

LISTEN HERE

A car's interior has never been the best place to listen to music, but there's now a major breakthrough...

Trying to get concert hall performance out of your car stereo system is more likely to leave you with a feeling of being inside an enormous pair of headphones. That is, of course, unless your stereo has been equipped with a 'Surround Sound' processor.

'Surround Sound' is the latest audio effect, designed to reproduce the same sound structure experienced during a live music-

al performance. In simple terms it aims to give you a feeling of being there, actually amongst the atmosphere and ambience of a live concert. The overall effect is that music appears to come from all directions at various intensities to ultimately 'surround you with sound'.

But why go for surround sound? Isn't a good stereo set-up as good? Well, there has always been an element of doubt amongst audiophiles about the effectiveness of stereo set-ups (where music is presented with a narrow frontal image and obvious left to right balance). This is particularly easy to recognise in a car with two front speakers. The usual way to improve this and

'surround' yourself with a better sound is to add-on a pair of rear speakers — Right? Wrong!

The now normal practice of fitting four speakers into a car can do wonders for spreading the sound, but when it comes to actually appreciating the stereo imaging or sound structure it's actually worse than a simple two speaker system. Perhaps another, more obvious way, of looking at it, especially when cars have large rear speakers fitted, is that when sounds from the rear speakers dominate the fronts, it seats the driver in a listening position equivalent to a seat in an auditorium with his back to the stage. Not normal practice at the Albert Hall, we're sure!

One exception, perhaps, to this effect would be where an installation is built-up of component speakers and the frontal stereo image is maintained by mid and high range speakers with only sub-woofers on the back shelf. Even so, by surround sounds standards this system offers little benefit to the normal two speaker set-up and leads us back to the headphones syndrome.

There will be many different types of surround sound systems to be had in the future and now the system has gained acknowledgement from the major Japanese manufacturers, we can be sure of its high profile in the domestic hi-fi market. The aim will be for surround sound to become a feature, not only for domestic and car hi-fi but for all audio visual equipment, including video recorders and television sets. Although there is no fixed definition for surround sound itself, the Electronic Industries Association of Japan (EIAJ) were aware of its growing popularity and initiated guidelines for future developments. Recognition, indeed, and it ensures that surround sound will be on most manufacturers' 'desirable features' list.

In the UK we've been able to enjoy the basics of surround sound enhancement since 1983, when Pioneer first took up the idea. However, the system didn't prove successful at that time and it's taken until now for the idea to really take off.

As the main requirement for any surround sound system is four speakers and a four channel amplifier it obviously made sense for any interested company to find a market that used a lot of four speaker systems. This explains perhaps, the main reason why the domestic market presents such a limited market, as few people use four speakers in the home. The car, on the other hand, is home to a relatively large number of four speaker systems and so it's here that two companies — Pioneer and Troy Ambisonic — have concentrated their surround sound products.

SURROUND SOUND SYSTEMS

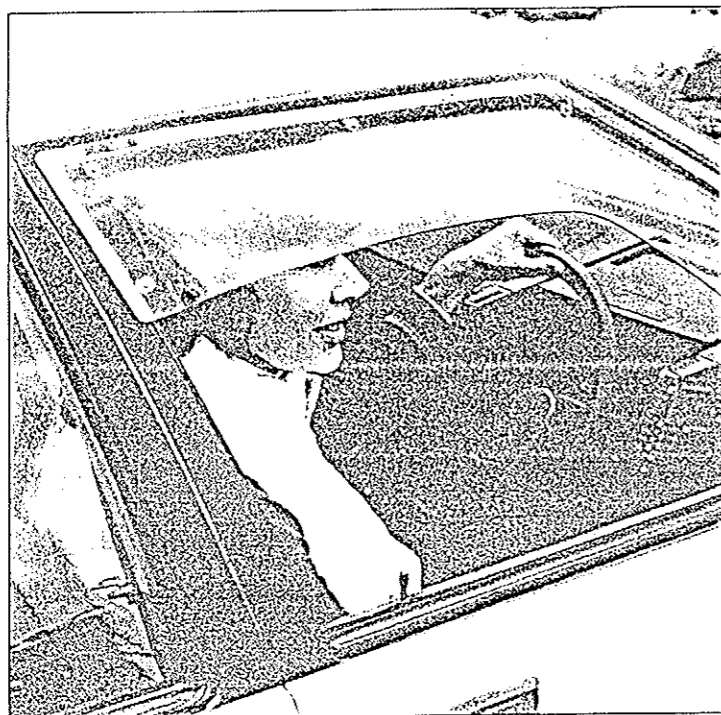
Pioneer's EQ-220 surround sound processor is a three mode device incorporating a nine band graphic equaliser. It is designed to function with any of the Pioneer component style pre-amp units and has a built-in dual amp balancer. The processor technique uses a small time delay circuit to control the level of one audio signal going to the rear of the vehicle. The effect is a sound similar to that of a reverb or echo unit and has the capacity—say Pioneer—to "acoustically enlarge your car."

