

V2 Mixer “X” or “Q”

Version 2 software has a full digital mixer which uses the powerful Motorola 56301 DSP chip (Digital Signal Processor) on the SSAC-1 Accelerator Card installed in your unit. The mixer has a completely user-definable channel structure and routing and it allows real-time ‘plug-in’ effects and EQs to be used. You can easily create and save your own mixes and the entire configuration of the mixer plus all of the parameter settings are saved in the mixer file, so it is truly ‘total recall’.

Each channel can have any number of real-time processes running (e.g. EQ, compressor, reverb etc.) limited only by the available DSP processing power. In fact, you can have as many mixing channels as you need (up to 48 approx.), and there are 16 internal busses (per unit) to send signals to internal real-time effects, with 99 selectable fader and solo groups. You can also use any of the 10 inputs and 12 outputs of the system as sends/returns to external effects units, while mixing tracks from your arrangement.

Note: The mixer is completely separate to the arrangement of audio Parts in the arrange window and so initially, without first loading a mixer file and entering the V2 mixer password, you will not hear any audio.

V2 Mixer Password

You will need to enter a V2 Mixer password in the **Options menu** before use of the mixer is activated. The individual password for your system can be obtained from Soundscape Digital Technology or from your local distributor and is free of charge for users who purchased their system prior to 1997 and have upgraded with the SSAC-1. Users who have upgraded from the SSHDR1-FS system should be issued a password with the SSAC-1, as it is included in the cost of the upgrade.

Loading and Saving Mixer Configurations



Under the **File menu** you will find **New Mix**, **Open Mix**, **Save Mix** and **Save Mix As**. Mixer files can be saved to the PC or to the SDisk, and can be opened from the SDisk by double-clicking on an SFile that is identified with a mixer icon.

Mixers are currently not loaded automatically when you load an arrangement, so for easy identification, you should use a similar name to the arrangement when saving the mixer file.

Select **Open Mix** and load ‘mix1.MIX’ from the Mix folder.

This 12 track example mixer is set to mix all tracks to SSHDR1 outputs 3/4, so connect a stereo lead from outputs 3/4 to your amplifier, powered monitors or to a stereo input on your mixing console.

Mixer Concepts

The key to understanding the mixer is simple: "you can have virtually any type of mixer that you want" provided that you do not exceed available DSP processing power. The number of channels, EQs, sends or return channels, peakmeters or faders and their positions in the mixer are completely user-defined. In fact, every part of the mixer is a plug-in element, just like a plug-in DSP effects algorithm. The only parameters that are fixed are that there are 16 internal audio busses per SSAC-1 (*i.e.* per unit) and there are a maximum of 10 inputs and 12 outputs per unit.

Virtual Mixer Channels and DSP Processing Power

The mixer can have 'virtual' channels or elements that are muted (*i.e.* turned off) and unlike a fixed digital mixer, in Soundscape these do not consume processing power from the DSP. This means that you can construct a mixer with duplicated channels having different parameter settings, for easy A/B comparison. Or, you can have one that has far more processing requirement than the DSP(s) can provide, but with just the elements that you need activated. This way, if you need to use more effects than available DSP power allows, you can adjust an effect in real time, record the output to a new track, or use the **Mixdown** tool and then mute the real-time effect to save processing power for other channels.

Note: Pressing the BP button (Bypass) for an element does not reduce the DSP processing power, as the element is still instantly available. Only muting the element with the Mute tool will reduce the DSP power used.

Each element consumes a certain percentage of DSP resources and the overall percentage for processing (P) and memory (M) is shown in the caption bar at the top of the mixer page. For example, a single channel is around (P)1.1% (M)1.4%, the 2 band mono EQ is (P)2.5% (M)1.1%, a mono peakmeter is (P)0.3% (M)0.3% etc. More complicated effects take more DSP power, so for example, the mono Chorus/Flanger from the Audio Toolbox plug-in takes (P)5.6% (M)2.1%. If you mute an element, you will see a reduction in the processing power used, as long as there is no 'masking' taking place, as described below.

The DSP processing power that is shown as being used for each element is the percentage of the DSP resources used by the worst case parameter for the algorithm. In reality, there are several parameters that are important to the DSP, like processing time, program and memory requirement etc. This means that if two different elements are combined, the overall DSP percentage required may be less than just adding the percentage for each (*i.e.* one element may need more memory and the other may take more processing

time, but with less memory used). One algorithm is then 'masking' the power requirement for the other.

With multiple units, the total percentage shown is for the individual DSP that is most utilised, and there may be much more power still available from the other DSP(s).

