

## FH MMA Salzburg – Music Production, Mix & Mastering

Online resources: <http://www.digitalnaturalsound.com/index.php/fh--multimediaart.html>

### MIXING AUTOMATION

In classical productions, the mixing settings are often kept the same throughout a set of pieces (like a sonata, a suite, or a symphony): once the optimal balance between instruments has been found, dynamic changes are left to the interpretation of the performers. In some cases, small adjustments might be desired: for example, in an orchestra production the level of a certain string part playing an important theme might be pushed up a couple of dB in a “tutti” section to be better heard.

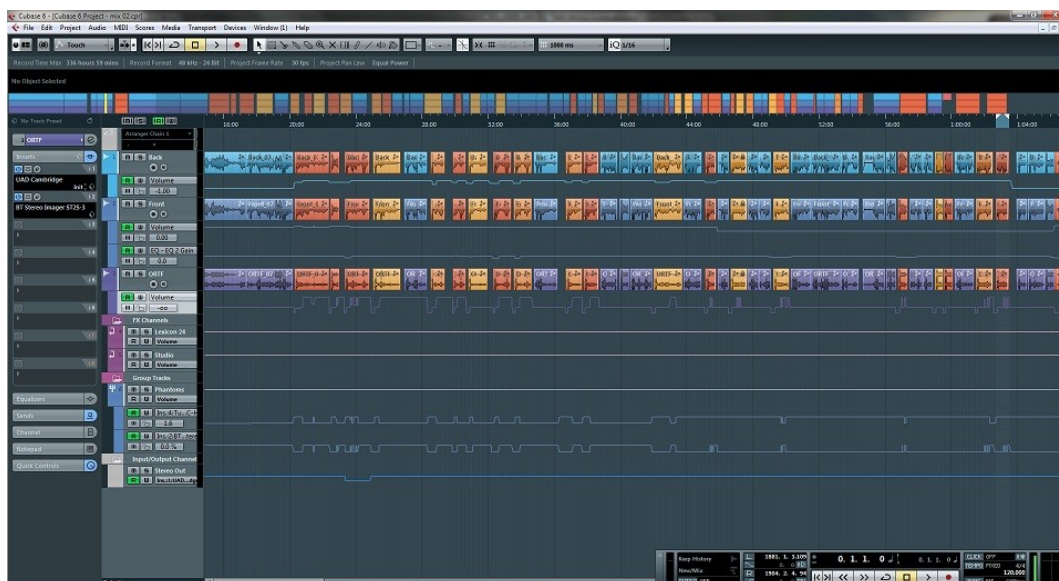
In pop/rock/electronica as well as in soundtrack productions we have a quite different situation: a mix does not just consist in setting parameters to a certain value for the whole length of a song. More likely, in the course of a song it is necessary to adjust volume, balance between instruments, panorama, EQ and effect parameters, according to the musical texture and the requirements of the arrangement.

This can become such a complex task that a single engineer cannot master it alone in one pass. In fact, before mixing automation was introduced, to mix a complex song it was sometimes necessary for several operators to work side by side on the mixing console and “perform live” changing all required parameters in real-time.

This was complicate and time consuming: the mix had to be “rehearsed” like a musical performance in an ensemble, and there was also a very high chance that at least one operator would do some mistake (like forgetting to mute a track at the right spot), and the whole mix-down process had to start again from the beginning.

On the other hand, this approach sometimes led to unexpected but interesting results, and besides the mix had a certain spontaneous character, like a live musical performance.

With mixing automation it is possible to save any number of different mixes of the same song. It is also possible to compare, combine and edit parameter data. A single engineer can control even very complex mixes by working subsequently on different channels and parameters and letting the automation system play back the information as an “invisible operator” – an operator with a lot of hands (it can even control 128 audio channels and thousands of parameters at once), with endless patience, that never gets tired and never does any mistake.



## **ANALOGUE CONSOLES**

The first form of automation implemented in analogue consoles was Fader automation: this makes it possible to program changes of volume using the channel faders. The two main types of fader automation are VCA Automation and Motorfader Automation (also called "Flying Faders").

### **VCA Automation**

In a VCA system the fader is not controlling directly the audio signal, but just the voltage that drives a Voltage Controlled Amplifier (VCA). The VCA controls the volume of a channel. The control voltage is digitalized and saved in the automation computer. During playback, control voltage commands are sent from the automation computer to the VCAs, but the faders are not moving, so that their position does not correspond to the actual channel volume.

Some engineers prefer VCA automation because it reproduces very sudden changes in volume more accurately than a standard Motorfader system. Also, motorfaders can be noisy and disturbing (not in the audio path, just in the mixing room).

