

technique

mix
automation

automation stations

INTRODUCTION TO MIXER AUTOMATION: PART 1

Paul White introduces the concept of VCA and moving-fader mixer automation in the first part of a short series on automated mixers and their applications.

Until the late '70s, virtually all multitrack music mixing was done using analogue consoles with no automation at all. Fader levels had to be changed manually during a mix, and if the mix was complicated, additional people would be conscripted to help. One wrong fader move and you either had to start the mix again from the top, or resort to splicing together the best bits from several mixes using razor blades and sticky tape. Obviously this was restrictive enough to prompt someone to come up with the idea of building a mixer where the fader levels could be automated in some way.

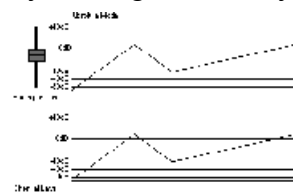


The two main ways of automating fader levels on analogue consoles are either to use motorised faders, under computer control, that can reproduce the fader moves you made earlier, or to use voltage controlled amplifiers (VCAs) controlled by standard manual faders. In the VCA system, no audio passes through the faders -- they're just used to produce a DC voltage that is read by the automation computer to determine the fader position. By contrast, most moving-fader systems route the audio signal through the fader in the conventional manner.

Initially the VCA approach was popular as motorised faders were expensive, but one disadvantage of VCA systems is that, as the faders don't move while the mix is playing back, you have no visual feedback of the actual levels unless you use a system to which a computer monitor screen can be connected. A typical VCA system with a screen will often show both the physical position of the faders and the virtual fader level corresponding to the VCA gain. Where edits need to be made to the mix data, the screen may be used to match up the actual fader levels to their virtual values to prevent sudden level jumps at the edit point, and on systems with no screen, a system of LEDs is often used -- for example, a couple of up/down arrow-shaped LEDs next to the fader -- to tell the user which way to move the fader in order to match the VCA level. When a match is achieved, the LEDs may go out or they may both come on -- it depends on what the designer felt was best. Early VCAs also compromised the sound and/or headroom of the console to some extent, though modern

versions can be almost as good as a fader, with the added benefit that they don't go scratchy with age or dust.

The moving-fader approach is arguably better from a visual feedback point of view, because the fader level always relates to the actual gain setting of the channel. The negative aspects are that moving faders can go noisy in exactly the same way as manual faders, and the mechanical noise of the faders moving during a mix can be distracting.



Virtually all analogue mixers that offer fader automation also have a system for automating channel mutes and sometimes effect send/return mutes as well. Mutes are a useful way of controlling noise, as the background hiss from 16 or more tracks soon adds up, no matter how well recorded they are. In general, tracks are muted when nothing is playing so they're not contributing to the overall background noise level. Mutes may also be used to remove recorded parts that are no longer required in a particular section of the song for artistic reasons.

Mix Data

When a mix is being set up, the data generated by manual fader movements is stored in a computer. With more serious automation systems, the computer will be either a part of the mixer or an external unit dedicated to the mixer, but at the lower end of the market, it's not unusual for the mix data to be sent as MIDI so that you can record it into a standard MIDI sequencer. How easy the mix data is to edit in this case depends on how sophisticated your sequencer is.

Once a rough mix has been written, the mix data on individual mixer channels may be replaced or modified, much like doing a punch-in on a multitrack tape recorder, and thus fine-tuned until everything is exactly right. Only then is the mix run to the master stereo recorder.

Fader Groups

With a manual analogue mixer, it's necessary to use the desk's routing busses if you want to subgroup a set of channels while mixing. However, an automated desk, whether VCA or moving fader, can generally handle automated fader grouping without the need to involve the group busses. Once a number of faders have been assigned to the group, operating one of the faders in that group causes the levels of the entire group to be adjusted, maintaining any relative level differences that may have been set up. On a moving fader desk, all the faders in the group will move when the controlling fader is moved, and if the scaling has been done properly, all the faders will reach the bottom of their travel at the same time, regardless of their relative positions at the start of the fade.

VCA Fader Modes

When you first write (it's conventional to say we 'write' automation data rather than record it) a set of mix moves using a VCA console, it's normal to use 'Absolute' mode, where the VCA levels correspond precisely to the fader positions. With a basic moving-fader analogue console, the fader positions always reflect the true channel gain setting, so they are, in effect, always in absolute mode. Figure 1, opposite, shows how the channel gain responds in Absolute mode.