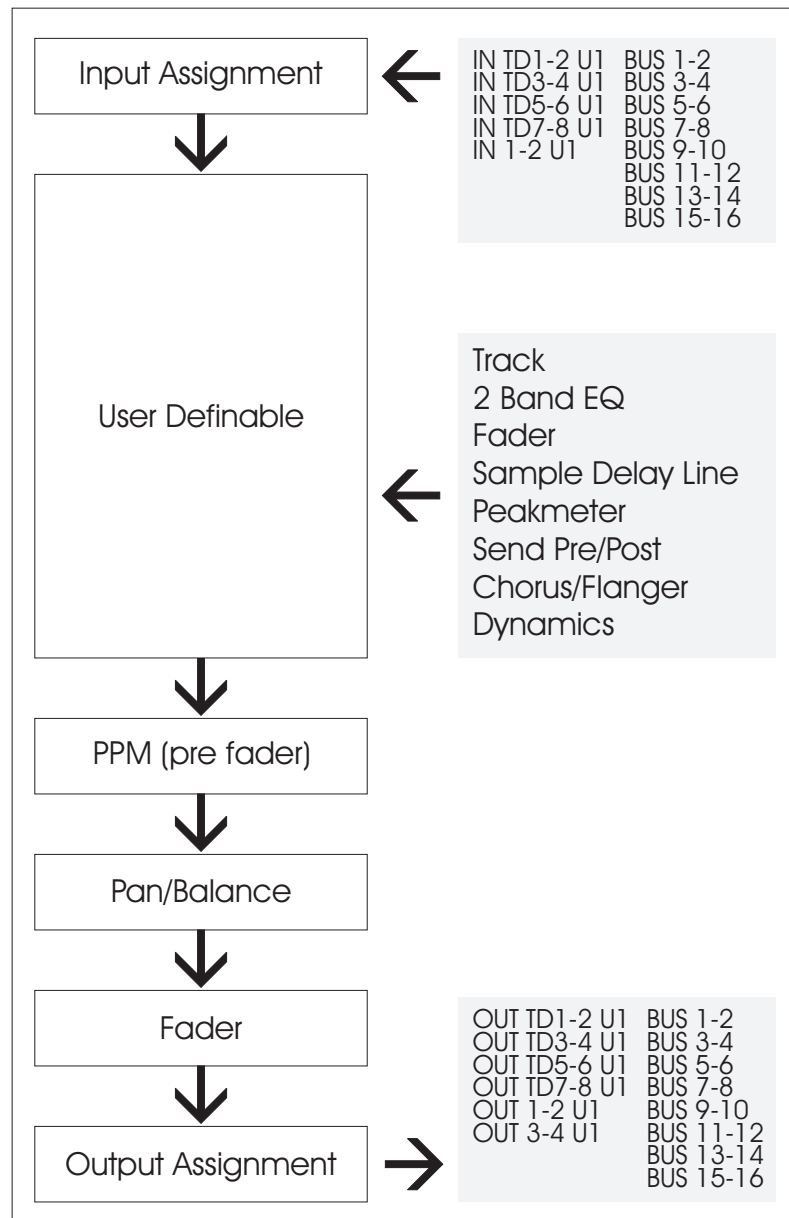
Basic Hierarchy

This diagram simply shows how a signal moves through a basic stereo input channel. The input for a channel can start as either a signal via the TDIF, analogue or AES/EBU or S/PDIF digital inputs, or it can be internally sent from another mixer channel on one of the sixteen 'busses' from the

channel's output or from an inserted send. Once the signal is in the channel, it can be mixed with a track output, equalized, level adjusted, peak monitored, delayed, sent to another channel or output and processed by one of the available 'plug-ins'. The fixed PPM meters are pre-fader so they will show a signal even if the fader is all the way down or if the channel output is muted. Any changes in level as a result of an inserted fader or EQ will be shown by the fixed PPMs.

Viewing the Mixer

You can view a **Full** size mixer by pressing '**X**' on your keyboard or a **Small** mixer by pressing '**Q**'. Both can also be selected under the **View** menu.



Soundscape

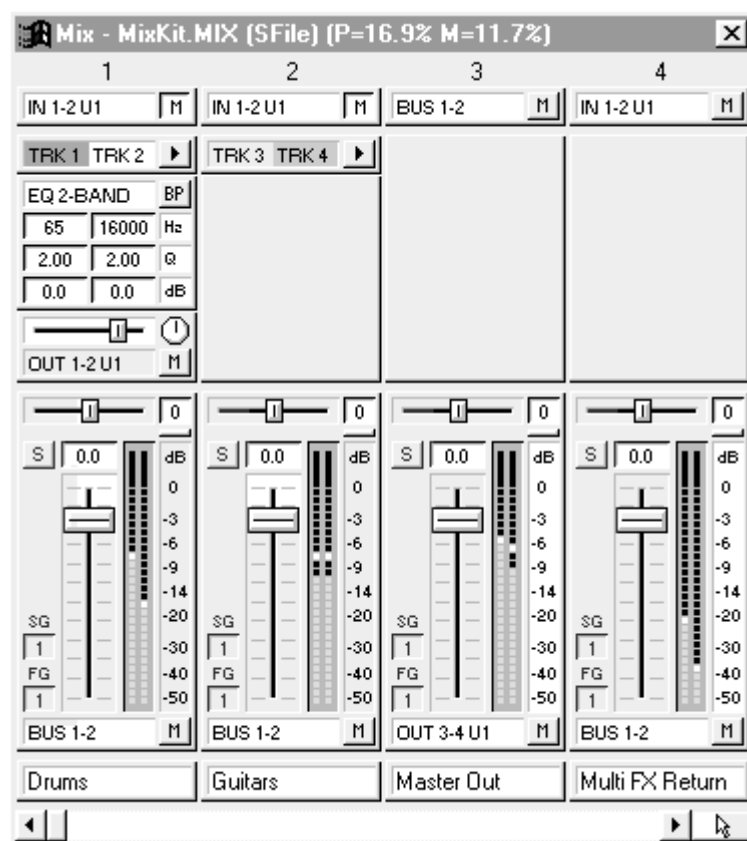
With 800x600 screen resolution, Full view allows 8 channels to be viewed and with Small view this is increased to 13 channels. When using Small view, there may be some parameters of the elements that cannot be viewed or adjusted until you double-click on the element to display a pop-up window for that element. Press the key used to open the mixer again to close the mixer window.

Note: *Once a mixer is opened, it will continue working even if you close the window.*

Most of the elements have some kind of pop-up window, especially the plug-in effects, which have more parameters than can be displayed in the mixer channel and usually will have graphic displays. The effects and EQs also have functions for saving and loading presets from the PC.

The mixer has 128 columns and the scroll bar at the bottom of the mixer allows you to view these. There is also a selection for having the mixer 'always on top' in the **Settings** menu.

The mixer below is a basic mixer with two stereo channels bussed to a master channel and an FX return also bussed to the master channel.



You will notice that only column 1 has an EQ and send assigned to it. This is an example of putting power where it is needed. The restrictions of a standard mixing desk have been put into the past. If you want to send an EQ'd signal to an FX unit... drop an EQ in before the send. If you want a normal signal sent to the FX unit but want an EQ'd version sent to your master outs... drop an EQ in

after the send. The flexibility of being able to configure and store/recall mixers creates an entirely new way of working with digital audio.

Standard Mixer Controls

A mixer channel has several standard controls and buttons:-

M	-	Mute button for Input or Output of a channel
S	-	Solo for the channel
Pan/Balance		Pan for mono-stereo channels, Balance for stereo channels
C	-	Centre for pan/balance control
Fader	-	Output volume for the channel
Meter	-	Mono/stereo pre-fader peak meter
BP	-	Bypass
SG	-	Solo Group (1 - 99)
FG	-	Fader Group (1 - 99)

Note: Mono in - mono out channels do not have a pan control.

Fader and Solo Groups

There are 99 **Fader Groups** and 99 **Solo Groups**, which can be selected for each mixer channel by clicking with the left or right mouse buttons on the **FG** or **SG** values to the left of each fader (they can only be viewed or set when the Full mixer view is selected). Double clicking on the values allows them to be entered numerically into a dialogue box.

Different Fader and Solo Groups would be used when you want to change the levels of some of the mixer channels simultaneously, or for example so that a 'master' fader channel is not also muted when you solo one of the other channels (select a different Solo Group for the 'master').

Fader Groups

Using the left mouse button just moves the fader that you click on, but using the right mouse button moves all faders which have the same Fader Group value. Moving the group maintains the same relative dB positions between the faders until any faders reach the maximum or minimum levels. If you move the group back without releasing the mouse, then the dB relationship will be unchanged.

Clicking on the Mute button for the output of a mixer channel with the left mouse button just changes the mute status for that channel. Using the right mouse button toggles the mute status for all channels which have the same Fader Group value.

