadcasters, SoundField became

THE REVIEWER

GERRY FURSDEN has been a freelance broadcast sound supervisor and dubbing mixer for nearly twenty-five years, working on a very wide range of programming genres and with an equally wide range of technologies.



SOUNDFIELD UPM-1



► aware of the broadcasters' regular requirement to 'up-mix' stereo archive material to blend in with the 5.1 programmes their microphones were being used for. As a result, the company has been able to bring its considerable expertise to bear on producing a product aimed squarely at that need, and the result is the UPM-1.

This product takes an innovative approach to the concept of upmixing a stereo soundtrack to 5.1, using some seriously powerful and very

clever DSP jiggery-pokery. It doesn't add anything to the mix at all – there is no added reverb, for example – and it doesn't mess around with phase shifts to create the rear channels either, so a stereo downmix of the up-mixed material always comes back sounding like the original source material. What the UPM-1 does, essentially, is analyse the stereo source material on a moment-by-moment basis using a bespoke, patented DSP algorithm, to determine what audible components can

be classed as 'direct sound' or 'ambient sound'. The direct components – those that were close to the original microphones – are sent to the front channels maintaining the stereo imaging of the source. The ambient, more diffuse or reverberant components are spread around the front and rear channels, again largely maintaining the original stereo imaging and spatialness.

Since the 'direct' sounds are separated from the ambient sounds, important direct signal components that are hard left or right in the original stereo source stay hard left or right in the surround – they don't get pushed around to the rears. Fast pans of up-front effects also work exactly as intended across the frontal image, too. Only ambient effects and music are spread to the rear – pretty much exactly as would be wanted in a discrete 5.1 mix.