Once the first rough mix has been written, though, you may want to make further adjustments, but find that while some faders are at sensible positions somewhere near the middle of their travel, others are almost at the bottom of their travel. This is where another mode, called Trim or something similar, comes in. This mode allows the faders on a VCA console to be moved to more convenient mid-way positions (the 0dB position is most logical) without the VCA gains changing. Then, when the mix is resumed, moving the faders either way from their new position will increase or decrease the existing VCA values. When in this mode, mix data that's written doesn't replace the existing data but instead modifies it. This is very useful if you have a mix that's more or less OK, but have one or two phrases that need to be made louder or softer. All you need to do is switch to Trim mode, start writing mix data on the selected channel, then use the fader to lift or drop the level of the mix data already written for that channel. For example, if you push the fader up by 3dB, the existing mix data will be increased in level by 3dB. Figure 2, on page 50, shows how the levels behave in Trim mode.

Yet another useful feature offered by some automation systems is 'Write to End'. This allows a current fader or control setting to be continued from the current position to the end of the mix without you having to play the track all the way through.

When you come to play back your mix data, the console is placed into Read mode. To recap then, when a fader is in Write mode, the gain is controlled by your fingers. When it's in Read mode, the computer calls the shots.

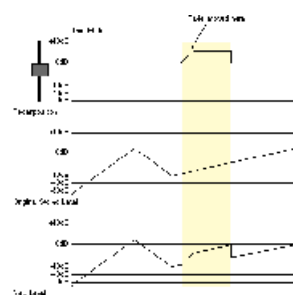
Some consoles also have a mode that flips the channel from Read to Write mode if you grab hold of the fader during a mix playback. When you release the fader, the channel goes back to Read mode. On a less expensive console, it's more common to have a button associated with each channel that is the equivalent of the 'record select' button on a multitrack recorder. Depending on the mixer, this button is used to arm individual channels (you have to select whether you want to write fader, mute or other data elsewhere in the system) or to punch in and out of write mode for that channel. No two automation packages are exactly the same, though most follow similar basic rules, so it is essential that you read the manual for your automated desk.

Snapshots

A snapshot, sometimes called a scene, is simply a set of automation data reflecting the state of the console fader gains and mutes at the time the snapshot was stored. On a digital console, the snapshot may also include the pan, EQ, aux, effects and dynamics settings, though input gain trim settings are rarely automated. If you're doing a complex mix that requires lots of changes to happen instantaneously, it's often easier to create a snapshot, which can be called up at the appropriate time (under control of the automation), than to spend ages editing your mix to change lots of fader and mute settings.

Most automated desks will be able to store a number of automation snapshots in their internal memory, and these may be called up at any time during a mix as part of the normal automation process. Further refinements include the ability to isolate individual channels so they're not affected when a snapshot is recalled.

Digital Console Automation




Digital consoles may be designed to emulate VCA-style automation (non-moving faders) or they may have moving faders, but because no audio passes through the faders on a digital desk, you don't have the restriction that the faders must always correspond to the actual channel gain setting. Not only does this make it possible for a moving fader desk to emulate VCA Trim and Offset modes, it also means that the faders can be switched off when appropriate so their noise and movement doesn't distract you. Unfortunately, not all moving-fader digital desks offer this latter facility.

While it's unusual to find an analogue console that offers automation of more than the channel levels, the mutes and the master stereo output level, modern digital consoles can be designed to automate pretty much everything -- levels, pans, aux send/return levels, EQ, and mutes. What's more, most digital desks include one or more built-in digital effects processors, and often dynamics control such as compression or gating, sometimes on every channel. More often than not, it's also possible to automate aspects of these effects and dynamics processors. Digital desks also offer fader grouping and have the facility to store snapshots, frequently with features not found on analogue desks, such as the ability to 'morph' from one snapshot to another over a period of time set by the user.

Note that Yamaha digital desks take a slightly different approach to most others, in that you can't just put the desk into write mode and then start mixing. Instead, you must create a snapshot or scene that represents the conditions at the very start of your mix, and then write automation data from that point on. Further snapshots may be introduced during the mix if required. In essence, your mix data comprises both dynamic automation and snapshot data.

Timing And Saving

Obviously the console automation system has to keep time with your multitrack recorder, and the usual way of doing this is to run MTC or SMPTE, depending on the automation system you're using. In effect, the automation system is always in slave mode, and most models drop out of write mode automatically when the timecode stops. Once a write pass has been made, there should be the option to update the mix with the new moves you've just written, or to abort the last pass and leave the mix as it was. Depending on the system, you may also have the facility to store multiple mix histories, allowing you to return to any point in a project, or you may have only one mix which is constantly updated. In this latter case, saving some interim versions to disk can be helpful. Those consoles without inbuilt disk drives -- such as the Yamaha 03D -- allow you to save a limited number of mixes to a non-volatile (battery backed-up) internal memory. At any time, these internal memories can be dumped via MIDI to any suitable MIDI storage device or sequencer.

Next month I'll be looking at various strategies for setting up an automated mix without getting lost in the sea of possibilities that automation opens up. 

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