Solo Groups

Using the left mouse button solos the channel that that you click on, muting all other channels that have the same Solo Group value. The Solo button for the active channel turns red and all other channels from that Solo Group that are muted are indicated with a red 'S' on their Solo buttons.

Clicking with the right mouse button on a channel Solo button, solos all channels that have the same Fader Group value and mutes channels from all other Fader Groups. Active channels are indicated with a red Solo button.

Naming Mixer Channels

Mixer channels can be named by double clicking on the box just below the channel fader (exit **Edit mode** first).

Track and Input/Output Identification

The TDIF (Tascam Digital Interface) port on the SSAC-1 provides 8 inputs and outputs and for the first unit, they are named **IN TD1-8 U1** and **OUT TD1-8 U1**. The main SSHDR1 hardware provides 2 inputs and 4 outputs and these are named **IN 1-2 U1** and **OUT 1-4 U1** for the first unit. Identifications for other units are shown below:-

Unit 1			Unit 2		
	<i>Inputs</i>	<i>Outputs</i>		<i>Inputs</i>	<i>Outputs</i>
TDIF	IN TD1 U1	OUT TD1 U1	TDIF	IN TD1 U2	OUT TD1 U2
	IN TD2 U1	OUT TD2 U1		IN TD2 U2	OUT TD2 U2
	IN TD3 U1	OUT TD3 U1		IN TD3 U2	OUT TD3 U2
	IN TD4 U1	OUT TD4 U1		IN TD4 U2	OUT TD4 U2
	IN TD5 U1	OUT TD5 U1		IN TD5 U2	OUT TD5 U2
	IN TD6 U1	OUT TD6 U1		IN TD6 U2	OUT TD6 U2
	IN TD7 U1	OUT TD7 U1		IN TD7 U2	OUT TD7 U2
	IN TD8 U1	OUT TD8 U1		IN TD8 U2	OUT TD8 U2
	IN 1 U1	OUT 1 U1		IN 1 U2	OUT 1 U2
	IN 2 U1	OUT 2 U1		IN 2 U2	OUT 2 U2
		OUT 3 U1			OUT 3 U2
		OUT 4 U1			OUT 4 U2







Soundscape

Unit 3			Unit 4		
	<i>Inputs</i>	<i>Outputs</i>		<i>Inputs</i>	<i>Outputs</i>
TDIF	IN TD1 U3	OUT TD1 U3	TDIF	IN TD1 U4	OUT TD1 U4
	IN TD2 U3	OUT TD2 U3		IN TD2 U4	OUT TD2 U4
	IN TD3 U3	OUT TD3 U3		IN TD3 U4	OUT TD3 U4
	IN TD4 U3	OUT TD4 U3		IN TD4 U4	OUT TD4 U4
	IN TD5 U3	OUT TD5 U3		IN TD5 U4	OUT TD5 U4
	IN TD6 U3	OUT TD6 U3		IN TD6 U4	OUT TD6 U4
	IN TD7 U3	OUT TD7 U3		IN TD7 U4	OUT TD7 U4
	IN TD8 U3	OUT TD8 U3		IN TD8 U4	OUT TD8 U4
	IN 1 U3	OUT 1 U3		IN 1 U4	OUT 1 U4
	IN 2 U3	OUT 2 U3		IN 2 U4	OUT 2 U4
		OUT 3 U3			OUT 3 U4
		OUT 4 U3			OUT 4 U4

Creating/Editing a Mixer

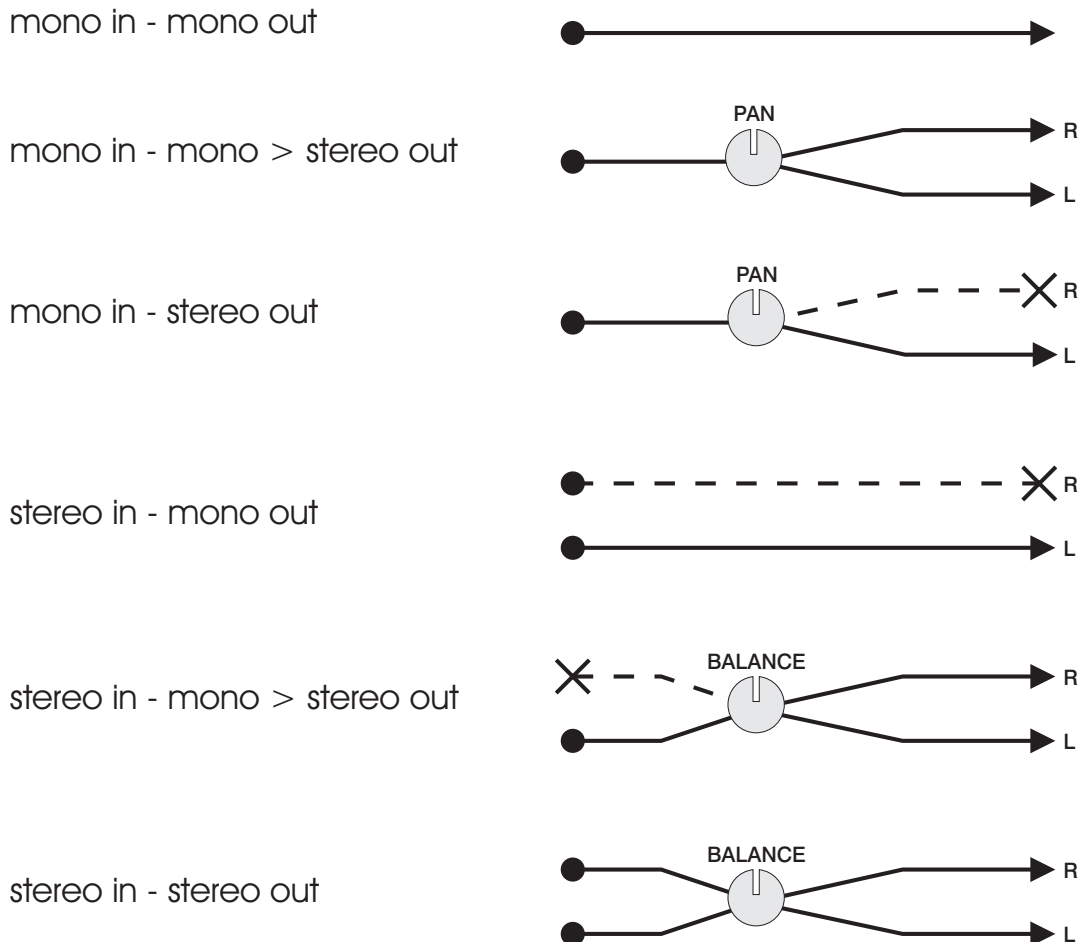
To create a mixer, first select **New Mix** from the **File menu** and you will see a completely blank mixer page, with an **EDIT button** at the bottom right (you can also edit previously created mixer files). Click on the **edit button** (or press 'E' on the keyboard) to allow the mixer to be edited. It's always quicker to understand the mixer if you have a specific routing/mixing configuration that you need to use and you set out to create it.

