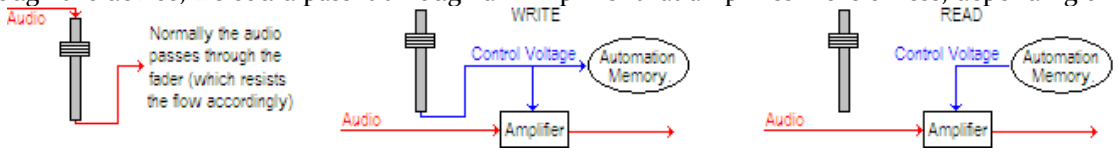
Automation is the process of teaching a device to automatically make changes to knobs and faders as a song proceeds.
In order to perform movements *in time, every time,* automation requires a time-code of some kind (eg. Hours, Minutes, Seconds and Fractions) as a reference.

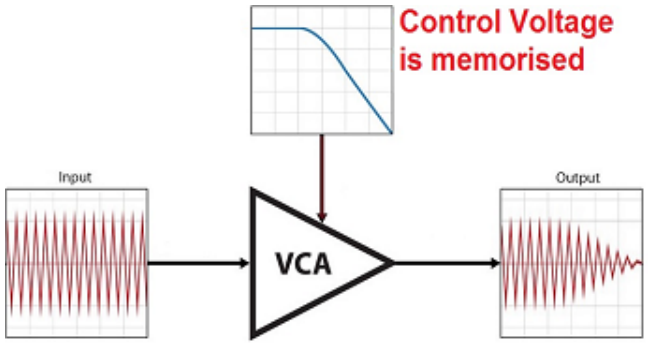
MEMORISING THE MOVEMENTS

Normally the audio passes through a Fader or a Dial, which causes more or less resistance to the signal as you adjust it.
Instead of passing the audio through the device, we could pass it through an Amplifier that amplifies more or less, depending on an external voltage it receives.



At the heart of Automation is the Voltage Controlled Amplifier (**VCA**) which uses an external 'control voltage' to dictate how much it will amplify.
On digital systems (*eg. digital mixers, software mixers*) the **VCA** has become a **DCA** (Digitally Controlled Amplifier) but the function is the same.

The advantage of controlling a volume using a **control voltage** is that the changing values of the voltage can be saved digitally into a memory.



As the control voltage is really just a stream of numbers it is easy to record "**write**" your fader or dial movements, and even "**update**" the movements, and finally save all your movements as a file. Any time you wish you can ask the Automation system to "**read**" its' memory and send back those control voltages exactly as the controller (fader or dial) was moved, and it can repeat this whenever you want.

Push Buttons may also be automated. This means that the VCA just needs to memorise the on/off movements of a button. This is handy for memorising Mute buttons which can turn on and off as a song proceeds.

Some digital mixers have motorised faders. Basically, each fader has a little motor inside it, and it physically moves to show you its' current control-voltage value.

The basic principles of automating encompass the following:

First, we use the **WRITE** mode. This cancels all previous memory. Push *Play*, and as the song advances any knob, button or fader we move is memorised by the automation device at the time (address) we made the change. Press *Stop* at any time to finish writing the automation.

If some of our moves were good but other parts weren't quite right, we can **UPDATE** the automation memory. Some automation devices call it **TOUCH**. In this mode when we press *Play* it will automate faders and knobs according to its memory of what you did before, ***unless*** you 'touch' something, in which case it will give priority to your new movements. Any time you aren't changing things, it will be using the old memory. Now your memory is a mixture of the old and the updated material. You can update as many times as you like.

Often, we are going along really nicely, but then we make a big mistake. In this case we could choose the **LATCH** mode. When we press *Play* it will automate using the movements in the memory ***until such time*** as you move something. From that moment forth it forgets any previous movements and it goes in to *Write* mode.

Finally, we can choose the **READ** mode. When we press *Play* the automation device will repeat all the moves we made.

