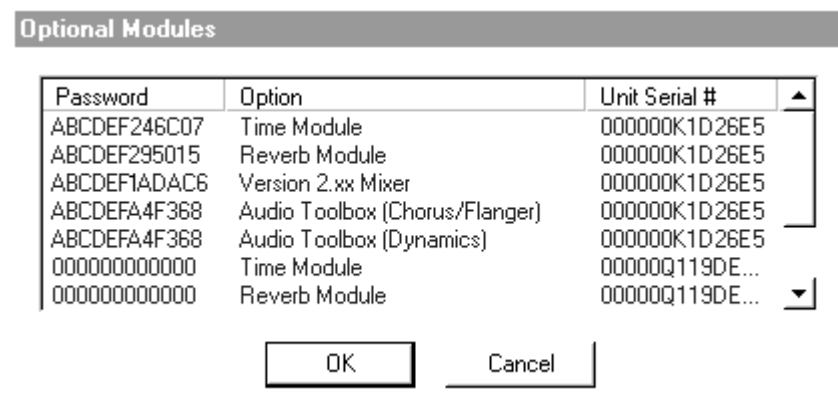


Audio Toolbox (option)

The Audio Toolbox is an optional set of real-time DSP effects elements for the mixer, which can be placed in a mixer channel in the normal way, just like an EQ or send element. It is eventually intended to include around five DSP functions, all activated by the same password, which must be entered for each function under the **Options** menu.



The Audio Toolbox DSP effects are designed as DSP power efficient “building blocks” for the mixer, not the most comprehensive DSP effects available, but are all very usable and above all have excellent audio quality. More comprehensive DSP effects plug-ins will be available, developed by 3rd party companies.

Chorus/Flanger Plug-in

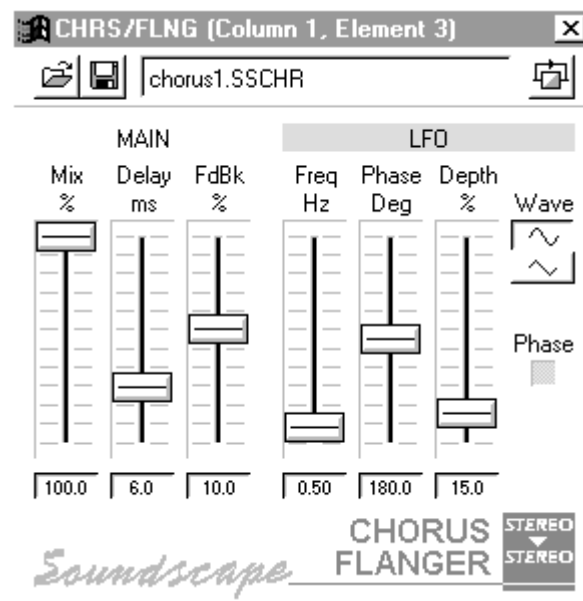
CHRS/FLNG	BP
Mix	50.0 %
Delay	15.0 ms
FdBk	0.0 %
Freq	0.50 Hz
Phase	180.0 Deg
Depth	10.0 %
Wave	

The Chorus/Flanger plug-in algorithm requires around 10% of DSP resources (for stereo), so several can be used as necessary. Mono and Stereo versions are available, depending upon the type you require for the channel. All available parameter values are displayed in the mixer channel element (pictured left), and can be altered directly with the mouse. Double-clicking on the element in the mixer channel pops up a control window with faders rather than the numeric parameters (shown next page) .

You can save and load presets of the Chorus/Flanger settings to the PC hard drive, by clicking on the **Open** or **Save** buttons or by selecting from the menu (displayed by clicking on the Windows icon at the left of the title bar).

The digital Chorus/Flanger effect is produced by passing the signal through a short delay, with the Delay time modulated by a low frequency oscillator (LFO). The varying delay produces a pitch shift which varies with the amount of modulation (**Depth**), the **Shape** (sine or triangular wave), the **Phase** and the **Frequency** of the LFO. A proportion of this signal (**Fdbk**) can be mixed with the input signal for increasing the effect. The **Mix** control sets the balance between the original and processed signals.