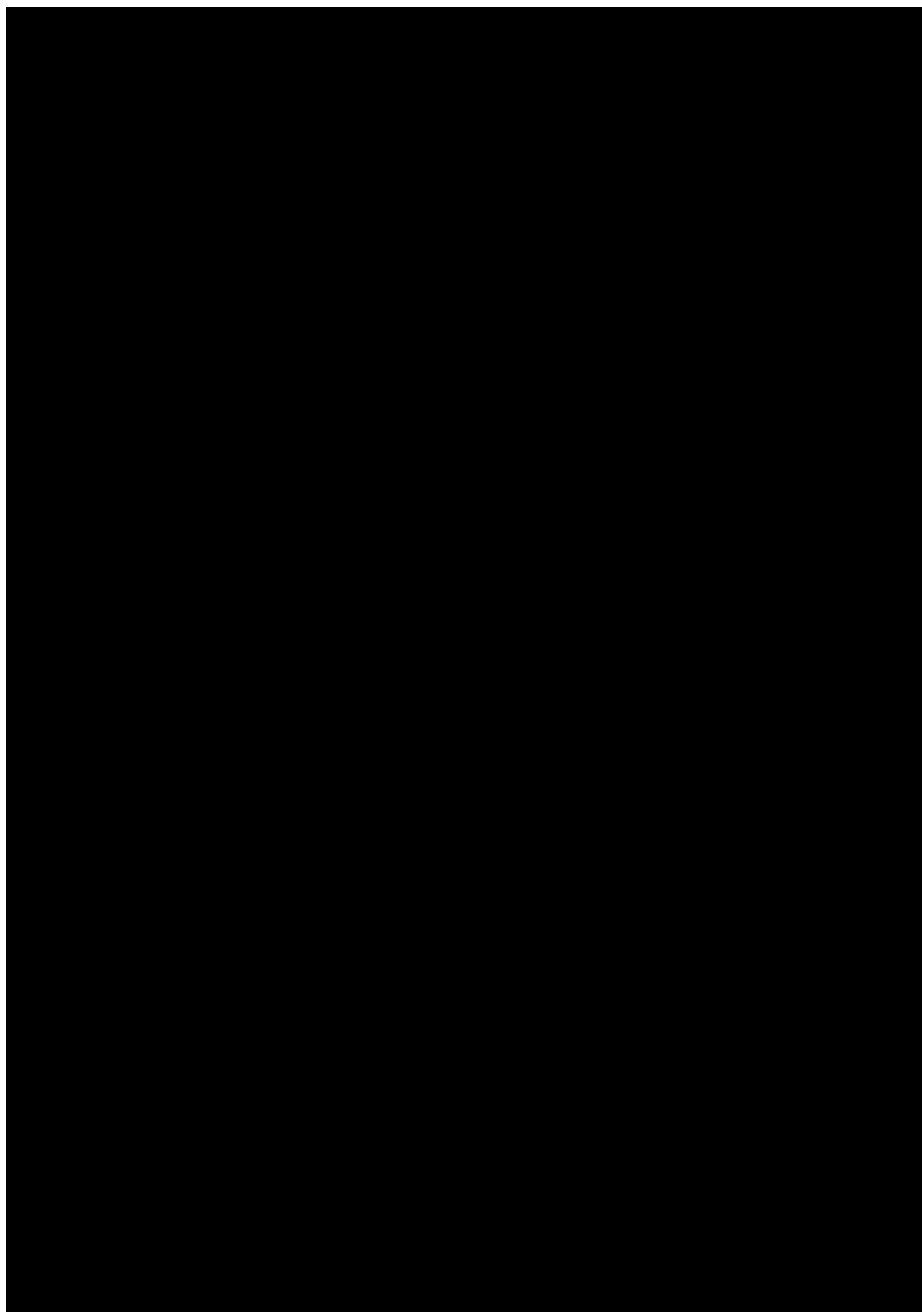
Hands-On

This all-digital unit occupies a 1U 19-inch rack space and extends around 250mm behind the rack ears. The rear panel carries a fused and switched IEC mains inlet socket (configurable for 115 or 230V AC working) and six BNC sockets. Two are associated with wordclock, outputting the internal clock or accepting an external reference clock input – both being 48kHz only since the UPM-1 is designed specifically for a broadcast environment. The stereo input is connected via another BNC using the increasingly popular AES3-id interface format, and sample-rate converters here accommodate any asynchronous sources or those with sample rates ranging from 32 to 192kHz, and 16- or 24-bit wordlengths. The generated 5.1 outputs are presented on three more AES3-id BNC outputs using the standard channel allocations (L/R, C/LFE, and Ls/Rs), at a fixed 48kHz sample rate.

The black front panel is laid out with clear white control legends and the facilities progress logically from left to right. Starting at the left side, a couple of subtle yellow LEDs indicate internal or external clock (the system automatically selects an external clock if present and valid), and correct input lock. The first rotary control has the largest knob and adjusts the input level. This ranges from minus infinity to +10dB but, surprisingly, there is no detent or bypass mode for a fixed unity gain operation. A smaller stereo balance control sits alongside to enable fine-tuning of inter-channel source levels, and a L/R Swap button does as the label suggests – with a yellow warning LED when active. A simple five-step stereo LED bargraph provides an indication of incoming signal levels, covering a 50dB range. Normal broadcast levels illuminate the three green LEDs fairly constantly, with only very occasional flicks of yellow.

In The Middle

The central control section contains the upmixing controls, and although very useful for fine-tuning I found little need to adjust them with most material. A push-button switches the system between SoundField's bespoke stereo upmix algorithm or a matrix-decode mode designed to up-mix Dolby Pro-Logic (LtRt) material, with LEDs to indicate the current mode. Next is a ±10dB level trim control for what the system determines is 'direct sound' being sent to the front channels, followed by two more level trim controls to balance the amount of 'ambient sound' being





▶ sent to the front and rear channels. These three allow the overall direct/ambient and front/rear balance to be tweaked to suit the specific material, although I found the centre positions to be close to perfect almost every time.

The next two controls are activated by push buttons with associated LEDs. The first adjusts the width of the direct sound components, in extremis pushing some out to the rear channels, while the second applies centre channel divergence, spreading centre channel components towards a phantom centre. I'm not a fan of hard centre dialogue for television programmes, and I found I used this control quite a lot.

The last control section provides four ±10dB output levels trims, each with associated green (signal) and red (clip) LEDs. Again, there are no centre detents or bypass controls to establish a fixed unity gain structure. A system bypass button (with warning LED) allows instant comparison of the stereo source and the upmixed output, if required. Finally, a USB socket is provided for firmware updates.

In most applications, once the unit is plugged in and configured there will be little need to adjust any of the controls again, although I did find it useful to be able to tweak the balance of direct/ambience and front/rear ambience occasionally, along with centre divergence.

Impressions

Connecting the UPM-1 into a typical broadcast audio chain is trivially simple. I simply routed the output of a stereo sources group on the console to the UPM-1 and returned its outputs to a fixed 5.1 source channel. I clocked the UPM-1 from the desk and I had to use AES-3 to 3-id adapters, but none of that was rocket science.

With all the controls in their default positions I started working through a variety of archive stereo material as well as some live off-air feeds and I have to say I was extremely impressed with the results from the outset. The surround stage generally exhibited stable frontal images with appropriate panning and image widths, plus a convincing spread of enveloping ambience and (often) music. Up-front dialogue and effects always stayed at the front – I didn't find anything that caught the unit out to force key on-screen components to the rear. Folding mixes down to stereo or mono never produced anything untoward either. The balance of direct and ambient components remained close to the original stereo source and I didn't hear any evidence of phasiness at all.

Hard Centre

As I mentioned earlier, I generally applied some centre divergence when there was hard centre dialogue, and occasionally I adjusted the front/rear ambience balance a little, but these were usually minor personal preference and detailed optimising tweaks rather than anything essential. About 98% of the time I thought the up-mix was totally acceptable, but very occasionally – and this mainly happened with dominant compressed stereo pop music – I became aware of some minor pumping artefacts and slight image instability. Adjusting the width, divergence, and ambient level controls usually managed to produce something completely

acceptable again, but the UPM-1's algorithm does seem to be challenged by this type of material at the moment. However, I understand that the algorithm is still being honed as a result of feedback received from current users and updates are easy to implement via the front panel USB port, so I dare say this very minor issue will improve. With more typical source material – light-ents, location and studio dramas, and especially sports programming – the results were genuinely very impressive indeed.

Conclusion

There aren't many 'must-have' products for the broadcast sound industry, but I can see this product becoming commonplace in HDTV sound galleries and OB trucks. The unique approach taken by SoundField's UPM-1 in converting stereo material to 5.1 is quite clearly extremely effective and very reliable, with no unwanted or distracting

side effects on the vast majority of source material. Importantly, the essentially hands-free nature of its operation makes it enormously convenient and practical for busy broadcast sound balancers.

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INFORMATION

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