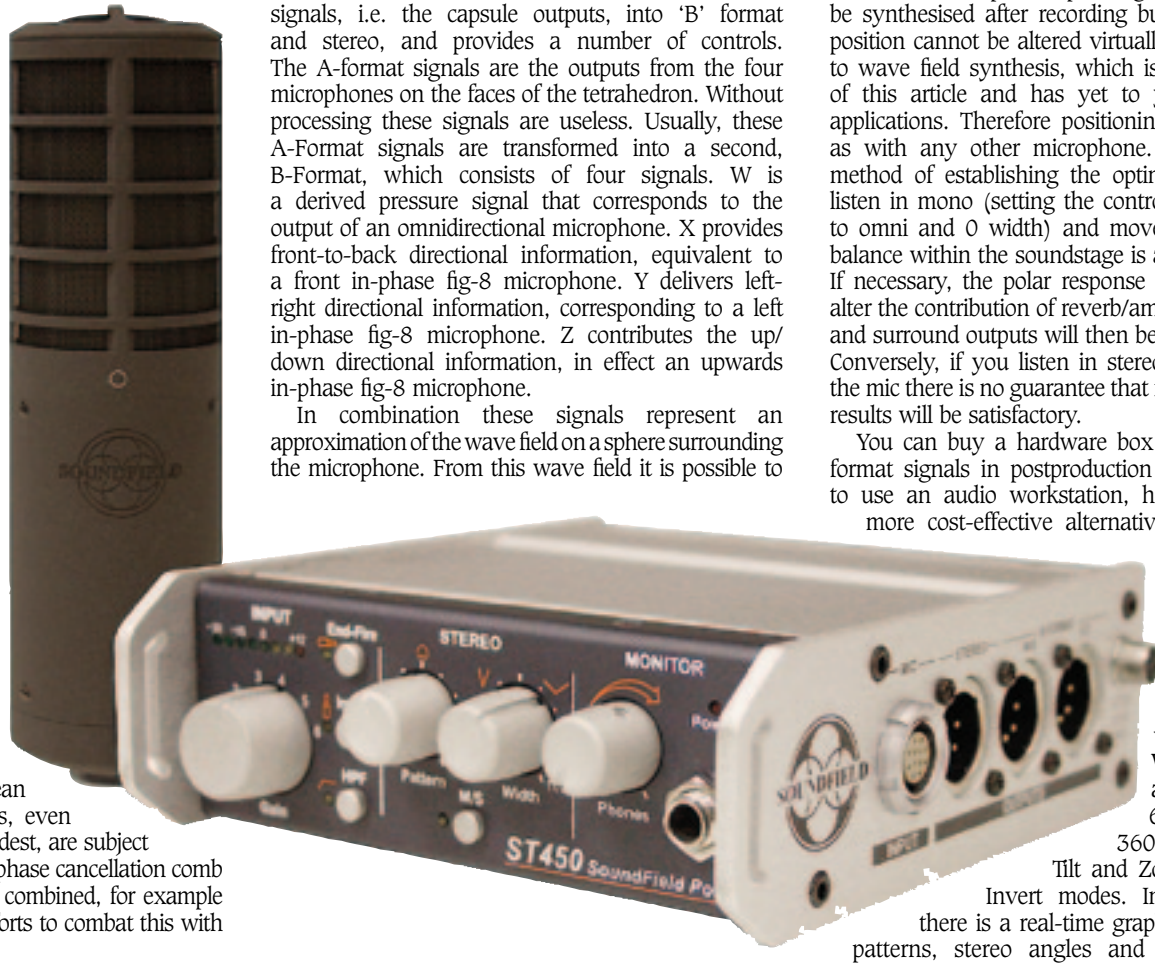
SoundField ST450

The virtues of SoundField principles do not need justification to converts but taking the gear out in the field poses other issues. ROB JAMES delights in the latest incarnation of a portable version of the microphone system.

The Soundfield principle was developed by mathematicians Michael Gerzon and Peter Craven and their collaborators in the 1970s. Expanding on the Mid / Side technique defined by Alan Blumlein in his seminal 1933 patent, which laid the foundation for all coincident mic techniques, the SoundField microphone seemed like science fantasy. It is a single point microphone which can behave as an omni, cardioid, hypercardioid, fig-8, or anything in between, a microphone that can be electronically 'pointed' in any direction and its outputs can be tailored for loudspeaker arrays from mono to 8.1 plus Ambisonics. Any and all of these adjustments can be made 'after the fact' in post, if a four-channel, B-format recording is made.



