

SURROUND MIXING IN PRO TOOLS LE

Witold MICKIEWICZ, Jakub JELEŃ

Technical University of Szczecin
Al. Piastów 17, 70-310 Szczecin, Poland
e-mail: witold.mickiewicz@ps.pl

(received June 15, 2007; accepted November 30, 2007)

Today's multimedia use surround sound extensively, and most often in format 5.1. A lot of popular software packages used for sound production, including Pro Tools in LE version, do not have the ability to form mixes in this format. However, thanks to an appropriate configuration of internal audio buses and the cooperation with the multichannel input/output interface, this mode of operation is possible. Unlike other proposals, based only on send channels to individual output channels, the authors present a new configuration that uses the Pro Tools LE software. Thanks to this configuration, placing an apparent source of sound in the surround space becomes more intuitive, as it is accomplished through the use of panning sliders which determine space coordinates. Direct send channels serve exclusively to form the central and low frequency effect channel (LFE). This configuration was applied to make the final mix-down of a multichannel recording of the choir concert with the use of the Optimized Cardioid Triangle (OCT) microphone array.

Keywords: DAW (digital audio workstation) software, surround, mixing.

1. Introduction

Although stereophonic systems are still most widespread, the demand for surround recordings is increasing at a fast rate, meaning that the era of multichannel sound has undeniably begun. Thus, new demands are made upon sound engineers, who obviously concern the ability of moving into the surround domain. New requirements are basically the necessity to equip the workshop with a suitable multichannel monitoring system, and a mixer capable of sound panning in at least two dimensions or a digital audio workstation (DAW) software which gives this possibility [1]. Each of these investments is a high expense which not everybody can afford. While the audio monitoring system is an essential installation, mixing 5.1 becomes available through appropriate configuration of a 2-channel computer DAW software with a suitable number of internal audio buses.

One of the most commonly used audio digital workstations is Pro Tools. The producer of this package, the Digidesign company owes its success to Pro Tools LE series, in a large measure, as they are cheap and not so demanding systems. Obviously, these

series are for small and medium projects or home studios rather than for big professional recording companies. Software simplifications present in the LE version, unfortunately cause some limitations to its capabilities. However, as it can cooperate with a more compact hardware, the LE version still remains fully efficient and functional, and is a system at least satisfactory for an average user. It is also worth mentioning that Pro Tools LE with a multichannel interface (e.g. DIGI 002 Rack) is almost twice cheaper than the HD version.

In the times of multichannel stereophony one of the most important and irritating limitations of cheap DAW systems including Pro Tools, is that they are not capable of surround sound panning. The question arises, whether smaller studios, which can't afford new bigger DAWs with the surround service are confined only to a production of 2 channel mixes, and must forget about the existence of formats with a greater number of entrance channels. Fortunately, it is not true. Appropriate configuration of the session allows to work with the space sound, and although it is not comfortable and easy, it becomes acceptable if financial issues are taken into account.

However, it has to be mentioned now that the possibility of working with the space sound depends absolutely on hardware interfaces. Even if we don't take into consideration the recording of the material with any one of the microphone surround techniques for which a certain number of entrance channels and preamplifiers is necessary, there still remains a problem of the monitoring system. In the case of the Pro Tools LE systems, two basic interfaces: Mbox Mini and Mbox 2 have only 2 output channels. For the most typical 5.1 surround system, the suitable number of output channels is provided by the MBox 2 Pro interface and two more advanced interfaces Digi 002 and Digi 003 shown in Fig. 1.



Fig. 1. Multichannel interfaces which enable mixing surround in Pro Tools LE.

Therefore, if we have the DAW Pro Tools LE system with a multichannel interface we can mix surround recordings by means of a suitable software configuration. There are ways to form surround mixes in Pro Tools LE and other DAWs proposed by GALLAGHER [2] and PRICE [3], however these are the solutions which are basically limited to an appropriate usage of sends channels.

As presented in this article, the usage of additional aux returns channels provides a more intuitive surround regulation with the help of panning sliders. The proposed configuration was used when working on a sound material recorded with a multi-microphone technique.

2. Configuration of a surround session in Pro Tools LE

For simplification, in further deliberations the name “stereophonic” will be used as the synonym of “2-channel”.

