One German recording studio has gone into multichannel audio in a big way —the design considerations are explained by the project consultant and the designer



PHOTO: ROGER QUESTED

The Touchdown recording complex is situated amongst the hills, fields and forest land that is to be found some 25 kilometres north of Munich. The complex is a convenient 15-minute drive from the new Munich International airport, and welcomes its clients with an outdoor heated swimming pool and jacuzzi — alongside its two studio control rooms, 85-m^2 live room, MIDI suite and off-line postproduction editing suite. It also boasts a Foley stage in the live room and one of the largest sound effects libraries in the world. (This has been made available for third-party use and currently supports both the NED *Synclavier* and SSL *Screensound* libraries.) Most recently, Touchdown has seen the reconstruction of its Studio 2 to accommodate a 15-enclosure monitoring system capable of supporting stereo, Dolby Stereo (LCRS) and Ambisonic productions.

Touchdown is owned by New York entrepreneur Terry Drivas who is the ex-MD of various successful computer majors. The facility currently caters for a wide range of clients and enjoys a roughly equal spread of work from music recording and audio for video. Business on the postproduction side has grown steadily with two projects under way at the time of writing — *The Cement Garden*, a joint UK-German feature, and the HDTV *Phantom of the Diamond King* for Steiner Films-ORF-Beta Taurus.

The technical design of the studios was to cater for both analogue and digital recording media and also for synchronised machine control. Communication between all rooms is facilitated by a central patch bay matrix and central synchronisation is via a customised Motionworkers *AKES-III* system. All rooms have access to analogue and synchronised digital distribution lines and can route audio signals to and from some 96 plus recording channels. Data lines are similarly accurately matrixed.

Because of the demands of the picture-orientated clientele, Touchdown has 'outgrown' standard stereo audio requirements and the requirement for what was originally called 'the virtual room' started to become clear. Thus it was decided to make a 'reasonable departure' from conventional audio.

The resultant Studio 2 is equipped with a sophisticated Sony HDTV (*HDIR-550*) video projection system, an octagon of Quested audio monitoring in the conventional plane plus an overhead channel for vertically-placed signal content. The room caters for Dolby Stereo with the front three channels providing Left-Centre-Rear placement and the rear left and right providing the surround channel. The additional mid-left, mid-right and centre-rear monitors complete the hexagon and cater for other surround formats such as Ambisonics.

Signal placement is facilitated by the use of a sophisticated digital surround-sound processor encoder-decoder and 16-channel vector-positioning unit. This unit was developed by UK-based AGM Digital Arts and employs multiple AGM *TMS-320c30*-based, 4-channel in-out, 32-bit ▶



Touchdown Studio 2 showing equipment and monitor installation

THE VIRTUAL ROOM

floating-point processing cards communicating via a proprietary bus. These are programmed to encode and decode audio in B-format and UHJ Ambisonics, and has been chosen as a hardware platform capable of supporting 'future' formats as and when they become available. The encoder-decoder has eight channels each of AES-EBU format audio.

The vector positioning processor offers panning of mono signals derived from the studios new Neve *VRP Legend* postproduction console which is loaded with 78 channels (the second such desk purchased by Touchdown within six months). B-format signals — termed Component Audio by AGM — can be summed and rotated using the combination of vector processor and console. Sixteen channels of input are catered for here, with 4-channel component audio (WXYZ) output appearing in AES-EBU format. Input and output is optionally available via a host of A–D and D–A 18 and 20-bit convertors built for AGM by Apogee.

Because of a substantial hardware processing overhead, it is possible to attenuate signals and add equalisation algorithms at a later date making the AGM unit a self-contained digital console (with remote control) in its own right.

Switching between surround-sound formats is achieved with buttons mounted on the Neve *VRP*. An analogue conversion of the VCA on the main monitoring section of the console controls the level on the encoder hardware via a matrix control computer (commissioned from David GmbH in Munich).

The Ambisonics system is anticipated to be of interest to the full range of clients at Touchdown. Classical and orchestral film music recordings made in the live room can be processed in stereo, UHJ and full surround for Dolby or B-format Ambisonics — with the option of being able to compare mastering formats at the touch of a button. The new studio system is, therefore, fulfilling the design criteria of maximum flexibility in audio. Whether for film dubbing or rock music mixing, the system allows comparisons between the various formats and the selection of the most appropriate format for the job.