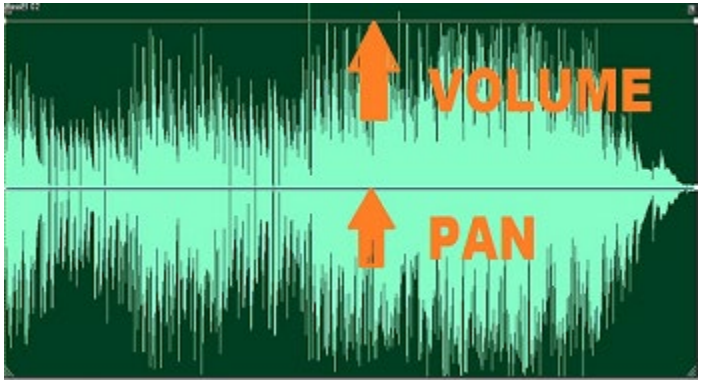
Some Automation offers you a **TRIM** (or UPDATE-BY-TRIM) option. This lets you add or subtract an amount to all the memorised values. You could call it an **OFFSET**. For example, if you select TRIM and nudge a Fader by 6dB, you just made all the Fader's values 6dB louder (or softer).
The original memorised movements (WRITE, UPDATE, TOUCH) are what we call **ABSOLUTE** (they are the real figures that were recorded).
TRIM is what we would call **RELATIVE** as it is something that is added to the all ABSOLUTE positions in the memory.

Sometime Automation systems let you say if you want to work in Absolute or Relative, in which case:
In **ABSOLUTE** mode all new moves become the new values.
In **RELATIVE** mode all new moves will add or subtract to previous info.

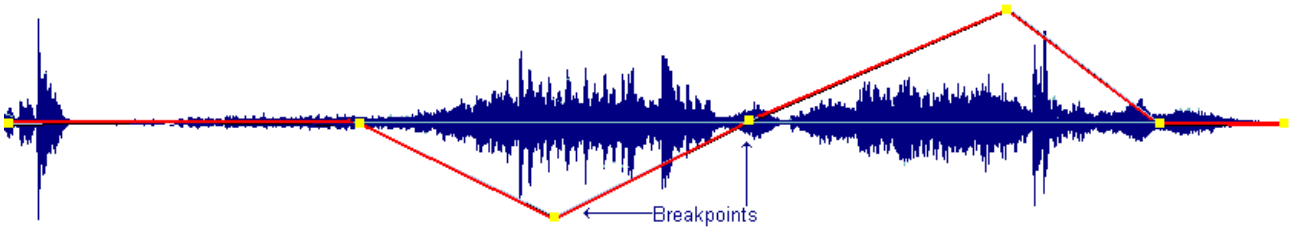
MEMORISING THE MOVEMENTS BY DRAWING ON SOFTWARE

Automation using software:

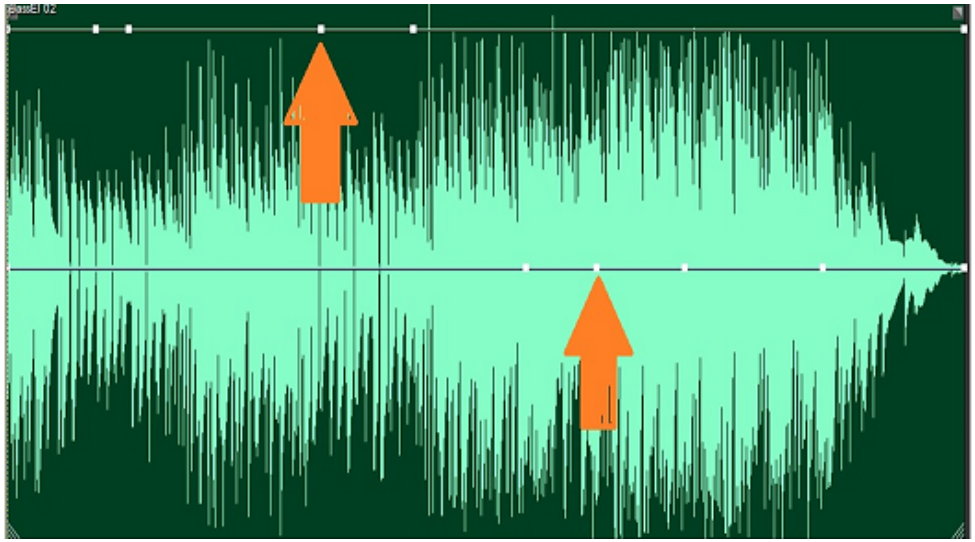
In order for the automation software to memorise your movements, you can either press WRITE (or a word similar) and make the moves using the mouse as the song proceeds, or you can use the mouse to drag the automation (control voltage) line displayed on top of your audio waves.