It is only with the rise to prominence of 5.1 that the SoundField mic has really come into its own as a highly desirable sound for picture location surround microphone, arguably surpassing all other current surround microphones for the purpose. By this I mean that all spaced surround mics, even those where the spacing is modest, are subject to a greater or lesser degree of phase cancellation comb filtering when the outputs are combined, for example when downmixing, despite efforts to combat this with compensatory delays.

A SoundField microphone comprises a head containing a tetrahedral array of very closely matched sub-cardioid, full condenser capsules and a control unit. The control unit converts the raw 'A' format signals, i.e. the capsule outputs, into 'B' format and stereo, and provides a number of controls. The A-format signals are the outputs from the four microphones on the faces of the tetrahedron. Without processing these signals are useless. Usually, these A-Format signals are transformed into a second, B-Format, which consists of four signals. W is a derived pressure signal that corresponds to the output of an omnidirectional microphone. X provides front-to-back directional information, equivalent to a front in-phase fig-8 microphone. Y delivers left-right directional information, corresponding to a left in-phase fig-8 microphone. Z contributes the up/down directional information, in effect an upwards in-phase fig-8 microphone.

In combination these signals represent an approximation of the wave field on a sphere surrounding the microphone. From this wave field it is possible to derive the full three-dimensional soundfield including height or a 5.1 soundfield. However, the SoundField microphone offers other, very versatile options for mono or stereo output. When the B-Format signals are combined correctly, the microphone response pattern and direction of aim can be determined. So long as the W, X, Y and Z signals are recorded separately, these decisions can be made after recording using hardware boxes or software plug-ins such as SoundField's Surround Zone.

One important misconception needs to be debunked. Microphones pointing in any direction can be synthesised after recording but the physical mic position cannot be altered virtually without resorting to wave field synthesis, which is beyond the scope of this article and has yet to yield mass market applications. Therefore positioning is just as crucial as with any other microphone. The most reliable method of establishing the optimum location is to listen in mono (setting the controller stereo controls to omni and 0 width) and move the mic until the balance within the soundstage is as you would wish. If necessary, the polar response can be changed to alter the contribution of reverb/ambient sound. Stereo and surround outputs will then be equally successful. Conversely, if you listen in stereo when positioning the mic there is no guarantee that mono and surround results will be satisfactory.

You can buy a hardware box to process A or B format signals in postproduction if you don't want to use an audio workstation, however, there is a more cost-effective alternative in the Surround Zone plug-in. Available in VST, AU, Pro Tools and SADiE versions, Surround Zone offers a choice of 5.1 arrays with variable Front Width, Rear Width and Rear Pattern, 6.1 and 7.1 arrays, 360° mic array Rotate, Tilt and Zoom, End Fire and Invert modes. In the Stereo page there is a real-time graphic display of polar patterns, stereo angles and other parameters.

Mono/stereo polar patterns and angles are continuously variable with 360° mic Rotate, Tilt and Zoom, variable High Pass filter, End-Fire and Invert modes.

If a SoundField mic is to work properly the mechanical and electronic design must be meticulous and production tolerance requirements are very tight. It has taken many years of development to arrive at the SoundField mic of today. There were many further challenges in making a version suitable for everyday location recording, not least battery powering. The earlier field versions, the ST250 and ST350, took a great deal of engineering to make them capable and practical location mics and the latest iteration, the ST450, advances the game in terms of performance and ergonomics.

It is available in three different kits — 1, 2 and 3. UK£3750 (+ VAT) Kit 1 includes the microphone, control unit, 5m Lemo mic to controller cable, two B- format output cables, a stereo output cable, Rycote standmount and a mains power supply, all contained in a Pelicase that I'm sure you could drive a truck over with impunity. For £550 (+ VAT) more Kit 2 adds a compact Rycote windshield and a larger Pelicase to fit is a £299 (+ VAT) optional extra. £4,560 (+ VAT) Kit 3 adds a rechargeable battery and charger, adaptor and cable to Kit 2. The optional Surround Zone software is a £300 (+ VAT) extra with each kit. Mic to controller cables of up to 200m are available.