The arrival of, as yet, unspecified audio formats has been anticipated in the specification and design of Studio 2, and the digital platform is expected to be used as an experimental system for research and development, as well as for the evaluation of such 'future' formats. As audio formats are finalised for HDTV, for example, Touchdown is expected to be equipped and ready with the hardware to take immediate advantage of them. ■

Anthony Morris
Consultant on the Studio 2 project

The designer's tale

'The original Touchdown Studio 2 I designed about three-and-a-half years ago for straight music mixing. The idea now is to be able to record music for straight stereo, Dolby LCRS, Dolby LCRS with a discrete sub-bass channel and for ambisonics. So, this room had to be all things to all people.

'For the straight music side you have to have something which is very powerful — which is what they had before. But it was impractical to use that and add more. For one thing it would have become ridiculously expensive, and it would also have taken up too much space. Because of the Dolby subwoofer requirements we decided to turn the three-way system into a four-way system. We also decided to use active speakers as the front left and right, and use passive ones around the rest of the room. So the rest of the speakers are identical except that we have had to change some of the shapes to physically get them into the room. Unfortunately, the requirements for each of the formats mean that the way in which each of the speakers is used is not exactly the same. Ideally, for the ambisonics, we would have had exactly the same system in each location but it was totally impractical. Using the *H210*s it was possible to get somewhere close to a perfect system.

'The room is a mixture of reflective and absorbent surfaces, but because of the number of cabinets in the room, what you make reflective and what you make absorbent is fairly well determined. We have broken up the front of cabinets with irregularly-shaped pieces of wood to disperse reflections from the speaker baffles and the spaces in between there is low-frequency trapping consisting layers of different thicknesses of barrier.

'What we have speaker-wise is left-centre-right at the front, left-centre-right at the rear, left and right either side of you, one above your head and four subwoofers. There is one subwoofer in each corner, but in normal stereo mode the front subwoofers operate as part of a four-way stereo system. The David matrix control computer switches the outputs of the crossovers to different speakers and changes the level depending on which format you are working with.

'Front left and right are *Q210*s with *QSB121* underneath — that is the four-way active system you use in straight stereo. Rear left, rear centre, rear right, front centre, absolute left, absolute right and overhead are *H210*s. If you switch to Dolby *LCRS* you get the front three and the rear left and right in mono.

'The rear cabinets are mounted upside down because, in theory, the Ambisonics system requires all the speakers to be level. In practice, this is only possible if you are the only person in the room, so the side cabinets are mounted higher up and angled slightly down so peoples' heads don't soak up all the sound. Because of the height of the room, the tweeter and midrange units of the side two speakers actually share a separate box which is angled down, and the bass driver is flat against the wall.

'I spent about four days staring at a floor plan pondering where all these speakers were going to go. I kept finding something that would work but then realising that when you switch over to another mode of operation, it is not going to be so good. That was the hardest part of the job. My main worry was not what it was going to sound like — I was quite happy that to get it to sound as it should sound in any particular format, but at one point it did look as if it was going to feel claustrophobic to work in. We got away from that by building the special cabinets for the sides and changing the profile of the ceiling so that it feels airy and comfortable even though it has 15 cabinets in there.

'The hardest thing was optimising the placement of everything so that it was appropriate to every application — the music people would not want the stereo pair too high, for example. Getting it right for every purpose was the hard part.

'The only really unknown factor was the effect of the size of the Neve was going to have on the acoustics. There is a similar problem behind the listening position with the outboard, but it is not as bad. Although the floor is wood, and therefore presents a reflective surface opposite the ceiling speaker, the ceiling is quite low and so the first reflection is going to be well behind the signal. Also, your body will damp any reflections around your head.

'Also there was this huge high-definition TV screen in there as well. Because they did not want any noise from a projector, they could not use an overhead projector and a screen so, instead, there is this huge TV screen which stands on the floor and rises 1.8m to be exactly where the centre speaker should be. So the centre speaker is lower down and in front of that.

'Because there are limited applications for Ambisonics, the room had to be a multipurpose room. But there are some things in the pipeline for Ambisonic product presentations. For that we are going to do a 'portable kit' that we can set up in a theatre. We are also looking into doing a permanent installation in Munich.' ■

Roger Quested
Studio Designer