

SoundField ST350 in Action

Simon Jones MIBS gets on his bike to try out a SoundField microphone.

Our industry is littered with unsung heroes. In the development of microphones there are many names, some still familiar, others languishing in history. Some key names in microphone technology include Johann Philipp Reis (inventor of the 'sound transmitter'), Elisha Gray ('liquid transmitter'), David Edward Hughes (carbon granule microphone), Georg Neumann (refinement of the carbon microphone), EC. Wente (first capacitor microphone), Harry Olson (ribbon mic), and Alan Blumlein (moving coil). Many of these men filed patents in many areas of technology, such as the vastness of the new world of electric sound recording, telegraphy and transmission.

Then there are the heroes of technique and application. Alan Blumlein is justifiably famous for developing, describing and analysing stereo techniques, studying both spaced and crossed pairs and paving the way for generations to debate the strengths and weaknesses of both. However, the key advantage of coincident microphone techniques is precise stereo imaging and inherent compatibility with mono reproduction. As a result, coincident techniques have found great favour among broadcasters who recognise that few listeners and viewers have ideal stereo listening conditions, and many still listen in mono.

In the past 30 years, development of practical surround sound has resulted in many techniques being tried. To my mind, the neatest and most elegant has to be the Ambisonic principles developed by (mathematician) Michael Gerzon and colleagues, and realised by Ken Farrar's team at Calrec. Never mind the move from one-dimensional stereo to two-dimensional 'surround', here is a system for fully three-dimensional sound (or 'periphony') - if you have the hardware...

I first encountered the SoundField microphone (as Calrec's product became known) as a student, lugging the beer-bottle shaped mic with its large Mk IV control unit in and out of concert halls. The principle is simple: while the purest stereo technique comprises two figure-of-eight microphones aligned on two orthogonal horizontal axes, Ambisonics adds a third, vertical fig-8

component. These are known as the X (front/back), Y (left/right) and Z (up/down) components. In order to decode the directionality captured in these signals, there needs to be a phase reference by which each component signal can be compared to see if it is inverted (behind, right, below) or not (in front, left, above). Thus a fourth component is used, known as W: a perfect omni.

The practice is more complicated though, not least in that it is impossible to achieve perfect coincident alignment of all four elements at the same time. The genius of the original SoundField design is the use of a different arrangement of microphone capsules from which the W, X, Y, Z components can be derived, using four sub-cardioid capsules mounted in a tetrahedral array (think of the four faces of a triangular-based pyramid). The raw output from these four capsules is known as the 'A-Format' and the more useful WXYZ components as 'B-format'.

The current SoundField mics and controllers have been developed and improved enormously in comparison to their forebears, and several models now enjoy hardware or software-based digital matrixing to enhance imaging accuracy and further reduce noise. All allow the user to change the reference points for converting A to B-format - such as using the mic upside-down or in end-fire configuration, and some allow rotation and tilting of the virtual 'front' axis of the mic, too. The decoders also permit the simulation of any first-order microphone type by varying the ratio of omni and fig-8 patterns. In this way an infinite variety of stereo or surround coincident mic arrays can be modelled, making the SoundField a uniquely flexible tool.

Surround Heroes

My recent encounters have been limited to the SoundField's most obvious use in music applications, and I had great pleasure in accompanying Paul Crichton MIBS on a session recording the RAH organ for Priory Records. This is not the only label to use purist, single stereo pair techniques to produce fantastic results, but Paul has done all his sessions using an arsenal of SoundFields. When I was asked to record the Grimethorpe Colliery Band with guest conductor in Wakefield for a documentary, time was short and I enjoyed the coals-to-Newcastle effect of hiring a SoundField direct from the company in their home town. Quickly mounted on a long boom and heavy stand, I was able to make the most of the limited rehearsal time due to the virtual steering of the Mk V controller.

My heroes in surround sound techniques are folk who fortunately I have had the pleasure to meet - a benefit of IBS membership. Past issues of *Line Up* have recounted the exploits of Terry Meadowcroft, Florian Camerer and Tim White using various techniques to capture surround sound on location for documentary and film projects. Messrs Black and Lane (Sky), and the pioneering work of Edwards and Rosam (VSSL) in introducing surround sound to sports broadcasting has led to my frequent encounters with SoundField's latest incarnations (the digital DSF2 microphone and DSF3 5.1 decoder) on many OBs. Mike Skeet has also described his





The ST350 mounted on the author's bicycle

ongoing experiments in surround and periphony in music recording – this time with the latest portable SoundField, the ST350. All of which got me wondering: how would the ST350 fare as a location tool? So I borrowed one from SoundField and set out to record some atmos and effects for a short film.