Soundscape



A chorus effect produces anything from a slight thickening or doubling of the sound which is good for backing vocals to the jangly guitar sound that you can find on numerous recordings. Flanging is usually at the more extreme end of the range of this effect, and the name comes from the way in which studio engineers pressed the flange of the tape reel (outer edge) to slow down one tape machine, producing pitch changes and delay between two machines playing the same audio track.

Dynamics Plug-in - Gate/Expander/Compressor/Limiter

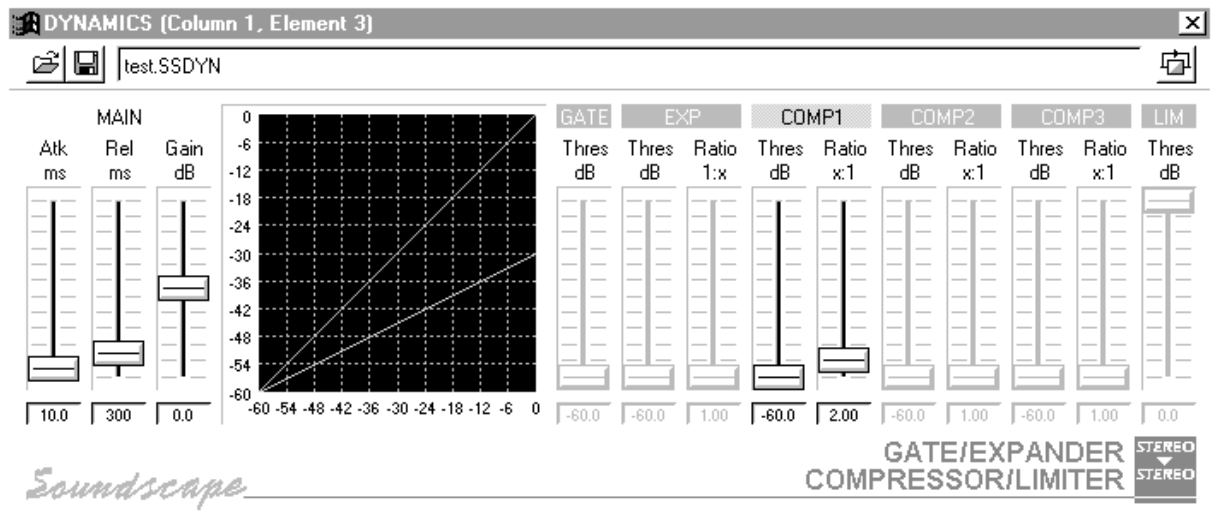
The **Dynamics plug-in** features a number of different real-time algorithms that can be used individually or in any combination. Below is an explanation of how a dynamics control element works and will help in understanding how you can adjust the parameters to achieve the desired result. In all of the curves shown, the **Input level** is shown on the horizontal axis from -60dB (left) to 0dB (maximum - right) and the **Output level** is shown on the vertical axis from -60dB (bottom) to 0dB (top). The gain or attenuation that is applied by the dynamics control can be found by comparing the output level with the input level on the curve.

Dynamics Control Functions

In general, dynamics control involves using the input signal level to determine the output signal level according to a curve on a graph, which gives the amount of gain or attenuation that needs to be applied to the signal (transfer function). To measure the input signal, it is first rectified, which means that the negative peaks are inverted to become positive ones and then it is measured using an envelope detector. This has an attack (**Atk**) and a release (**Rel**) setting that determine how fast the envelope rises and falls in response to the input signal. The settings of the attack and release time are very important in deciding how the gain is applied during transients.