No doubt any damage caused to the car's body work during this 'Stadium Mode' will be reimbursed by Pioneer at some later date!

Seriously though, another switch puts you into 'Studio Mode' which is designed to actually make you feel closer to the music, in a sense that you could be "sitting in the centre of an orchestra pit," or so they say. 'Impact and Presence' are apparently features of this mode and are created by using a speaker matrix to derive an out-of-phase signal to both rear speakers which is not delayed (no reverb). A 'By-Pass' switch allows for normal listening without any effects.

The Troy Ambisonic surround sound processor, TA-110P, represents something of a unique technique for its signal processing. While most surround sound systems will make an effect on the two rear speakers, the TA-110P uses all four speakers to create its sound structure. Troy's theory rests in the actual design of an auditorium and the way sound waves are reflected around it. Direct sounds are seen to be the strongest and should therefore be directed only from the front speakers.

Whereas reflected sound waves will be less strong and will be directed, depending on diminishing strength, from the rear speakers, some will come from the front. The main point of the exercise is to present a focal listening area towards the front of the car and not have an imaging crisis, caused by the rear speakers, as described earlier. This

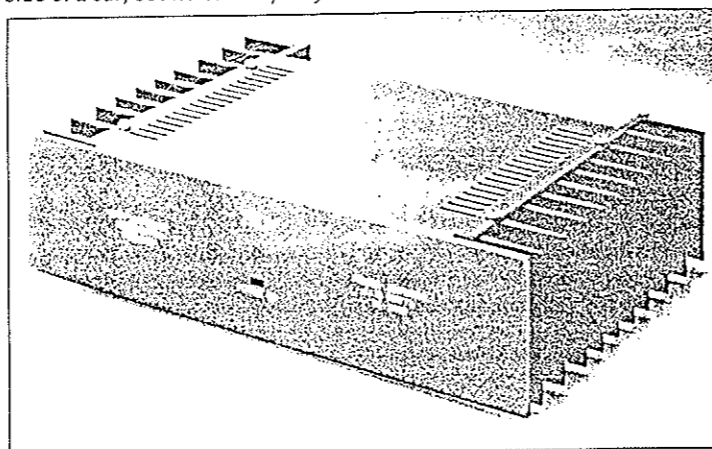
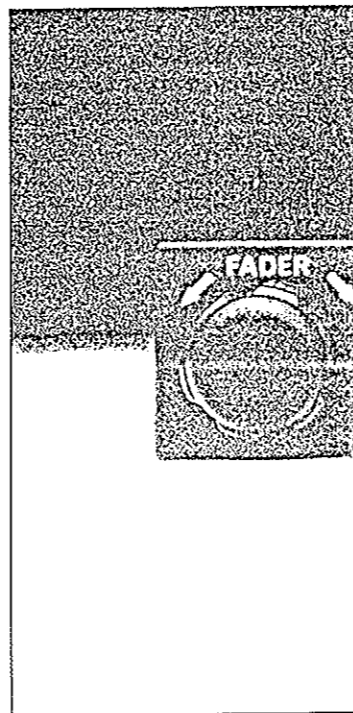


Even though you sit at the right hand side of a car, sound envelopes you

system uses signal filters and an amplitude matrix which decide how the audio signal should be split up and fed into the appropriate output amplifier channels. The surround sound mode is called 'Enhance' and the unit also has a 'By-pass' or neutralising mode. Another feature of the TA-110P is its ability to be compatible with a system known as Ambisonic UHJ. Although few people will know of Ambisonic UHJ it is now a highly respected system used frequently by record companies and radio broadcasters.