### **Motorfader Automation (Flying Faders)**

In a Motorfader system the fader is controlling directly the volume of an audio channel, but is also generating over a secondary line a control voltage. This is also digitalized and saved in the automation computer. During playback, the control voltage from the automation computer drives a small step motor that controls directly the position of the fader, and therefore the volume of the channel.

While these motors are very precise and quite fast, they cannot reproduce sudden changes of volume at the same speed of a live operator, or of a VCA system.

However, some engineers prefer "Flying Fader" automation because of the visual feedback (the position of the faders corresponds to the set volume) and because in some cases there is less additional noise and distortion added to the signal path compared to a VCA system.



## **DIGITAL CONSOLES AND WORKSTATIONS DIGITALLY CONTROLLED ANALOGUE CONSOLES**

Total Recall and Automation is nowadays standard in digital consoles, where the control surface is anyway just sending control data for the DSP system processing the audio signal in digital form.

Total Automation is also standard in digital audio workstations based on programs such as Nuendo, Logic or Cubase. In these systems automation goes even a step further, allowing the control of each single Plug-In parameter (both effects and audio instruments) and allowing therefore very complex mixes that would not be easily realizable on a classic mixing console.

Total Recall and Automation is also available on some digitally controlled Analogue Consoles, where the signal processing path is completely analogue, usually in separate processing racks, but all parameters are controlled digitally by a digital control surface.

### **Total Recall vs. Total Automation**

Most large analogue studio consoles nowadays are able to “read”, save and then “recall” the position of every single fader, rotary control and button with the automation computer in a so-called *snapshot*. This is called a *Total Recall* system.

However, not all controls are “automated”. Typically, when you recall a certain setup, this is the procedure:

- the channel faders jump to the set volume (on a “Flying Fader” console), or the VCAs set the proper channel level. All selection buttons (routing, filters on/off, monitoring, etc.) are set to the recalled value;
- for other controls (such as EQs and dynamics) the computer just “remembers” the value and shows it to you on screen, but these controls cannot be moved as they are not motorized;
- at this point you have to set up each control manually: the automation computer supports you providing information about the recalled value and letting you know when the position of the controls corresponds to the recalled value – this can be a very time-consuming task. Most consoles, like the analogue models by Neve or SSL, work in this way.

In *Total Automation* systems the console is just a control surface with motorfaders and special “endless rotating knobs” that show their value with a crown of LEDs. All the actual signal processing happens in a separate rack mount set of components (usually separate for VCAs, EQs, dynamics, etc.).

During the writing phase of the automation, each control sends information to the control computer. This information is then used to control the parameters of the analogue rack components.

The great advantage of this system is that each single setting can not only be recalled but also set to the proper value, and that each parameter can be automated in real-time.

Among some of the best consoles following this principle are the CS 2000 and 3000 by Euphonix. They offer all the advantages of digital systems, but with a 100% analogue signal path.

## AUTOMATION MODES

All automation systems, be it on an analogue or digital consoles, work on similar principles: automation data can be written, edited and played back. The differences are more in the resolution (precision), speed, reliability and comfort of use.

The three standard operating modes are *Write*, *Read* and *Update*.

- Write (or Absolute): the position and movement of controls are recorded in the automation
- Read (or Play): the position of the controls is driven by the automation system
- Update (or Trim): recorded movements are edited by additionally moving the controls

### Write

In *write* mode all changes in the position of faders, rotary controls and buttons is recorded and saved. In successive passes, it is possible to set and control the values of different parameters.

### Read

In this mode all parameters are controlled by the automation. In this mode it is possible to listen to a mix without having to concentrate on controlling parameters. If additional changes are necessary, it is possible to switch back single channels in *write* mode.

### Update

This mode allows the *relative* change of parameter values. This can be useful in situations like when there are already pretty complex changes in the channel volume, but it is just necessary to adjust the overall volume of the track.

There are several options when editing automation data:

- Touch-Write: as soon as the touch-sensitive fader is touched (or other controls moved) automation switches in the *write* mode.
- Touch-Update: similar to touch write, only the channel switches in *update* mode.
- Auto-Return (Latch): similar to Touch-Write, only after leaving the control again, the automation switches automatically back in *read* mode.
- Auto-Takeover: similar to Auto-Return, only the automation switches back to *read* only when the set parameter is same as the previously recorded one.

### Recommended Literature:

- *das Tonstudio Handbuch* - Hubert Henle  
[CG Carstensen - ISBN 3-910098-14-2]
- *das Effekte Praxisbuch* - Frank Pieper  
[CG Carstensen - ISBN 3-910098-16-9]
- *The Mixing Engineer's Handbook* - Bobby Owinsky  
[Artist Pro - ISBN 0-87288-723-5]
- *The Mastering Engineer's Handbook* - Bobby Owinsky  
[Artist Pro - ISBN 0-87288-741-3]