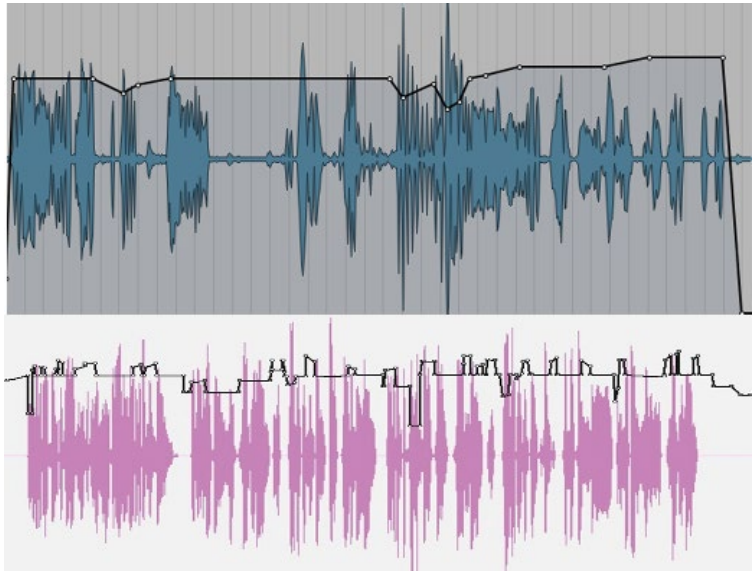
Software packages display lines over top of the Audio tracks. A line might represent the memorised positions of the Fader (volume), one might be the memorised positions of the Pan (L-R), and another might be the Mute for that channel. Initially they will be straight lines, until you memorise some changes.



At each change there will be a dot or box, called a break-point. The example above shows the positioning of the PAN as the music proceeds. It starts in the centre and then pans right and then left and finishes back in the centre. It is very helpful being able to see the soundwave underneath because it lets you set your movements precisely in time with the music. You can click on any break-point at any time and drag it (or even delete it).



You can click on an automation line anywhere and create a new break-point.



This is what automation lines often look like.

Software plugins can often be automated as well. This allows you to change the effect to suit the moment in the song, offering powerful mix opportunities.

There will be AUTO (Automation) or READ, or a word similar, for you to click which will tell the software to use your automation movements from now on.

CREDITS

This material is offered freely to the Christian Churches; downloadable at Pietango.com

Text: *Original, by the Author, a Christian Recording Engineer.*
Images: *Designed by the Author. Some photographs were sourced from the Internet, then re-worked.*

Ever since the creation of the world, God's invisible attributes and divine nature have been evident. They are clearly understood through his workmanship, and all the wonderful things that he has made. Therefore, those who fail to believe and trust in him are without excuse, or defence. **Romans 1:20**

All of us have sinned and fallen short of God's glory, but God treats us much better than we deserve.
Because of Christ Jesus, he freely accepts us and sets us free from our sins. God sent Christ to be our sacrifice. Christ offered his life's blood, so that by faith in him we could come to God. **Romans 3:23**

If you declare with your mouth, "Jesus is lord," and believe in your heart that God raised him from the dead, you will be saved. For it is with your heart that you believe and are justified, and it is with your mouth that you profess your faith and are saved. **Romans 10:9**

For the Scripture (*Isaiah 28:16*) says, "Whoever believes in Him will not be disappointed." **Romans 10:11**

These things have been written so that you may believe that Jesus is the Christ, the son of God; and that by believing, and relying on him, you may have new life in his name. **John 20:31**