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# MultitrackStudio

Bremmers Audio Design

## Manual

Version 7.1, March 2012

<http://www.multitrackstudio.com>

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<b>Version History</b>		
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1.2	February 2002	New MultitrackStudio 1.2 features added. General improvements.
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# 1 Introduction

## 1.1 Overview

MultitrackStudio is a virtual multitrack studio. You can record and play audio and MIDI tracks, edit them, and mixdown to stereo.

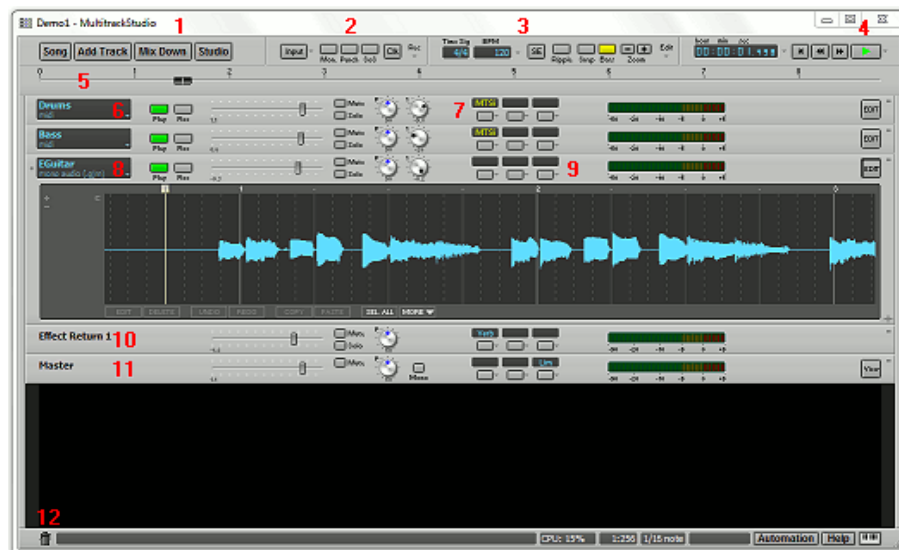
The straightforward and uncluttered user-interface has been designed with tape-based recording in mind. Mixer sections are oriented horizontally (as opposed to the more familiar vertical layout), allowing them to include an editor as well. The editing tools are aimed at correcting mistakes. MIDI tracks have been made to look like audio tracks as much as possible.

The large number of high quality effects and the built-in General MIDI compatible MultitrackStudio Instruments make it possible to do software-only mixing and mastering. All track, mixer and effect settings can be stored in a song file and recalled any time.

Using a songlist you can play a sequence of songs. This way you can preview your CD project without having to mix the individual songs down to stereo files first.

MultitrackStudio features a context-sensitive help system: pressing the F1 key (Windows) / Shift-Command-? (Mac) will show help on the item the mouse points to.

### The main window



MultitrackStudio main window

- |                      |                                       |
|----------------------|---------------------------------------|
| 1. Menu buttons      | 7. Midi Instrument slot               |
| 2. Recording options | 8. Audio track with its editor opened |
| 3. Editing options   | 9. Effect slots                       |
| 4. Start/Stop button | 10. Effect Return section             |
| 5. Overview bar      | 11. Master section                    |
| 6. MIDI track        | 12. Garbage Bin                       |

Tracks (6,8) contain audio or MIDI files. Tracks can be switched to playback or record mode using their Play and Rec buttons. Clicking the transport's Start/Stop button (4) will start recording / playing back all tracks simultaneously. Effects can be loaded in effect slots (9) by clicking the slot's down arrow. MIDI Instruments can be loaded in MIDI Instrument slots (7) in the same way. Tracks and effects etc. can be removed by dragging and dropping them onto the Garbage Bin (12).

The complete setup can be saved as a song using the Song menu (1). The Mix Down menu's 'Mix down to audio file' option can be used to mix the song down to a single audio file.

## 1.2 Quick Start: Recording a Song

*Note: after installing the program you can go to the Studio menu's Devices option to select the audio and MIDI devices you want to use.*

Follow these steps to record a song and make a CD:

### Step 1: Make new Song

Make a new (empty) Song using the Song->New menu option. A new (empty) folder is created automatically.