Packing the Handbag

The kit included 7.2V NPF rechargeable batteries and a Rycote suspension and basket of the same size as that for a standard MKH416. The first task was to arrange the control box in an 'electric handbag' carrying my Sound Devices 744T recorder which has, usefully, stereo monitoring for B-format signals. It was at this point that I met the only real issue with the ST350. It is the only portable processor in the range, and the box is very compact, but unlike just about every other professional battery recorder or mixer, all the connectors are on the opposite face to the controls, rather than on the side. This means that, even with a bespoke case from KT Systems, it does not sit nicely and accessibly in the bag. In this simple acquisition application I only needed access to the gain and end-fire switches, but having the connectors accessible to the side would have made life easier.

As the project required quite a lot of bicycle effects, I mounted the mic on a very short boom and attached it to my bike, facing the rear wheel and gear mechanisms. Gain set to minimum, 744T in record, and off I went. The meters on the 744 glowed brightly and a mile later I stopped to review the results. There was a lot of mechanical noise due to the vibration (Shropshire lanes are as bumpy as any!) and I was a little concerned that the W channel showed a much lower level than the others. However, I stopped in a gritty field entrance, wound up the gain a little and proceeded to record some 'up and pasts' of

walking and running footsteps. A quick review of these recordings gave very pleasing results and as all meters were evenly balanced I decided my checks had cured any loose connection. Back on the bike I rode another half mile, but the same problem reappeared: the W channel was significantly lower than the rest. Stopping again, I set up to record some evening woodland atmos. With the gain cranked to maximum I hit record and walked away, remembering a tip from Tim White that being in moderate proximity to a mic with very quiet atmos results in a permanent record of the recordist's breathing and movements.

Back home, I was able to listen carefully to the results, using SoundField's SurroundZone VST plug-in patched into Nuendo to decode the B-format signals. This requires a little care in setup as although the B-format files are four channel .wavs, the plug-in needs to be in a channel or group with at least as many channels as the output configuration. However, the SurroundZone software is easy to use with a circular area at top left showing the B-format input levels and options to reconfigure for End-Fire or Inverted decoding. I would like these to have a greater contrast when enabled – the colours used are too similar to the background. A series of tabs allows selection of stereo or surround outputs with presets for 6.1, 7.1, 8 channel plus three different forms of 5.1 – the Array button provides information on each. Further customisation is available through the rotate, tilt and zoom controls, as well as rear mic emulation (continuously variable from omni to fig-8) and front and rear width controls. Each decoded output has a separate output level control too.

Listening

The atmos tracks, despite the very quiet source and maximum input gain, exhibited very little noise: a bit more perhaps than

I would have expected from a Schoeps or Sennheiser MKH mic, but as we are considering the combined output of four capsules rather than one, a little extra noise is to be expected. The results were certainly very useable. The bike effects however were not very useable at all because of the extreme vibrations transmitted through the short boom. After a while puzzling, I realized that reality was matching theory: the relatively low level of the W signal was due to the inherent immunity of an omni mic to vibration and handling noise, while the fig-8 response is most susceptible! Further listening to the W component alone revealed a very useable (though purely mono) effects track. Selecting the stereo output from SurroundZone demonstrated this quite remarkably: the plug-in allows adjustment of the virtual polar pattern in real time and repeated passes of the same segment demonstrated the difference between pressure operated and pressure gradient principles – the omni pattern exhibiting a whopping 26dB less vibration noise than the omni mode!

Being a little heavier than the usual stereo rig on my boom, and needing the separate control box, the ST350 isn't going to be my first choice for general PSC work. Had I the spare cash however, it would be top of my list for a superb multipurpose mic for gathering effects and recording music. So much flexibility in positioning and manipulation has to be worth the reassuringly expensive price.

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Details

ST350 with Rycote kit
£3825 plus VAT

Soundfield
Tel: +44 (0)1924 201 089
www.soundfield.com