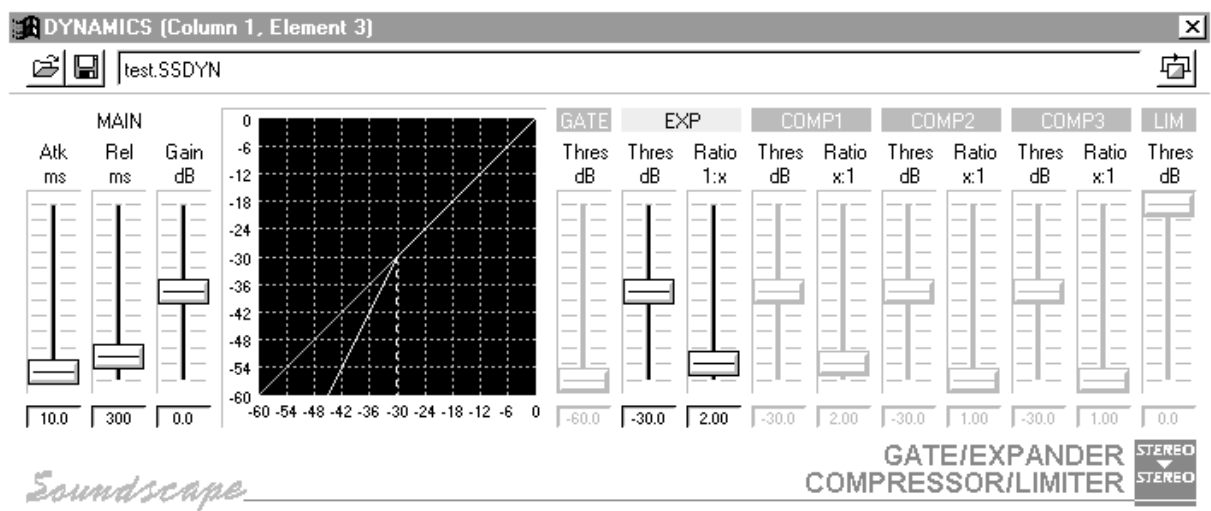
Compressor

A compressor function reduces the output dynamic range compared to the input dynamic range and is generally used for applying smooth control of the level, enhancing the low level signals to increase sustain, breathiness, etc. of vocals, speech or instruments. It can be used to make a mix sound louder overall without increasing the peaks of the signal if the attack and release settings are set appropriately.



The amount of compression is expressed as a ratio between input and output, *i.e.* 2:1 means that the a 60dB input dynamic range is converted to a 30dB output range (see above). For example, if a -60dB input signal is applied to a 2:1 compressor, the output signal is -30dB - *i.e.* 30dB of gain is applied. If the input signal is -30dB, then the output signal is -15db and so 15dB of gain is applied. However, the background noise level is always increased when using a compressor alone (*i.e.* -90dB becomes -45dB).