### Step 2: Add Click Track (optional)

If you're recording a song from scratch you'll probably want to add a Click track (metronome). Use the Clk button at the top of the window to do this. Note that you can tap the tempo on the space bar using the Tap button.

### Step 3: Add audio or MIDI track

Add a Track with an empty audio or MIDI file using the Add Track menu. Use a mono audio file if you're recording a mono source like a microphone.

### Step 4: Record the track

Click the track's Rec button. If you're recording audio you can click the Input button at the top of the window. The Audio Input Control appears, and you can select the input you want to use and/or set the recording level. Now you can start recording by starting the Transport. You will hear the Click Track, which was created in step 2, while recording. Stop the transport when you're done.

*Note: depending on the sound device there may be a dedicated software control panel or hardware knobs to set the recording level. Please refer to the sound device's manual.*

### Step 5: Record more tracks

Add more tracks (using the Add Track menu) and record them (repeat step 3 and 4). You will hear the previously recorded tracks while recording a new one. At this stage it is quite common to add Reverb to vocal tracks using an Effect Return section.

### Step 6: Mix down to master file

Now you can fine-tune the individual track's volume levels and add any effects. If your song sounds fine you can mix it down to a single .wav file using the Mix Down menu's Mix down to audio file option. This new file can be used for burning a CDR.

*Note (Pro Plus edition only): make sure it's a 16 bit stereo file if you want to burn it to CDR. CD burning software typically can't read 24 bit (or higher) files.*

### Step 7: Play back master file (optional)

Use the Mix Down menu's Playback mixed down file option to play back and verify the master file.

### Step 8: Burn CDR

Now you can burn the file recorded in step 6 to a CDR using the software that came with your CD-writer.

## 2 Songs

### 2.1 Songs

MultitrackStudio project files are called "songs". A song file (.hdr file extension) contains all information that is required to reproduce the mix you made. This includes:

- The number of tracks and other mixer sections.
- The position of all their knobs, effects, names of audio/MIDI files etc.
- Sample Rate used
- Mixer enabled/disabled
- Song Comments
- Chords and Lyrics
- Markers

A song file does *not* include any audio or MIDI data, it contains only references to the audio/MIDI files used by the tracks (ie. these audio/MIDI files are needed in order to play back the song). All filenames that are stored in the song file have a relative path whenever possible. This way projects can easily be moved to other drives or folders.

*Note: The devices used for playing audio and MIDI are NOT part of the song file. This way songs can be used on any computer.*

*Mac note: Finder will show the song files as Radiance files. If you want to be able to open songs by double-clicking you can Ctrl-click a song, choose Get Info and change the "Open with" field to MultitrackStudio.*

The currently opened song is shown in the main window's title bar. '(R)' indicates the file is opened as read only.

#### The Song menu

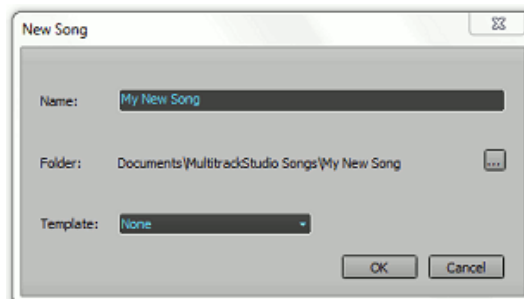
The Song menu contains the following options (note that some options are described in other chapters):

- **New:** In the New Song window you can type the name of the new song. It will be placed in a folder having the same name automatically unless you browse for a folder yourself.

The **Template** box (*Pro Plus edition only*) lets you apply a template. New templates can be created using the Template box as well: the **Create new template...** option creates a template based on the current song. Templates include almost everything related to the song, except for the audio and MIDI data in the tracks. New songs will have empty audio/MIDI files.

There's a special "**Identical to current**" template which creates a new song identical to the current one. This can be convenient for live multitrack recording.

- **Open:** Open a song file.
- **Save:** Save the song file and all MIDI files and edited audio files (.aem files) opened in tracks.
- **Rename:** Rename the song.
- **Close:** Close the song.
- **Comments:** Read or write text which is stored in the song file. You can use this to document the project.



*New Song window (Pro Plus edition)*

#### Export tools

The Song menu offers two tools to export tracks "Export MIDI Tracks" and "Export tracks as audio files".