Six tools are currently active for mixer editing:-

-  Create Tool - Used for adding new mixer channels or elements
-  Loudspeaker Tool - Used for modifying elements or routing
-  Mute Tool - Used for muting elements or complete channels
-  Move Tool - Used for moving elements or complete channels
-  Delete Tool - Used to delete elements or complete channels
-  Info Tool - Used to display information about mixer elements

Placing a New Mixer Channel

Select the **Record** tool and click anywhere in the mixer page to place a new channel. If you have two or more units in your system, you have to choose the unit (*i.e.* the DSP) that the mixer channel will be assigned to. Six types of Mixer channel elements are currently available, all with pre-fader metering (one meter where the channel has a mono signal path, and two meters where it is stereo). You can also select EPP (Equal Power Panning) mode for the outputs :-



The **mono in - mono out** and **stereo in - stereo out** channels are simple to understand, but for the other cases, there are some rules that the system uses.

For **mono in - mono to stereo out**, the signal is split into stereo at the pan control and the signal path through the channel is mono.

For **mono in - stereo out**, the input is mono, but the channel is actually stereo (there are two meters). This type of channel would be used when you want to use a stereo effect on a mono source (e.g. a mono to stereo chorus or reverb). In fact, if you use this channel element without a mono to stereo process inserted in the channel, then the right signal path will not be connected at the channel output.

For **stereo in - mono out**, only the left side of the stereo input will be connected through the channel.

For **stereo in - mono to stereo out**, only the left side of the stereo input is connected through the channel, but it splits into stereo at the pan control.

The channel has input(s) and output(s) and these can be set to use 10 external ins and 12 outs or the 16 internal busses. Select the loudspeaker tool (modifies routing when in EDIT mode) and click on the input or output label to see a menu of possible routing options.

IN TD1-2 U1	BUS 1-2
IN TD3-4 U1	BUS 3-4
IN TD5-6 U1	BUS 5-6
IN TD7-8 U1	BUS 7-8
<input checked="" type="checkbox"/> IN 1-2 U1	BUS 9-10
	BUS 11-12
	BUS 13-14
	BUS 15-16

► Stereo input assignment

OUT TD1-2 U1	BUS 1-2
OUT TD3-4 U1	BUS 3-4
OUT TD5-6 U1	BUS 5-6
OUT TD7-8 U1	BUS 7-8
OUT 1-2 U1	BUS 9-10
<input checked="" type="checkbox"/> OUT 3-4 U1	BUS 11-12
	BUS 13-14
	BUS 15-16

► Stereo output assignment

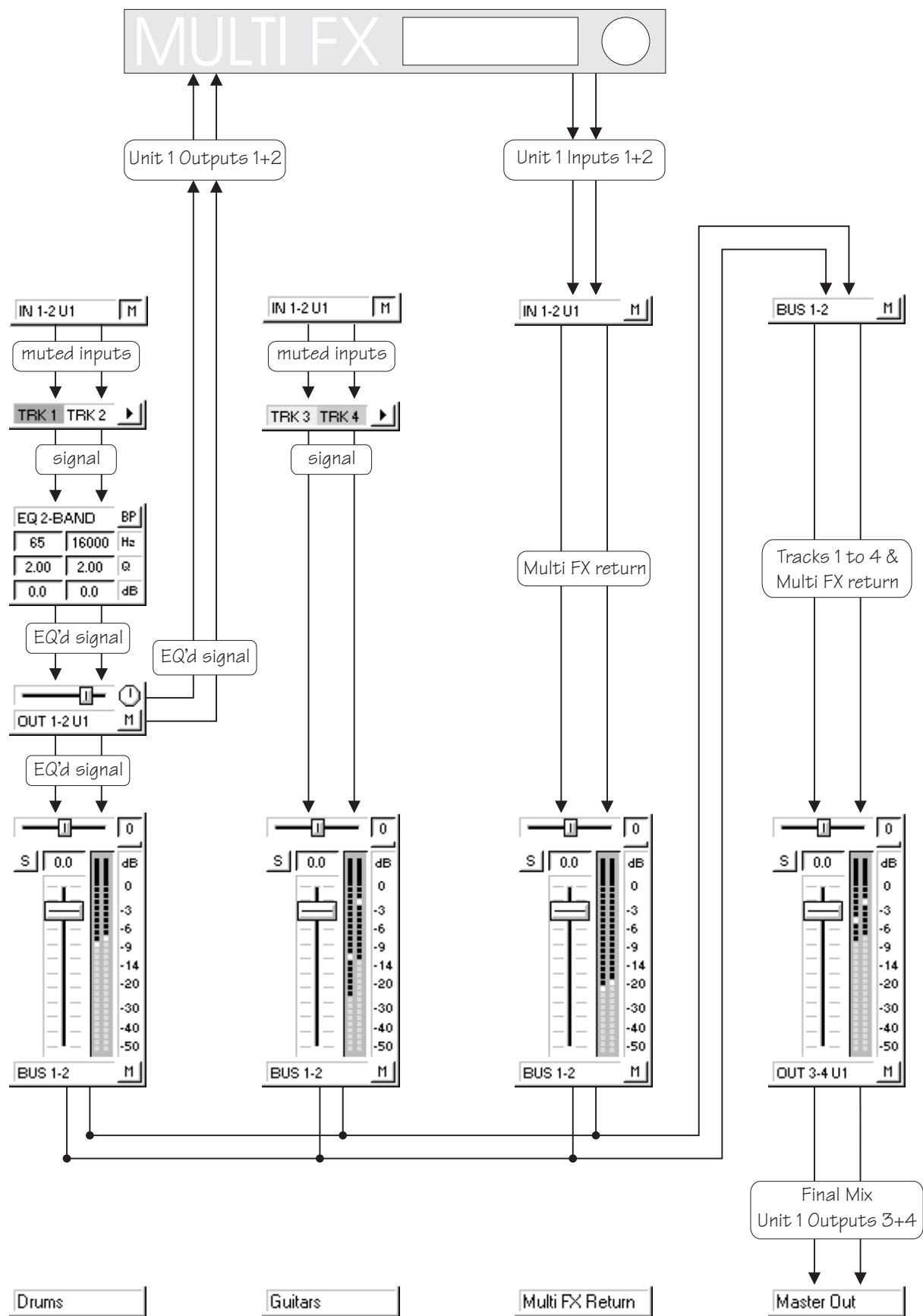
There is no restriction in how you use the inputs, outputs or busses, and every signal routed to an output or bus is mixed in equal proportion (after the output or send fader). For instance, you could have 10 channels with IN 1-2 U1 (or Bus 1&2) as the input, and Bus 3&4 as the output routing. You could then use different EQ settings to split the signal, process it with different effects (e.g. for a multiband compressor) and recombine the signals at Bus 3&4. You are even able to select the same bus as the input and output of a channel, but be careful as you can have digital feedback this way !