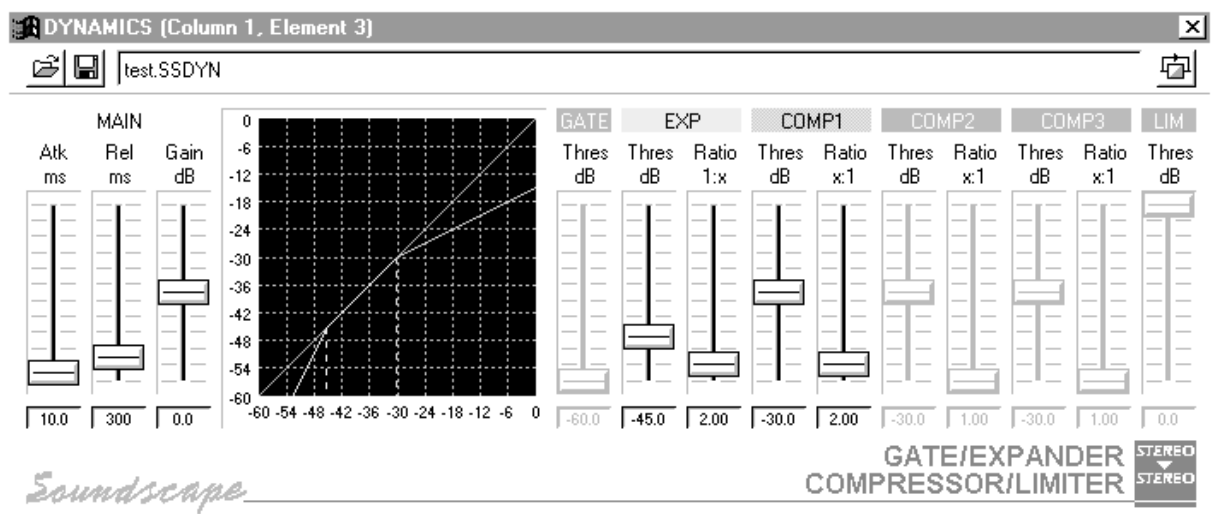
Expander



Soundscape

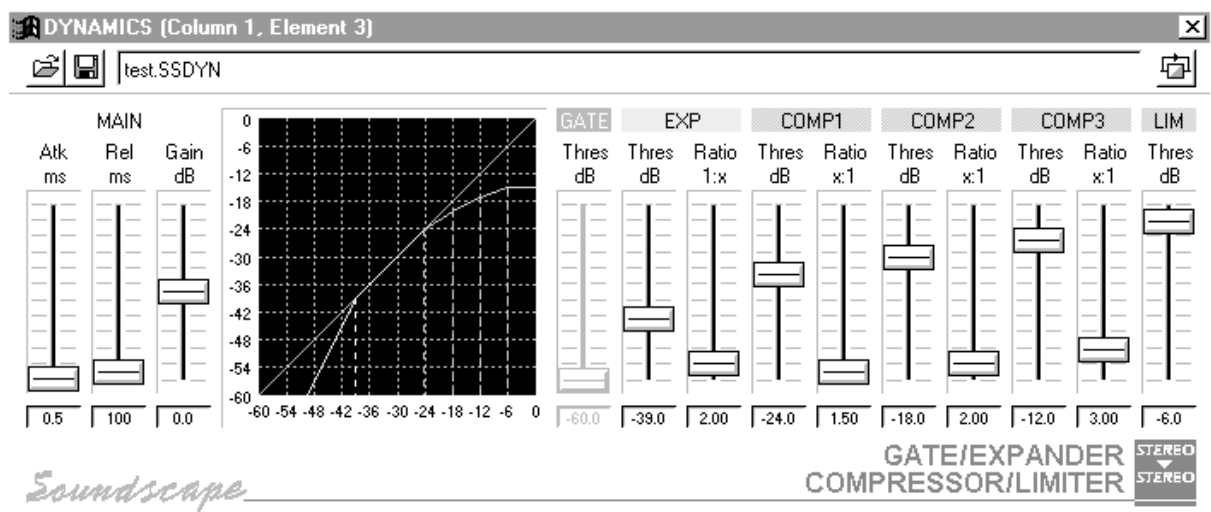
An expander function increases the output dynamic range compared to the input signal and has the effect of making a signal 'punchier', increasing the peaks and reducing low level signals. It is sometimes referred to as a 'downward expander' for it's ability to reduce the background noise in the absence of a signal. The expander ratio is expressed as a ratio in the same way as for compressors, but is 1:x (e.g. 1:2). With a threshold setting, so that normal level signals are not affected, an expander can greatly reduce the background noise level of a signal used when as a 'single ended' function. In combination with a compressor, using an expander can reduce the increase in background noise level that occurs when a compressor is used alone.