#### Export MIDI Tracks

This tool merges any combination of the currently loaded MIDI tracks in a single MIDI file. It's intended for moving your MIDI tracks to third party notation software. The current versions of the tracks are used (ie. the MIDI files are not read from disk), so you can temporarily edit MIDI channels, or quantize tracks if necessary.

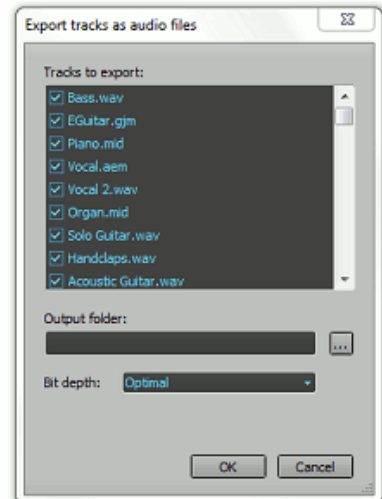
## Export tracks as audio files

*Note: this feature is available in the Pro Plus edition only.*

This tool exports the tracks as audio files. You can use this if you're going to have your tracks mixed by someone who doesn't use MultitrackStudio. Audio tracks and MIDI tracks using a software instrument can be exported. Any audio effects in the track effect slots are not included.

Bit Depth can be "Optimal" or "32 bit float". "Optimal" uses the lowest bitdepth that won't cause any loss of quality for each track.

*Note: if a MIDI track has multiple streams only the first stream will be exported. You can click the track's file name box and choose Split Streams to split it into multiple single-stream tracks.*



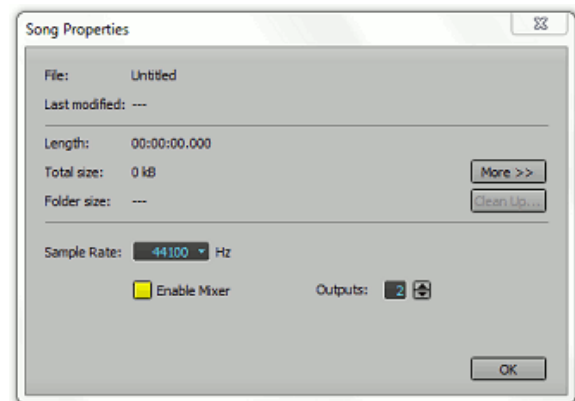
"Export tracks as audio files" window

## 2.2 Song Properties

In the Song Properties window, reached via the Song menu's Properties option, you can change mixer and samplerate settings. It also shows file related information.

The **Sample Rate** box specifies the sample rate to be used for audio recording/playback. Usually the default value (44.1 kHz) will be used, as this is the value used on CDs. The bottom entry of the drop down list lets you make the current value the one to be used for new songs.

The **Enable Mixer** button enables/disables the mixer. Disabling the mixer can be useful if you want to play a single audio file without any processing.



Song Properties window

**Outputs** (Pro Plus edition only) determines the number of audio outputs. This is always an even number, the minimum value is two (stereo), the maximum value is 96. If the value is greater than two all Group and Effect Return sections will have an Output Selector. Note that the Outputs value can exceed the number of outputs the audio device actually has. Any mixer sections using these non-existing outputs will not be heard.

The window also shows some non-editable properties. These include:

- The total playing time of the song
- The total occupied disk space
- The file name, playing length and occupied disk space of each track's file (via the More button)

### Clean up Song Folder

The Clean up Song Folder tool analyzes the folder that contains the current song, and lists all MultitrackStudio related files which are not required to play back a song file. You can delete these files in order to preserve disk space.

*Note: Any alternate or partial takes appearing in a track's file options menu appear in the list, and can be deleted. Once deleted the take will no longer be available.*

*Note: song version files (.hdrversion) and any tracks used by the versions appear in the list as well. If you delete audio files used by a version this version will no longer play back correctly.*

## 2.3 Song Versions

Versions of the song can be created, and reverted to, later. These versions include the song file and the MIDI and .aem files opened in the tracks.

Typical applications of versions include:

- Create a version before making major changes to the song, so you can revert to the old version if it's not such a good idea after all.
- Try different mixes and store as versions. Note that you can not only change mixer settings, but edit audio and MIDI tracks as well.
- Create a version of any mixes you send to someone, just in case they later feel the old one was better.