The Pro Tools LE system may be configured in many ways, which with a bit of patience and skill enable to form mixes in 5.1 format. Below, a method will be presented, in which panning sliders of audio tracks, return aux tracks, and faders of sends channels are used to place apparent sources of sound in the surround mix.

It was assumed that sources of the final recording are exclusively monophonic tracks (standard 2-channel stereo tracks are treated as 2 separate mono tracks and are not considered separately).

In the first stage of session configuration, the hardware interface output channels are assigned to the 5.1 format channels by adding 2 stereophonic master tracks (Master faders): channels 1-2 correspond to channels Left_Front (L) and Right_Front (R), and channels 5-6 correspond to channels Left_Surround (LS) and Right_Surround (RS) and 2 monophonic master tracks for central C (3) channel and LFE (4). For convenience,

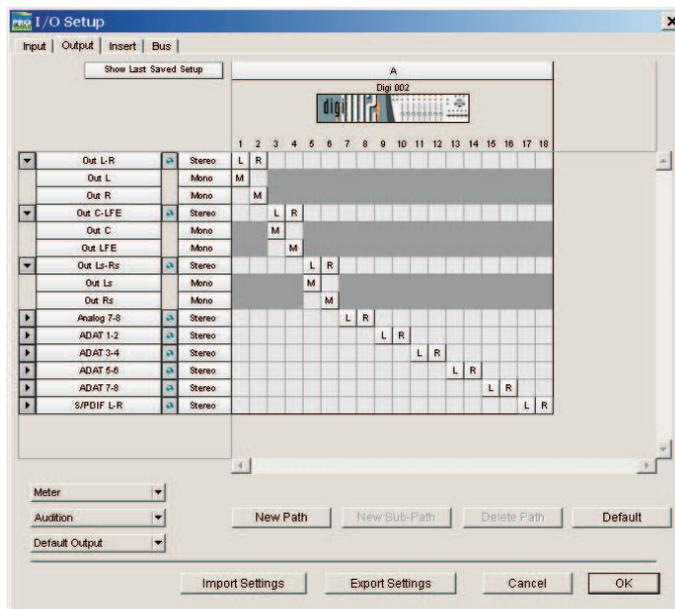


Fig. 2. Assignment of surround channels to the outputs available in interface Digi 002.

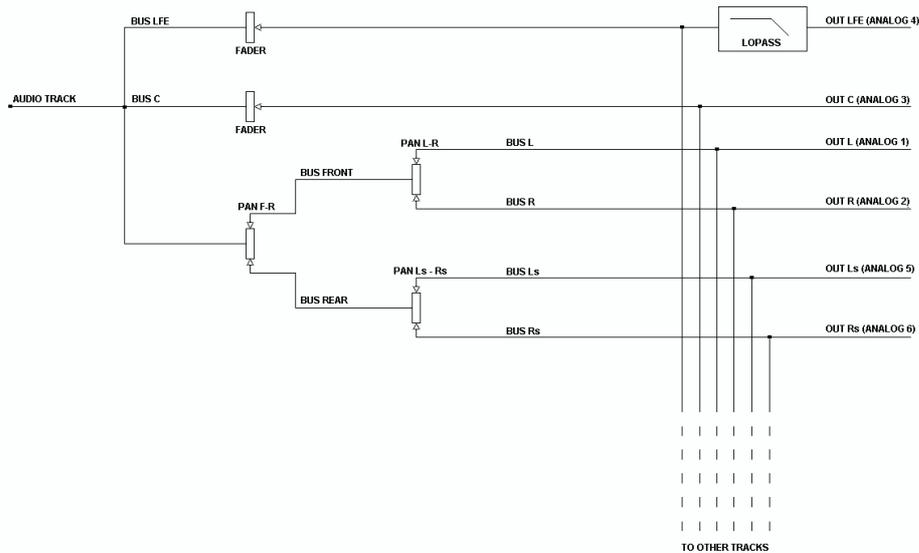


Fig. 3. The diagram of the signal flow and arrangement of regulators in the proposed DAW system configuration.

these names can be defined in the Setup>I/O menu setup, shown in Fig. 2 for Pro Tools 6.4 LE and the Digi 002 interface.