Take care when you mix several channels directly to external outputs, as with the pre-fader metering, it is not possible to view the output signal in order to check if the level overloads. It's best to route the channel outputs to a stereo bus and then place an additional channel that has the stereo bus as the input and the channel output routed to two of the outputs. This way the metering for the mixed signal on the bus is shown and you also have a master fader.

Understanding the Signal Path

The diagram on the opposite page shows an exploded view of how routing works in the mixer. Column 1 (Drums) has it's inputs muted so the signal starts with recorded **Tracks 1+2**. The signal is then EQ'd before it is sent to physical outputs 1+2 of Unit 1 (**OUT 1-2 U1**) for external processing by the Multi FX. The EQ'd signal carries on through the peak meters and the fader. The signal is then sent out to **BUS 1-2** where it is combined with **Tracks 3+4** as well as the processed return from the external Multi FX. As the Master Out column has **BUS 1-2** as it's inputs, all the signals arrive mixed and the fader becomes the master level. The signal is then routed to outputs 3+4 of Unit 1 (**OUT 3-4 U1**). As the Multi FX outputs are hooked up to Unit 1's inputs, unmuting column 1's inputs could cause a feedback loop. Unmuting column 2's inputs would mix the returns from the Multi FX with Tracks 3+4 and would double level of the signal from the Multi FX.

Soundscape

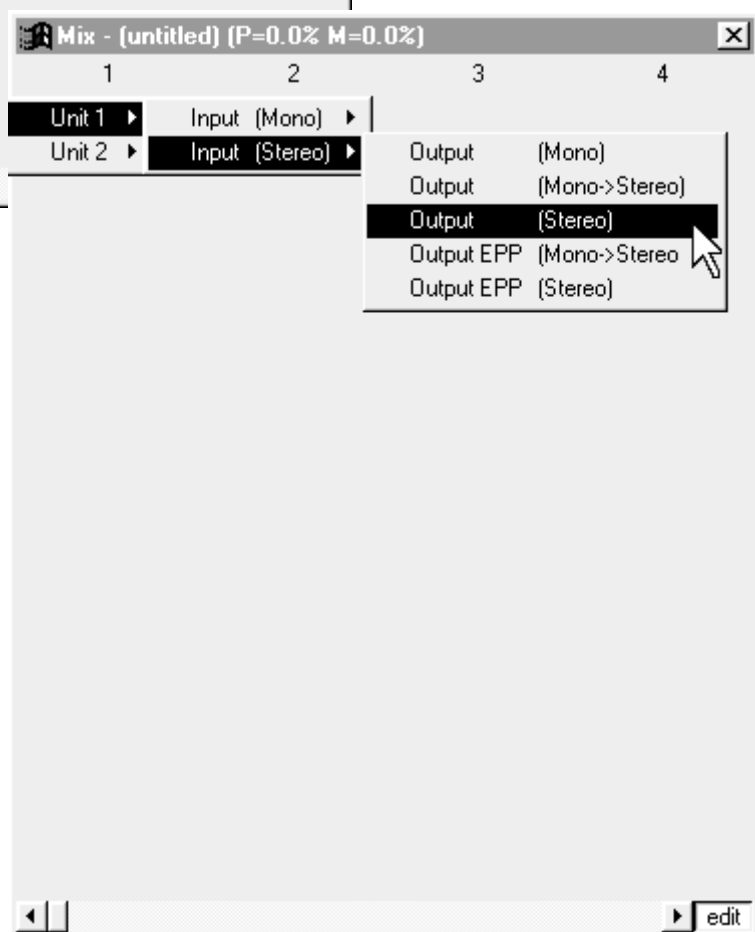


Step by Step Mixer Channel

- 1 Under the **File** menu select **New Mix**. You will get a completely blank mixer in **EDIT** mode as pictured below:-

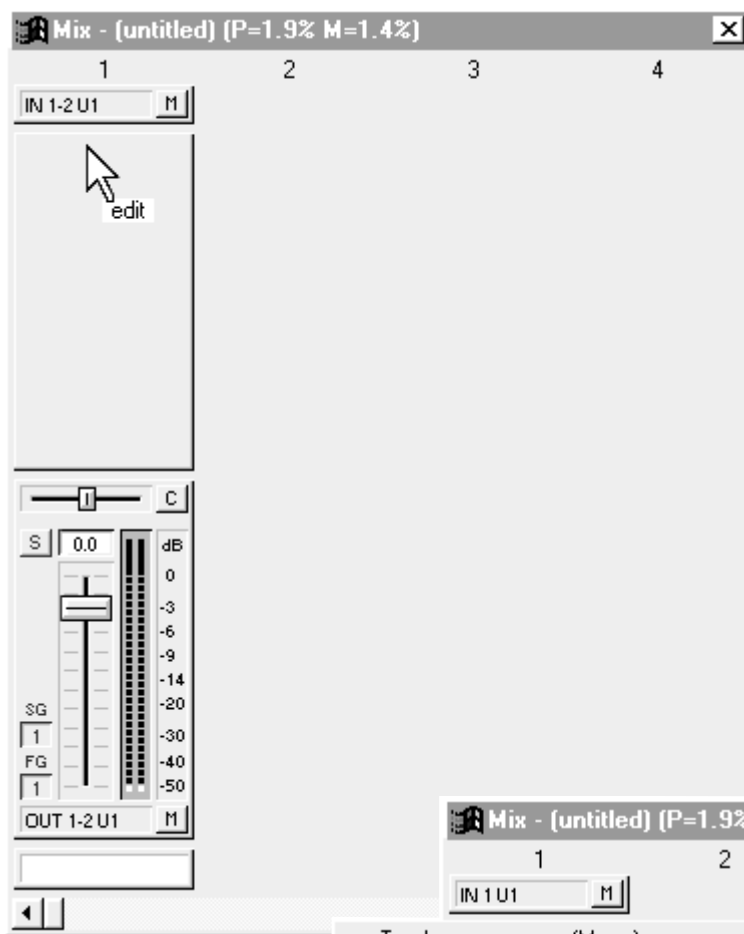


- 2 Using the Record tool, click on a column and select the type of channel you require. We have opted for Stereo Input - Stereo Output on Unit 1. The **EPP** options select **Equal Power Panning** channels, so as the pan control is moved to one side, the level for that side gradually increases by up to 3dB to compensate for the overall loss of power from the other side.