### Create Version

The Song menu's Create Version option pops up the Create Version dialog which lets you type a name for the version to be created. If there are modifications in the song which haven't been saved yet you can choose whether you want to include the modifications in the version or not. This can come in handy if you open a song and start tweaking the mix: if you think you're onto something good you can still create a version of the song as it was when you opened it, just in case the new mix appears to be not so good after all.

### Revert to Version

The Song menu's Revert to Version item lists all available versions. Tooltips show information about the versions, like the date it was created. You can revert to a version by clicking it. If there's no version that equals the song in its current state a version equaling the current state will be created. These automatically created versions are named "Autosave Version 1" etc.

### Autosave

Some versions are created automatically:

- **Autosave (safety backup):** This version is created every 15 minutes. If the computer crashes you can open the song again and revert to this version in order to minimize the amount of work lost. The version is created when the transport is stopped.
- **Autosave (discarded version):** This version is created if you choose to discard the changes when the song is closed. If you regret this you can open the song again and revert to this version.

*Note 1: Autosave versions aren't created until the song has been saved for the first time.*

*Note 2: Audio files themselves are not stored in the version files, so if you edit an audio file using a third party editor all versions using that file will be affected. You can make a copy of a file and edit the copy to avoid this.*

*Note 3: The versions mechanism assumes there's only one song in a folder (ie. it assumes every versions it finds in the song's folder is a version of the current song). This is likely the case with MultitrackStudio 5 or newer, but you might want to make sure this is the case with songs you created with older versions before reverting to a version.*

*Note 4: Some third-party demo version VST/AU/DX plugins pop up a 'demo limitation' message window when the plugin settings are written to file. These messages will appear whenever a version is created.*

### Under the hood

A version file (.hdrversion file extension) is a song file which also contains the .mid and .aem track data.

## 2.4 Songlists

*Note that using songlists is not required.*

A songlist file (.lml file extension) contains references to song files. When a playing song is finished, the next song can automatically be opened and played. When the last song is finished the transport will be stopped.

## Creating or opening a songlist

The Songlist menu is not visible if no songlist is opened. The Song menu's Songlist item contains New and Open options. After using one of these the Songlist bar will appear.



*Songlist Bar (3 songs)*

The Songlist Bar will be placed at the top of the window. A button with the song's file name is shown for each song in the songlist, the yellow one being the song currently opened. Clicking a button will open the corresponding song. The songs can be reordered by dragging and dropping the buttons. Opening or reordering songs is not possible while the transport is running.

Songs can be added and removed using the Song menu: New or Open will add a song to the Songlist, Close will remove the current song from the songlist and Rename will update the name of the current song.

The **Play All** button determines whether all songs will be played back consecutively. It's on by default. You can turn it off if you're going to do some work on a song, in order to avoid going the next song inadvertently.

## The Songlist menu

The Songlist bar contains the Songlist menu, which offers the following options:

- **New, Open, Save, Save As, Rename, Close**
- **Comments:** Read or write text which is stored in the songlist file. You can use this to document the project.
- **Songlist Properties:** Show the songlist's properties. This includes:
  - The song file name, playing length and occupied disk space of each song
  - The total playing time of the songlist
  - The total occupied disk space

Collecting the songlist properties might take a few seconds as all songs have to be analyzed.

## 3 Transport

### 3.1 Transport

The transport controls are similar to a tape recorder's transport controls.



*The transport controls*

The transport is controlled by four buttons (from left to right):

- **Home** (go to start of song)
- **Rewind**
- **Fast Forward**
- **Start/Stop**

When the transport is started all tracks that are in playback mode will play back, and all tracks that are in record mode will record. If there are no tracks that are in either playback or record mode the transport will not start.

*Tip: you can hit the space bar instead of clicking the start/stop button.*

#### Cycle Transport

After clicking the Start button's down arrow you can select "Start cycling", which will make the transport cycle through a region until you stop the transport. The cycle region starts at the current transport position. The end of the region can be picked from a list that appears right after you click "Start cycling". This list contains the Markers and the end of the song (ie. the length of the longest track). If you're doing a punch-in recording the point two seconds after the end of the punch region appears in the list as well. The "Cycle selected part of focused track" option cycles the part that's selected in the focused track's editor.