In the LFE channel, the low-pass filter with the limit frequency of about 150 Hz is placed as an insert.

With the use of master faders, the tentative audio monitoring system can be calibrated (the differences in the sensitivities of the pairs of loudspeakers are compensated). Next, the faders can be grouped to regulate simultaneously the initial level of all channels. In order to place the signal from a given track in any location in the space around the listener, two stereophonic returning tracks must be assigned to each monophonic signal track. If a given software version serves N stereophonic internal audio buses (in versions Pro Tools LE 6 and lower $N = 8$, in version 7: $N = 16$), then it is possible to mix N monophonic signal tracks. To this end, for the i -th track we form 2 monophonic returning aux channels. The source for the first aux channel will always be a mono internal bus $(2i - 1)$, and for the second internal bus it will be $(2i)$. The output of the first aux channel will always be a stereophonic output L-R (1-2), and the output of the second aux channel will always be a stereophonic output channel LS-RS (5-6). In this way, with the use of a panning slider of the i -th track, we can regulate its y position (front-rear). With the use of the panning sliders of the return aux tracks we can regulate x position, appropriately L-R in front and LS-RS in the rear. The signal from the i -th track can be placed also in the Central and LFE channel, what is realized through 2 monophonic sends postfaders included in a given signal track. The output of the first send channel is central channel C, and for the second it is channel LFE. The diagram of a connection of one track to the output channels

Owing to the postfader setting, the location of the signal from the i -th track in a given place of surround space through the panning sliders regulation and sends faders remains constant with the regulation of the track signal level with the use of its fader. A mixer with a formed single signal track, aux return channels and master fader is shown in Fig. 4.

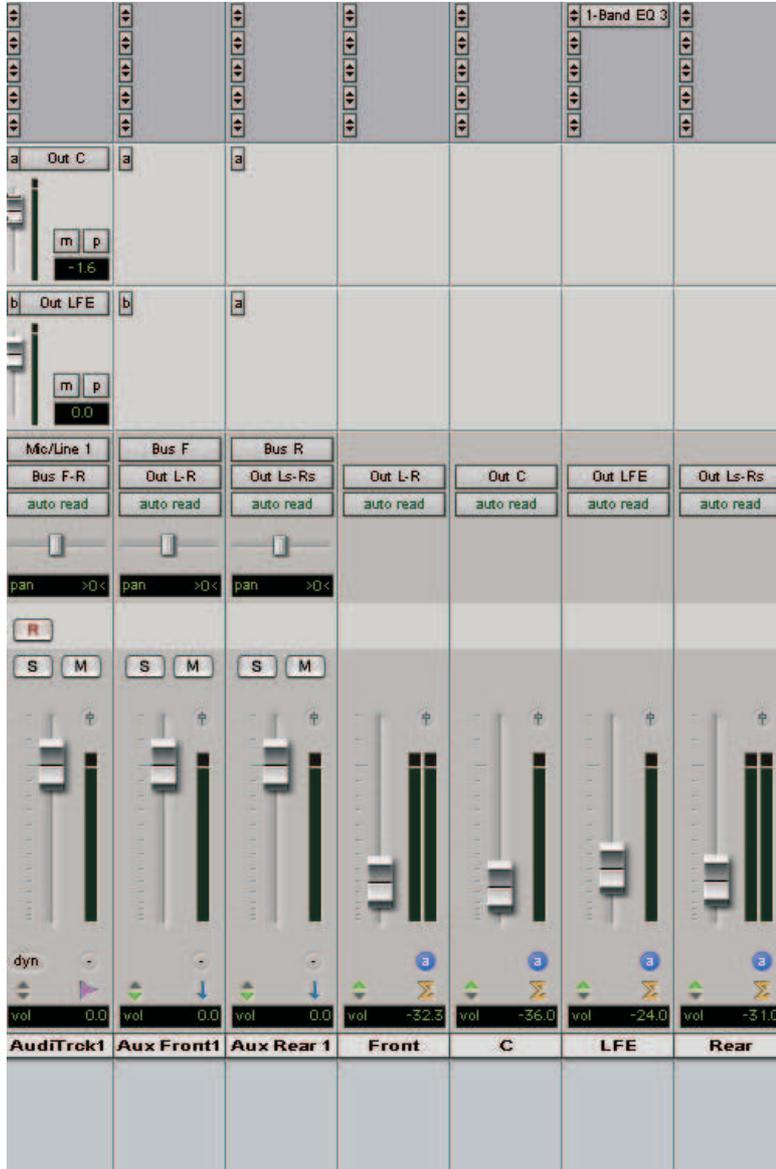


Fig. 4. Sight of the mixer window in Pro Tools LE session with configuration corresponding to the signal flow and regulators from Fig. 3.