The UHJ abbreviation represents a simple coding that has been used in association with Ambisonics over the last few years. At one stage the BBC recorded a number of programmes to be broadcast using the UHJ format and it wasn't for some time that they realised, due to the lack of four speaker domestic radio systems, the broadcasts could not be fully appreciated. At that time though, they didn't consider the possibility of four way Ambisonics in the car. Even so, it is still possible to find the occasional programme being advertised in the Radio Times that indicates it was Ambisonically recorded.

Record companies too have



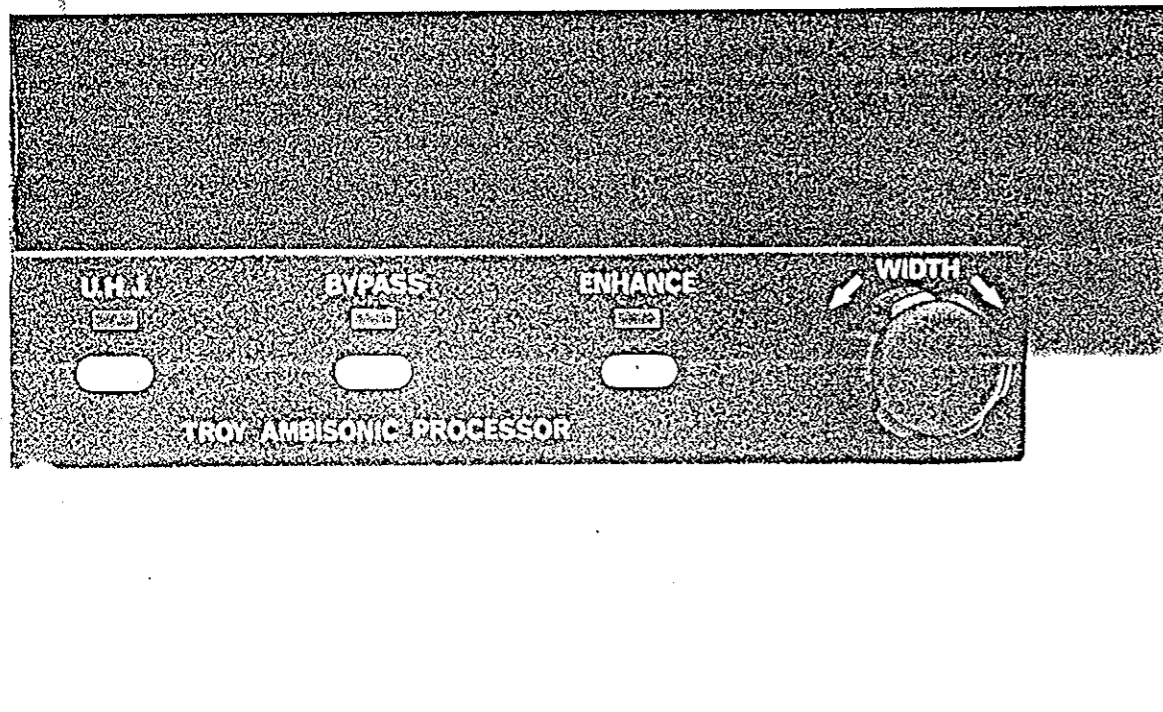
Troy Ambisonic make their own amp but you can use an existing one

their sights on the future use of Ambisonics and there are already more than 150 titles available in various musical categories. Nimbus Records is one particular company renowned for their classical repertoire and who insist on using UHJ for all their recording. Other albums which are famed for their recording qualities include such names as 'Alan Parsons — Stereotomy' and Tina Turner's — Break Every Rule.'

A feature of the Troy TA-110P processor is that it can be interfaced to work with almost any brand and type of car audio equipment. For systems that don't already have four channel

amplification Troy supply their own 4 x 20 watts amp which can also be used with most types of systems. To carry out our own test all we required was the TA-110P, and an interface lead to link a Nakamichi 500E cassette-tuner to a pair of Harman/Kardon amplifiers. The half-din sized TA-110P mounted neatly under the dashboard and its interface cables clipped nicely into place. As the ultimate test for the system's ability to balance the focal listening point away from the rear speakers in favour of the fronts, we had 6 x 9 inch co-axial speakers on the rear shelf and 6 x 4 inch dual cone speakers in the front kickwells.