The Overview Bar shows the cycle region while cycling.

*Note: in cycle mode the transport is actually stopped and started again when a new cycle starts, so there's a gap in the sound.*

### 3.2 Position Indicator

The position indicator shows the current transport position. It can show either hours:minutes:seconds or bar:beat (use the down arrow on the right). The bar:beat option is available only if at least one track contains a MIDI file. That's because tempo information is stored in MIDI files.

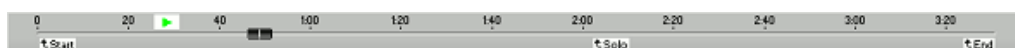
The position indicator's maximum value is 10 hours at 44.1 kHz samplerate (4 hours and 30 minutes at 96 kHz).

After left-clicking the position indicator a new position can be typed. Hours:minutes:seconds values (separated by colons) are interpreted right to left, so you don't have to enter hours or minutes if the time you enter is less than 60 seconds. But if you want to enter minutes you should enter seconds as well. Zero values can be omitted (you can enter 12: instead of 12:00).

Bar:beat values are interpreted left to right, so you can enter plain bar numbers easily (12 instead of 12:1). The seconds and beat values can be real numbers (like 1.462). Press Enter to accept the new value, or Esc to cancel the operation.

### 3.3 Overview Bar and Markers

The Overview Bar is closely related to the transport. It is a large slider indicating the current transport position. The slider thumb can be moved using the mouse. Double clicking it starts the transport, clicking it again stops it. The overview bar also shows the markers.



*Overview Bar with three markers*

Markers are used to name certain parts of a song (for instance Intro, Verse 1, Verse 2, Solo, Verse 3). Navigating through a song becomes significantly easier using markers. The Transport Options menu, accessible via the down arrow on the right hand side of the position indicator, features an **Add Marker** option which adds a marker at the current transport position. If there's a marker at the current position a **Delete Marker** option is presented instead.

Alternatively markers can be added by rightclicking the overview bar. Most editors can be used to add markers by right-clicking the grid-area (where the needle handle lives) as well. An easy way to add markers "on-the-fly" is to press Ctrl+M at the appropriate times while the song is playing. Use the Marker Editor to edit the marker names. Ctrl+M takes the grid snap setting into account, so accurately adding markers on-the fly is easy when using a gridspacing of one bar while the "Snap" button is engaged.

The markers appearing on the overview bar can be left-clicked to jump to the corresponding transport position. They can be right-clicked to delete, rename, quantize to the grid, or edit the marker. Renaming can also be done by double-clicking the marker. Markers can be dragged to a new position.

The most recent transport start position appears in the upper half as a green triangle. If you click it the transport moves back to that position.

### 3.4 VariSpeed

*Note: this feature is available in the Pro Plus edition only.*



VariSpeed acts like a tape recorder's speed control. An important application is recording instruments which aren't in tune with existing tracks. Speed Only mode can be used to slow the music down to make transcription or practising easier. The VariSpeed controls are hidden by default, they can be made visible using the down arrow on the right-hand side of position indicator.

The box offers a choice of several VariSpeed modes:

- **Off:** No VariSpeed
- **Tape style - 1 semitone (T1):** Change pitch up to 1 semitone, speed changes accordingly.
- **Tape style - 2 semitones (T2):** Change pitch up to 2 semitones, speed changes accordingly.
- **Tape style - half speed (TH):** Run at half speed (+/- 1 semitone). Audio tracks and software instruments sound one octave lower at half speed, External MIDI Instruments don't.
- **Speed Only (SO):** Change speed (50%..150%) without changing pitch. Recording isn't possible using Speed Only mode, VariSpeed will be turned off automatically if you try to do so.

The rotary knob controls speed / pitch. It can be turned while the transport is running, but not while recording.

The tape-style modes work exactly like a tape recorder's speed control: if speed increases pitch goes up, if speed decreases pitch goes down. If you want to record an instrument and its pitch is different from your song's pitch you can use VariSpeed to change the song's pitch. After recording the track you can switch off VariSpeed and the recorded track's pitch will be equal to the song's pitch.