3. Discussion and conclusions

To place any track in the surround space using “traditional” approach (direct sends to 5 surround channels), we need to manipulate with 5 regulators per input track. In the proposed method it is reduced to 4 regulators per track (3 panning sliders and 1 send regulator for central channel), so the reduction seems not to be significant. However, the process of the regulation is quite different. Using panning sliders instead of independent sends regulators we change only the position of the phantom source without changing its volume. Using independent sends regulators each time we want to change the position of the phantom source without changing its volume, we have to do it in iterative way (increasing volume in one channel should be followed by decreasing volume in other channels). Using panning sliders it is done automatically. Moreover the proposed method is more intuitive – it is based on simple x - y coordinate system model, and is therefore time-efficient. Of course panning sliders are optimized for left-right positioning and the exact slider position corresponds well to x -coordinate. Using left-right panning sliders for front-rear adjustments introduces some errors, but the nonlinear function between the slider and the phantom source position seems not to be a big problem for the mix engineer. She/he always uses her/his ears to place the phantom source in the surround space and the slider position doesn’t matter.

In this paper the authors presented the technical aspects of the new method using the ProTools LE environment. Of course the method is universal and can be applied in any DAW system, which contains on the hardware side the appropriate multichannel I/O audio interface (at least 5 or 6 output channels) and on the software side sufficient reservoir of internal buses (the authors implemented with success the method also on the Magix Samplitude SE platform).

The proposed ProTools session configuration was used when the multichannel choir recording mix was formed. The recording was made using main microphone array in the Optimized Cardioid Triangle-Surround (OCT) configuration [4] and some spot microphones. During the 5.1 channel mix down procedure it was especially important to the authors to have a possibility to easily put some parts recorded by spot microphones in different places of the surround space created by the signals from main microphone OCT array, because in reality the arrangement of the individual choir members and soloists was changing during the concert. Thanks to the applied method, this task was much easier than before with only sends regulators and the satisfactory results (proper phantom sources positioning from spot tracks according to the surround space created by main microphone array) were achieved in shorter time. The usage of panning sliders for suitable movement of phantom sources was more intuitive than in the case of configurations proposed by other authors. The movement of the phantom sources could be also easily animated using the DAW software automation feature. This opinion was expressed uniformly by all members of audio engineering section of student scientific circle “Elkona” at Szczecin University of Technology.

In conclusion one could be stated, that the proposed method won’t fully substitute the surround panning using especially developed methods (e.g. vector base amplitude

panning, [5]) and professional surround mixing consoles or DAWs. Moreover it doesn't allow applying full surround effects, for example surround reverbs. However, it is a proposition for everybody, who being an owner of 2-channel DAW likes to begin the surround mixing adventure in a quick and convenient way without additional investments. Finally one can presume, that individual configuration of the proposed system will allow having better feeling of the surround panning operation principle and more conscious utilization of professional surround mixing consoles in the future.

Acknowledgements

The article was created thanks to an active cooperation of the members of the student scientific circle "Elkona". Special thanks to Mr. Wawrzyniec Szwaja and Mr. Karol Skirgajło-Jacewicz.

References

- [1] TOZZOLI R., *Pro tools surround sound mixing*, Backbeat Books, San Francisco 2005.
- [2] GALLAGHER M., *You're surrounded*, EQ Magazine, April (2004).
- [3] PRICE S., *Pro tools notes*, Sound On Sound Magazine, November (2001).
- [4] THEILE G., *Multichannel natural recording based on psychoacoustic principles*, 108th AES Convention, 2000, preprint 5156.
- [5] PULKKI V., *Virtual source positioning using vector base amplitude panning*, J. Audio Eng. Soc., **45**, 6, 456–466 (1997).