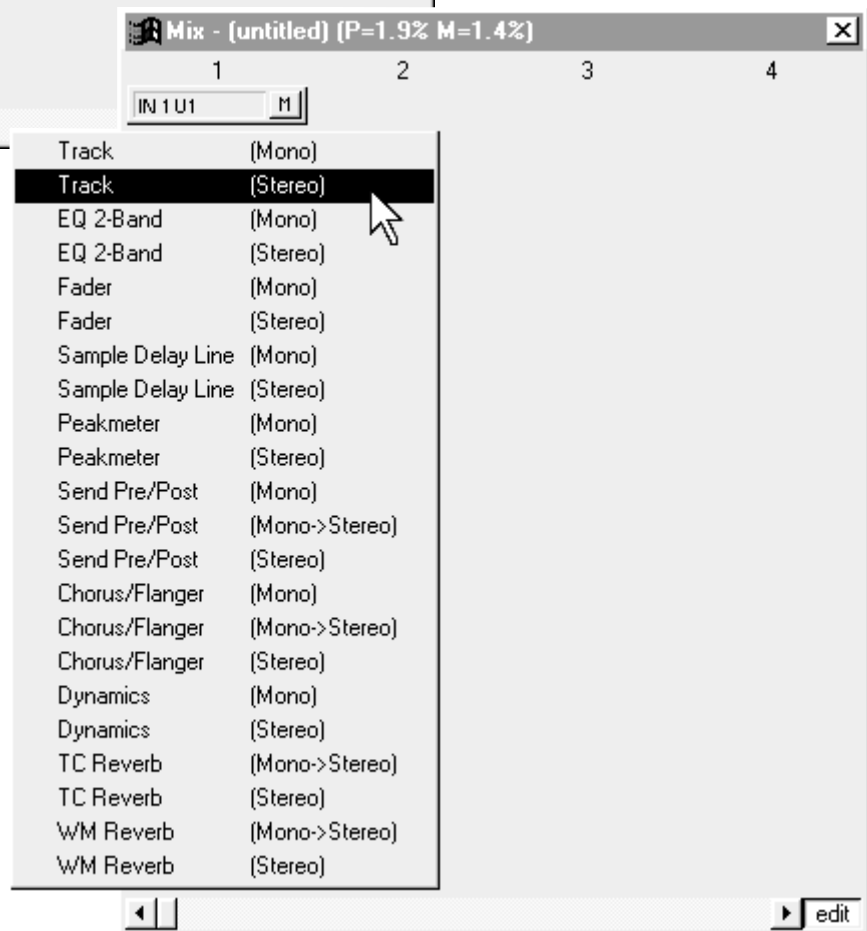


Soundscape

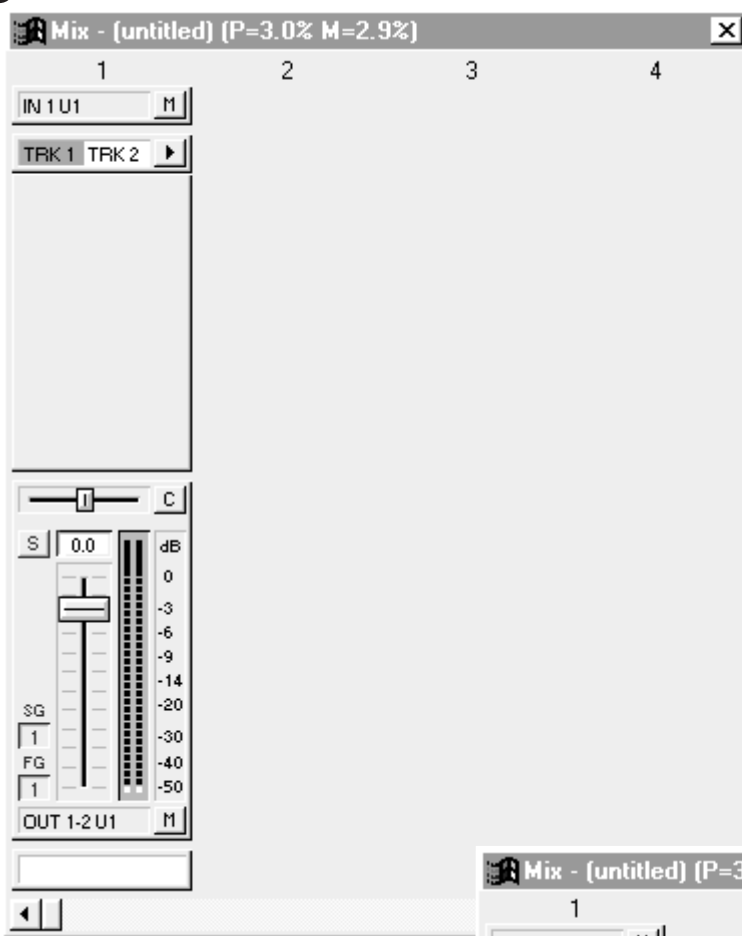
- 3 A standard mixing channel will appear with the default inputs and outputs, a pan/balance slider, pre fade peak meters and a channel fader. There is also a blank space at the bottom of the column to name the channel.



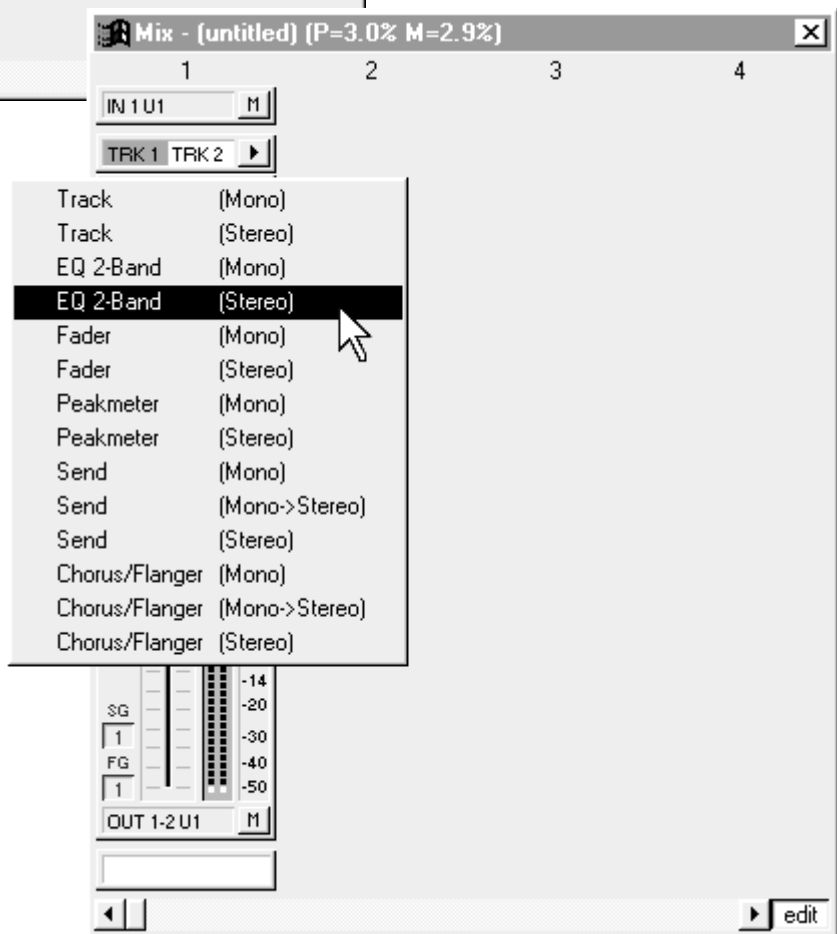
- 4 Click anywhere within the blank area of the channel. You will see the drop down menu for selecting the mixer elements. Selecting a stereo track will insert the next available tracks.