Hard Knee/Soft Knee Compressor



► *Hard Knee Curve*

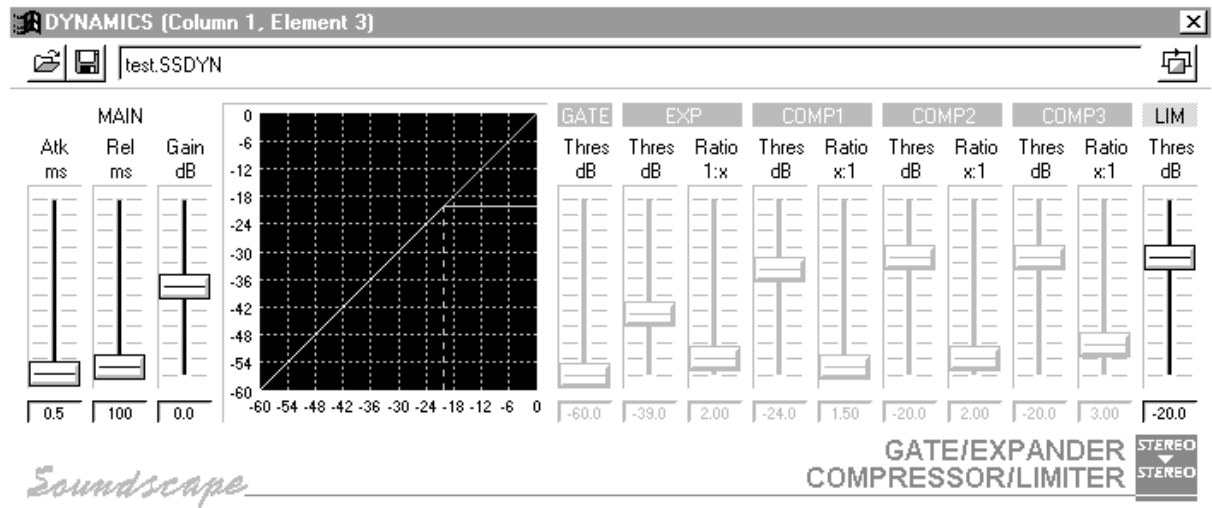
If the compressor has a threshold point, below which the line changes to a 1:1 slope or an expansion slope (e.g. 1:2), then it is known as a 'hard knee compressor'. The background noise is not increased as much as for a simple compressor, but an expansion slope can result in 'pumping' of the background noise. Also, the 'hard knee' gives an abrupt change between the compression and expansion slopes which can be audible.



► *Soft Knee Curve*

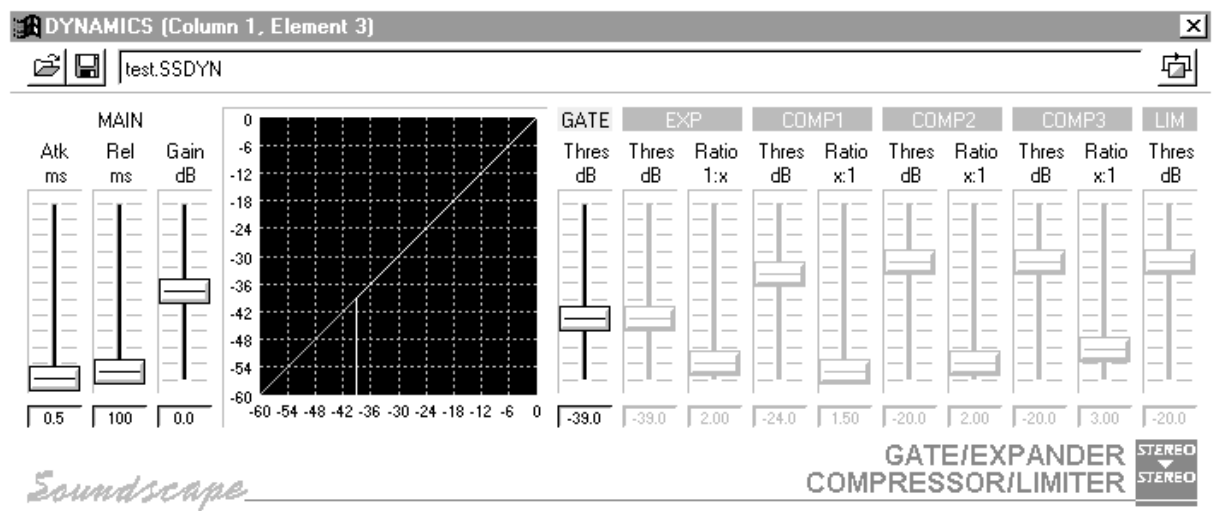
A 'soft knee compressor' (previous page) has a smooth curve between compression and expansion slopes, which avoids audible gain changes around the knee point.