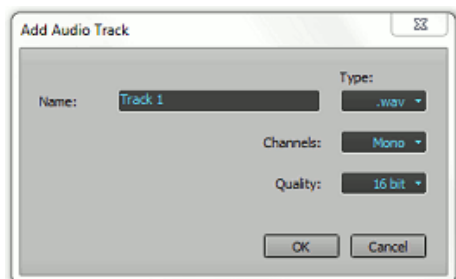
VariSpeed also works with MIDI tracks. Tracks using an External MIDI Instrument are detuned using Pitch Bend messages (the pitch bend range is assumed to be 2 semitones).

*Note that VariSpeed consumes CPU power, so it should be switched off when it's not needed.*

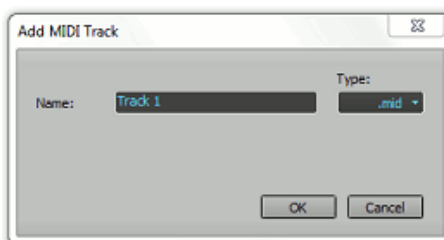
## 4 Recording

### 4.1 Recording

The first thing to do when starting to record a track is to add a track with an audio or MIDI file that will contain the recording. You can do this using the Add Track menu.



Add Audio Track window (Pro Plus edition)



Add MIDI Track window

If the track contains an audio file (like the default .wav format), the track will record audio (using a microphone or a line input), if it contains a MIDI file (.mid) the track will record MIDI (usually a keyboard). See the Audio files and MIDI files paragraphs for more information on supported file types. To record a track you should click its Rec button (it turns red) and start the transport.

If you want to wait a certain amount of time until recording starts (to give you time to walk to the mic for instance) you can use the Delay Before Recording option.

#### Recording options

Five buttons at the top of the main window provide access to the most frequently used recording options:

- **Input:** Show the Audio Input Control, which depends on the driverset being used. If your audio device comes with a control panel application you can click down arrow menu's "Browse for device control panel..." option and open the control panel. Now you can access the control panel via the down arrow menu's "Device control panel" option. If "Button shows device control panel" is checked it will pop up on clicking the Input button itself.
- **Mon:** Soft Monitoring
- **Punch:** Punch In/Out
- **SoS:** Sound on Sound recording
- **Clk:** Add or modify click track (metronome).

The **Rec** button pops up the Recording Options menu which offers more options. The buttons move to the menu automatically if the main window is too small to show them all. The menu's options are described in the following paragraphs.



Recording options

### 4.2 Audio Recording

If you want to record using a microphone you should connect it to your sound device's Mic input. Keyboards, mic preamps or mixer outputs should be connected to the Line input.

#### Input assignment

By default channels are assigned to tracks automatically. This is convenient for home recording. Manual assignment may be preferred for live recording.

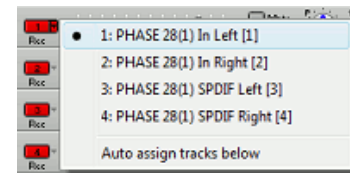
#### Automatic assignment

The **Input** button pops up a list of audio input channels. The input channels of the audio device being used are assigned to recording audio tracks in order of appearance. I.e., with a stereo device and two mono tracks the first (upper) track will record the left channel, and the second (lower) track will record the right channel.

The list can be re-ordered using the mouse.

### Manual assignment

Click the **Input** button and turn off **Automatically assign channels to tracks**. Now all audio tracks will show a down arrow on the right hand side of the Rec button. Clicking this down arrow pops up the input channel selector. The input channel is displayed on the Rec button itself.



Input channel selector

*Note: an audio input channel can be recorded by one track at a time only.*

*Note: Input assignment works different with the WinSound driverset. On Windows XP/2000 the **Input** button pops up the Windows Recording Mixer. Make sure the input you want to record is selected. Windows 7/Vista don't have such a mixer, the Control Panel's Sound page appears instead. When recording two mono tracks the first (upper) track will record the left channel, and the second (lower) track will record the right channel. When recording just one mono track the left channel will be recorded.*

### Recording Levels

The Level Meter starts working upon clicking the track's **Rec** button (it turns red). You can now set the recording level. How this should be done this depends on your sound device. If you're using the AsioSnd driverset you should use the control panel that came with the sound device. If you're using the VistaSound or WinSound driverset the **Input** button takes you to the recording level controls. If you have a mic preamp or a hardware mixer it's more convenient to use this to set the recording level (set the sound device's level at its maximum value).