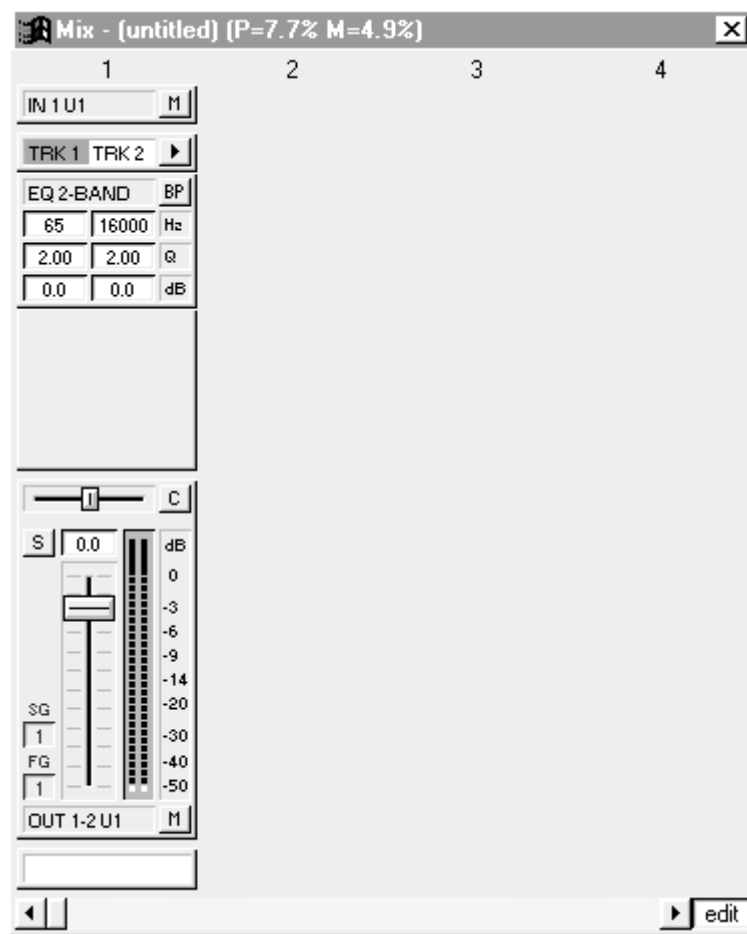
- 5 As there are no tracks already selected, it will default to tracks 1 + 2.



- 6 Next, click under the tracks and select EQ 2-Band Stereo.

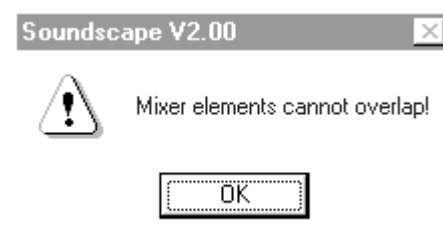


- 7 The EQ module will now be displayed under the assigned tracks. While you are in EDIT mode it is possible to move the modules using the **Move tool**. It is also possible to move the entire channel to another column.



Placing Mixer Elements in the Mixer Channel

Click with the **Create tool** in the mixer channel to display a menu of available mixer elements. Select the one that you need and it will be placed at the mouse position in the channel. To change the settings, you must first exit **EDIT** mode by pressing the **'E' key** or clicking on the **EDIT button**. You cannot overlap mixer elements, so if you do not have enough room in the channel to place an element, try increasing the vertical size of the mixer window first.



Signal Routing in the Mixer Channel

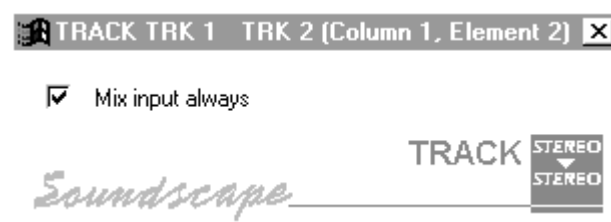
The signal routing is always from the top to the bottom of a channel, so for instance, if you place a **Track insert** below an EQ, this is the position at which audio will be recorded or played back (*i.e.* EQ will be recorded to disk).

Track Inserts

You can place **Track inserts** anywhere in a channel and you can place more than one Track insert for the same track, so that with the **Mute tool** (in Edit mode), you can easily change the insert point for playback or recording, by selecting which one is active.

Track Insert - Options

When you have placed a Track insert, there are two options for determining the mixing or routing between the track playback and the channel input signal. The options can be set by double clicking on the Track insert element (exit Edit mode first) to pop up a dialogue box.



The default setting allows the input signal for the channel to be monitored at the channel output only when a track is armed for recording, but only when playback is stopped.

If punch-in on the left locator is selected and you press record, while the play locator is before the left locator (where actual recording will start), you will hear the track output, but not the input signal. At the left locator, where recording starts, the input signal will be switched through, so you hear what is now being recorded. For normal recording, you will hear the input when record is pressed.

The second option is that the channel input signal is always mixed with the track output and so you can always hear the input. In this mode you have to remember to mute the input when mixing your recorded tracks, as otherwise, any noise at the inputs from external signals will be included in the mix. If you place several track inserts on the same channel, you should select this option, so that all tracks are mixed together.

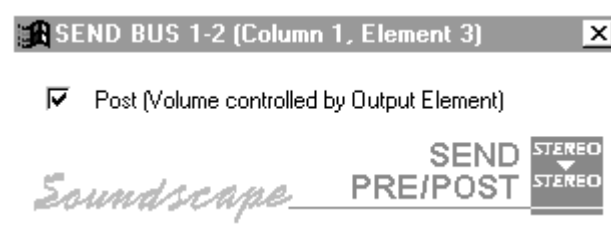
In both cases, when recording is armed and you have pressed the Record button, the track insert element shows a black record ready indicator which changes to red when the recording starts. In play mode, the track insert shows the black triangular 'play' symbol.