Limiter



A limiter is a compressor that has an infinite ratio, *i.e.* the output level is constant for any input level. It is usually used to prevent the signal peaks from exceeding a certain level, but in reality, this is difficult to achieve without setting the attack and release in the correct way.

Gate



A gate allows a signal to pass when it reaches a certain threshold and can be used to 'clean up' a noisy source, such as a guitar amp. A gate is a special case of an expander with a 1 to infinity ratio.

Setting the Attack & Release

The attack and release controls determine how the output of the envelope detector responds to changes in the input signal and from where on the curve the output gain value is derived.

Setting a long attack and release means that the control signal changes quite slowly and it will represent the average level of the input signal. With a compressor, this would result in an average level control, which increases gain as the average level of the signal falls.

Setting a fast attack means that the control signal reaches the peaks quickly, so that the applied gain can respond quickly to peaks in the signal. This would be used for a fast limiter, that prevents the output signal exceeding a threshold. For a 'brick wall' limiter, the attack should be set to the minimum and the release should be increased until the signal sounds natural.

Setting a fast release means that the control signal responds quickly to a drop in the input level, so that the gain could be increased immediately to compensate. The attack time should be increased until the signal sounds natural.



Setting both attack and release too fast will distort the signal, as the gain applied can change with the waveform of the input signal.

The amount of gain reduction is shown by the meter in the Dynamics element that is placed in the mixer channel (see above). If no change in gain is applied, the indication stays in the centre. If segments on the left are on, then gain reduction is being applied for expansion, to the right means that gain reduction is being applied for compression. The meter calibration is 3dB per segment.



The Dynamics plug-in is very efficient in the amount of DSP resources required so that several can be used as required. The element can be placed in a mixer channel as for any other mixer element. Double click on the mixer element to display the parameter/graphic display window.

The **Attack** and **Release** faders allow you to set the response of the control signal in milliseconds (mS) as required from 0 to 999.9mS for Attack and 1mS to 9999mS for Release.

The **Gain** fader allows the curve to be positioned vertically, changing the output level by up to +/-36dB.

There are 10 faders for setting thresholds and ratios for a Gate, an Expander, three separate Compressor functions, and a Limiter. These allow the curve to

be edited, which determines the transfer function between input and output levels. Depending upon the number of functions enabled, any curve shape can be defined, including 'soft and 'hard' knee compressors and expanders, gates and limiters, or any combination of these.

To enable or disable the controls for each function, click on the function name at the top of each section. The faders for that section will be activated.

The **Threshold** fader for each function can be set from 0dB to -60dB and determines where the function has effect on the signal.

The **Ratio** fader for each function sets the gradient of the line (below the threshold for the Expander and above the thresholds for the 3 Compressors), from 1:1 to 1:50 (for expansion) or 50:1 (for compression), and so determine the gain that will be applied at the measured control signal level. The measured control signal is indicated as a moving point on the curve, which allows you to see whether the signal is operating at the correct point on the curve.

Note: Remember that the measurement of the input signal depends upon the Attack and Release settings and increasing these will slow down the movement of the point on the curve and reduce the measured level due to the averaging effect.

When you move a threshold fader, it is possible to change the threshold settings that you have made for the other functions, but as long as you do not release the mouse button, you can return the threshold to its original position and the other threshold settings will be restored.