SURROUND SOUND SYSTEMS



Troy's Processor

When the system is first turned on the Troy unit automatically assumes the 'enhance' mode. For our purposes this had to be reset into 'bypass' and the fader control adjusted for optimum balance between front and rear speakers. The fronts quickly proved the weak link, requiring a reasonable bias.

Setting off on our test drive we immediately sensed that the rear speakers could be clearly defined above the kickwell speakers but rather than make further adjustments we switched into 'enhance'. At first, all we could sense was that something had changed — but what exactly? From the driver's seat it was clear that the front speakers were working harder and the sound came, not from the kickwells but from an area above the dashboard level. The rear speakers could still be heard when facing front, yet turning slightly sideways seemed to make its sound fade away — the thrust of the sound was most definitely still from the front. There was, however, a major loss of bass response that became more notable with greater volume.

This, fortunately, was predicted beforehand and was of course as a result of our speaker configuration. In 'enhance' the

direct sounds, which include most of the bass signal, is emitted only from the front speakers — leaving the rears with a lot of mid range and high frequencies. To overcome this syndrome Troy have a plug-in bass enhancer which compensates for the imbalance without ruining the sound structure.

The bass enhancer TA-25B was duly installed and the test continued. Bass response then appeared to be very even when switched between 'bypass' and 'enhance' and gave no adverse effects to the originally experienced surround sound structure.

There were times during certain pieces of music that prominent sounds seemed to be stronger from the back but this could possibly have been due to having co-axial tweeters in the rear speakers and only dual cones in the front.

An obvious point to make is that if the speakers were more evenly balanced — i.e. the same — the resultant sounds would have been equally so.

As the sound structure showed a marked difference for the front seat occupants when the system was in 'enhance', sitting in the rear seats also produced some dramatic changes. In 'Bypass' and with the

rear speakers being so close to the ear, no sounds could be distinctly identified as coming from the front. When the processor was switched into 'enhance' though, the sound effect was to literally move the focal point from behind one's head and position it somewhere around the top of the door pillars. A very moving experience!

Bass response was naturally still in evidence from the speaker woofers but we could only assume that if the TA-25B was not necessary then the movement could have been even more dramatic.

The overall sound of our system was very pleasant, and presented our normal stereo test tapes with great clarity and decisive imaging.

Stereo radio was also well presented and demonstrated some excellent effects, particularly during commercials when bouncing from left to right channels often resulted in a front to back movement as well as the side to side. In weak signal areas though it was sometimes necessary to switch the unit into 'bypass' to prevent adverse background noise.

Besides the rotary control for the fader there is another knob to control 'width'. This simply has

the effect of broadening or narrowing the presented stereo image, giving the simulation of being seated either closer or further from the stage.

VERDICT

It seems likely that Surround Sound is going to appear in many shapes and forms over the next few years. The advancing domestic market has virtually assured that. And there will be different approaches. All systems, though, will have a common aim and that is to enhance normal stereo listening. Whether it's for a domestic hi-fi or car hi-fi it's quite evident that there's a place for this type of sound.

The car, in particular, is proving to be the most popular sound room around and any benefit to this often dire acoustic chamber is likely to be received, but perhaps not immediately, with open arms. And, let's face it — if it lives up to its name and 'surrounds' us, there'll be no getting away from it!

STOP PRESS

We've just picked the winners in our exciting Trio competition and we'll soon be contacting them to arrange the fitting of some very interesting in-car entertainment equipment. But before we tell you who they are we'll give you the answers to the 10 questions:

1. Kenwood
2. KRC 747D
3. KRC 747D. Anti-theft chassis, means you can remove the set from your car.
4. KRC 949D
5. Digital Audio Tape
6. Long wave/medium wave
7. RMS (Root Means Square)
8. Tape is turned over when it reaches the end of a side.
9. A laser scans the disc and converts the information into sounds.
10. Two drive units.

And the winners: Winner of the KDC 9 Compact Disc player — D. Pitchford, Cradley, Malvern, Worcestershire; winners of the KRC 525L combination players — W.T. Gardener, Forest Hill, Newcastle-Upon-Tyne and Paul Drury, Moor Lane, Cheshire.