The mic head benefits from a new camera-friendly coat of slightly textured matt charcoal paint. A discreet silver circle has been added above the engraved SoundField logo that makes it much easier to identify the 'front' (bottom in end-fire mode) in less than perfect lighting but the majority of the changes are in the control unit. What began as a quick repackaging exercise turned into a two-year ground-up redesign. Previously, the sockets were on the back of the unit and this was regarded by users as inconvenient in some situations. Now, all sockets are on the right-hand side. The DC-DC power supply used to be a bought-in item but SoundField decided it could do better by designing its own. The result is higher voltage rails and greater efficiency for longer battery life. The higher rails also raise the headroom and lower the noise floor. The capsules' polarising voltage has also been increased to the same end. The SoundField is one of the few true condenser mics that can cope with life in the wild. Most condensers play up big time in conditions of high humidity. Thanks to a heater element built into the capsule cluster, the SoundField can operate successfully in the arctic and the jungle.

Where the ST350 used mini toggle switches, with audio running through them, the new version employs a pushbutton operated microcontroller and precision relays. The electronics have been redesigned to improve filter matching. All this has contributed to further improved imaging, a sharper, more focussed sound, lower noise and better dynamic range.

In sound for picture work the ST450 is at its best capturing an entire audio environment. For dialogue I would never use a stereo mic let alone a surround mic since successful dialogue poling involves a lot of movement that wrecks stereo or surround images and anything other than the mono component is of dubious value in postproduction. On the other hand, when the mic head is not being waved around all over the place, the ability to alter pick-up pattern, direction and tilt offers huge advantages when applied to location music, effects, ambience and nature recordings. The unique phase coherence attribute means that surround signals can be folded down to stereo and mono without problems, unlike spaced mics.

I made some effects and ambience recordings and loved the accuracy of the imaging and the open transparent sound. At one point I was listening to the sea and spring birds when a large bee flew sedately around the mic for some time. The localisation was excellent and completely convincing.

In the absence of any suitable local musical events I listened to some superb demo recordings of a choir. One word describes the overall sound — natural. Given the choice I would use the ST450 for all such recordings in future.

If this sounds too much like an unalloyed hymn of praise there are a couple of buts. The mic head is, as might be expected, susceptible to wind noise and requires a blimp type windgag with furry cover in all but the calmest conditions. I also think more work could be done on isolating the capsules from the body.

But, if I were working full time as a sound recordist today the ST450 would be on my (short) list of 'must-have' microphones. It saddens me that I cannot possibly justify the expense for my current activities.

PROS Natural surround and stereo sound with excellent localisation; recordings can be folded down from surround to stereo or mono without unpleasant artefacts; well engineered for practical location recording.

CONS Sensitive to air movement; handling noise could be better.

Contact
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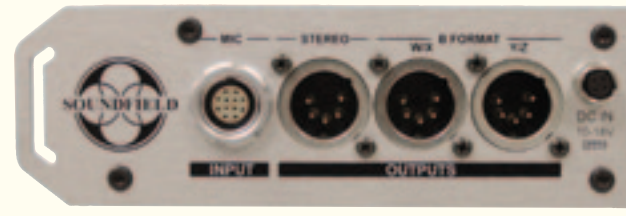

In detail

The mic head weighs 290g. A locking 12-pin male Lemo provides the mic cable connection. The control box is just 580g (down from 625g for the ST350). Constructed ruggedly, with alloy side cheeks, the connectors are on the right-hand side. A locking 12-pin female Lemo accepts the mic cable and three balanced line-level 5-pin XLRs provide stereo output and B-Format W/X and Y/Z outputs. Power input is a 4-pin mini Hirose connector and 7W of DC at any voltage between 10V and 18V are required.

On the front panel metering is taken care of by an 8-segment LED bargraph above the switched gain control. Offering 6dB of extra gain per step this switched control is preferred over a pot since it maintains much better level tracking between channels. End-Fire mode is selected by pushbutton with an indicator LED. Failure to select End-Fire when the mic is pointed at the source horizontally results in the front/back and up/down information being reversed. If the head is to be suspended upside down the Invert mode changes the perspective to suit. The bottom button inserts a 100Hz high-pass filter that affects all the outputs. In the centre stereo section, Pattern varies the virtual polar response for the stereo output between omni through subcardioid, cardioid, hypercardioid to fig-8. Width varies the stereo output from 0 mono to 10 wide-angle stereo. When the MS button is engaged the stereo output is in MS format. The headphone jack and level pot and the Power LED are on the right.