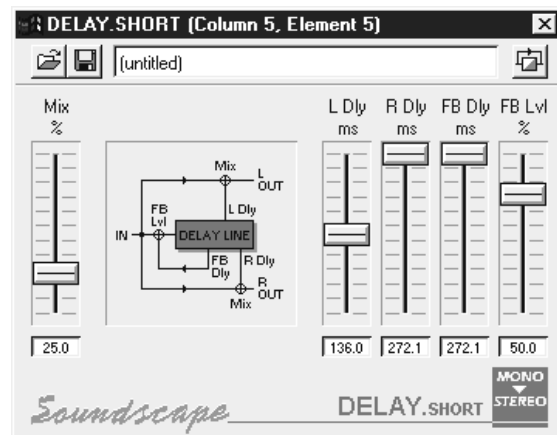
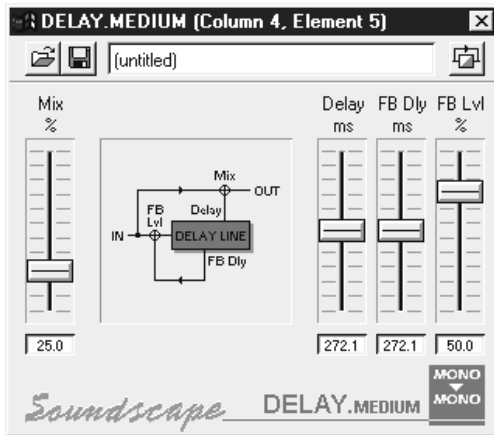
Moving any threshold fader with the right mouse button, will move all other threshold faders too, but will maintain the dB relationship between the faders. This allow the curve to be moved left and right, so that it is easy to position it at the desired 'working' point for the control signal that is being shown on the curve.

For the Gate, when the control signal is below the threshold, the output signal is switched off and when above the threshold the output signal is turned on

As for the other plug-in effects, you can open and save the Dynamics settings to a file on the PC, using the buttons at the top left of the Dynamics window.

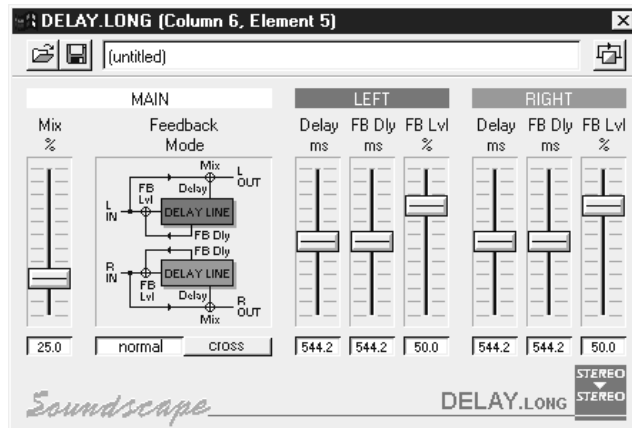
Delay Plug-in - 2-Tap

The Delay plug-in provides a 2-Tap mono, 2-Tap mono to stereo or a 2-Tap stereo delay with selectable cross linking between Left and Right channels.



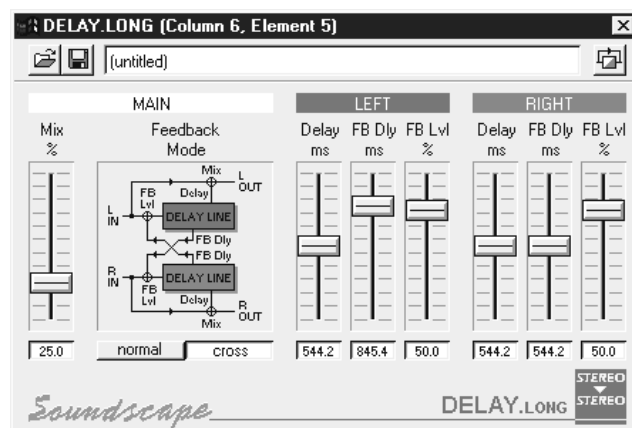
You can select Long, Medium or Short delay times for each type of Delay element. The delay time affects the amount of DSP memory that the plug-in requires, so it is best to select the element that best suits the delay time that you need.

- Long - up to 1088.4mS
- Medium - up to 544.2mS
- Short - up to 272.1 mS



Stereo Delay - Cross link

Clicking on the **Cross link** button for the stereo delay has the effect of connecting the feedback signal from the left delay line into the input of the right delay line and vice versa as shown below. This will give classic panning delay effects.



As for the other plug-in effects, you can open and save the Delay settings to a file on the PC, using the buttons at the top left of the Delay window.