Using the 16 Internal Busses

The mixer has 16 internal digital busses per DSP (*i.e.* for each unit's SSAC-1 card). These can be used to distribute or group signals that are to be sent to an internal effects process or a master fader. Any channel output or send element can be routed to a bus and the input for a channel can also be a bus instead of an external input. A bus can be assigned for the input signal for as many channels as you need, allowing easy signal distribution in the mixer.

Send Elements

The Send element allows a signal to be sent to external outputs or to the busses. Double-click on the send element to select whether the send level is pre-fader or post-fader.



Pre-fader sends are independent of the output fader setting, but post-fader sends apply the same output fader gain/attenuation to the send level (after the send fader). Send elements can be mono, mono to stereo or stereo, the mono to stereo send having a pan control and the stereo send having a balance control.

More than one send can be placed per mixer channel, for instance, if you need to route some of the signal to two different effects.

To use the Sends as auxiliary sends/returns to external effects units, set the routing (using the Loudspeaker tool) to use the external outputs. Then place a new mixer channel for the return signal, with the input routed to the external inputs. If you want to use internal DSP effects, then route the Send to a bus, and place a new mixer channel with the bus as the input and the place the required DSP effect in the channel.

Equalisers - EQ

EQ 2-BAND	BP	
200	8000	Hz
0.50	2.00	Q
-9.0	9.0	dB

The EQ's are fully parametric, allowing bandpass or notch filters with variable Q (bandwidth), cut and boost and centre frequency. You can place as many EQ's as you need in a mixer channel and all will be active simultaneously (assuming that there is enough DSP power).

If you are interested in the technical definition of Q, it comes from the parameter that is used to specify the Quality Factor (Q) of an inductor (coil), that in a passive filter determines how selective (narrow) the filter is. High Q,

means high quality and therefore a narrow filter. The Q factor value is arrived at by dividing the centre frequency by the bandwidth of the filter.

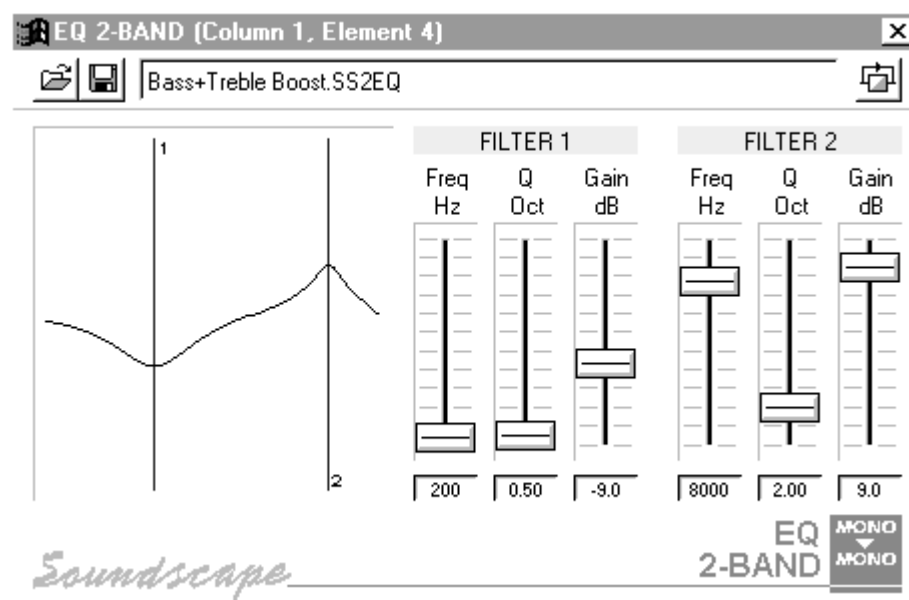
If you are used to using 'octaves' instead of Q for setting an EQ, then as the 'octave' value is the bandwidth of the filter compared to the centre frequency, then 2 octaves means that the bandwidth is twice the centre frequency and hence it has a Q of 0.5.

The EQs can be adjusted in real-time by clicking (and holding) with the left or right mouse buttons on the EQ parameters in the mixer channel. If you hold down both mouse buttons the EQ parameters can be changed more quickly, the direction of the change is determined by the mouse button pressed first. Double clicking on a parameter pops up a dialogue box where the value can be entered directly.

The Mono 2 Band EQ element has two separate fully parametric sections and for the Stereo 2 Band EQ, there are 4 active EQ's linked for two bands on the left and right channels.

Note: *In the Small view of the mixer it is not possible to view the second EQ band. To view this, change to the Full mixer view (press 'X' on the keyboard).*

Double-click on an EQ element (in the caption bar) to display the EQ pop-up window. The response of the EQ is shown in the curve display and you can use faders to adjust the parameters rapidly.



You can open multiple EQ windows, so for identifying which EQ elements the pop-up window is connected to, the mixer channel and element numbers are shown at the top.

To save the current EQ settings in a file, click on the **Save** button, or select Save from the menu.

Sample Delay Line

The **Sample Delay** element can be used to equalise time delays in the mixer or AD/DA converters (SSHDR1 and SS8IO-1 have different delays, phase and levels) or can be used to provide phase inversion in the signal path.

It can delay a signal from 0 - 255 samples in order to adjust the delay to null a signal due to different levels, phase, frequency spectrum etc... depending on the actual plug-in function. Presently, the **Bypass button** for plug-ins keeps the same overall delay as the active plug-in. This may not be possible with other plug-ins, hence the necessity for the Sample Delay Line. EQs always change the delay but are frequency dependent as in a normal analogue console.



Of course a bit of experimentation with the **Sample Delay Line** will provide for some creative results. If you split a stereo pair into two tracks, you can drop a mono Sample Delay Line on one of the tracks mixer channels and create a wider stereo image by delaying one side of the stereo pair. Phase inverting the delayed signal can also add extra width, but may cause mono cancellation or phasing.

Chorus/ Flanger

The chorus/flanger “plug-in” is only available if you have the Audio Toolbox Option. (See the **Audio Toolbox chapter**)

Dynamics

The dynamics “plug-in” is only available if you have the Audio Toolbox Option. (See the **Audio Toolbox chapter**)

Delay

The delay “plug-in” is only available if you have the Audio Toolbox Option. (See the **Audio Toolbox chapter**)

TC Reverb

The TC Reverb “plug-in” is only available if you have the TC Reverb Option.

WM Reverb

The WM Reverb “plug-in” is only available if you have the WM Reverb Option. (See the **WM Reverb chapter**)