The recording level is OK if the meter reaches the yellow section during signal peaks.

*Note: driving the recording level meters into the red section is definitely a bad thing in digital audio.*

### Under the hood

The level meters read 0.1% above the actual recording level while recording in order to make it possible for the first red segment to light when reaching the clipping level. Otherwise no red segment would ever light as the Audio In Device cannot output data above its clipping level.

### Live Multitrack Recording

*Note: these features are available in the Pro Plus edition only.*

The Pro Plus edition offers two features that make live multitrack recording easier:

1. The Add Audio Track window has a '#' box which holds the number of tracks to create, so you can add multiple tracks in one go. The box appears automatically if the audio device has at least 4 input channels. You can press Ctrl+N to make it appear anyway (this also works in the Add MIDI Track window).
2. The Song menu's New window has a Template box. The "Identical to current" template creates an empty copy of the current song. A new folder will be created, with new audio/MIDI files and a new song file. This feature can be used to record another take of a performance.

### Record Master

*Note: you can use the Mix Down menu's 'Mix down to audio file' option instead.*

If this options is activated recording audio tracks will record the output of the Master section (or simply the output if the Master section has been removed) instead of the Audio In Device. This option can be used to mix down the song to stereo (see mastering).

This option can also be used to 'bounce' tracks in order to reduce the number of tracks used by the song. For example: a five track backing vocal group can be bounced to a single track by recording the five tracks to a new track (temporarily turn of all other tracks, and bypass any effects in the Master section). Having done this, the five original tracks can be turned off (using their Play buttons) and the new track can be used instead.

In a similar way this option can be used to 'freeze' a track that uses effects that require a lot of processing power. The new (audio) track will include the effects, thereby freeing up the processing power used by them.

## 4.3 MIDI Recording

MIDI tracks always record the MIDI In Device(s) and/or the Onscreen MIDI Keyboard, regardless of the type of MIDI instrument being used. If the Autodetect Keyboard option is enabled (default) your keyboard's MIDI channel will be detected automatically. If necessary you can set the channel used in the instrument's user interface.

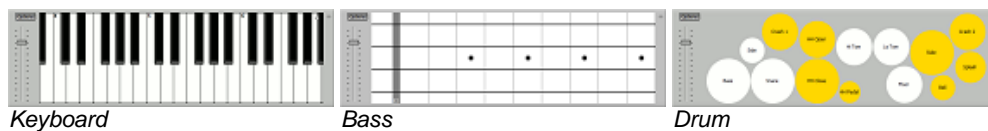
The Pro Plus edition features a built-in MIDI merger that merges all data that's being received on any of the MIDI In Devices (up to four of them can be used, see devices). Make sure your keyboards are using different channels in order to avoid problems.

You can undo MIDI-recording using the track editor's Undo button.

*Note: If the MIDI file contains multiple streams ('tracks' in MIDI terms) all streams will be recording. Using multiple streams is not recommended.*

### Onscreen MIDI Keyboard

The onscreen keyboard can be used to play MIDI instruments, it works just like a MIDI In Device. Not only does it offer a keyboard layout, but a drum layout and various string layouts as well. It can be made visible using the button in the bottom-right corner of the window.



The onscreen keyboard provides suitable shortcut keys for various international keyboard layouts automatically. The number of keys which can be played simultaneously solely depends on the keyboard hardware, three keys typically isn't a problem.

The mouse works as well, but it isn't really suited to playing music.

String instruments can be capoed using the Options button.

The fader on the left controls volume (MIDI controller 7).

The drum layout uses GM instrument mapping.

*Note: the onscreen keyboard's timing may not be as accurate as you'd expect from a real MIDI keyboard.*

### Using the MIDI keyboard with touchscreens

*Note: touchscreen support is available for Windows only.*

The onscreen keyboard can be used with a touchscreen. A multi-touch screen lets you play multiple notes simultaneously, and also makes monophonic parts easier to play. The number of fingers which can be used simultaneously solely depends on the touchscreen and its driver. Multi-touch support requires Windows 7.

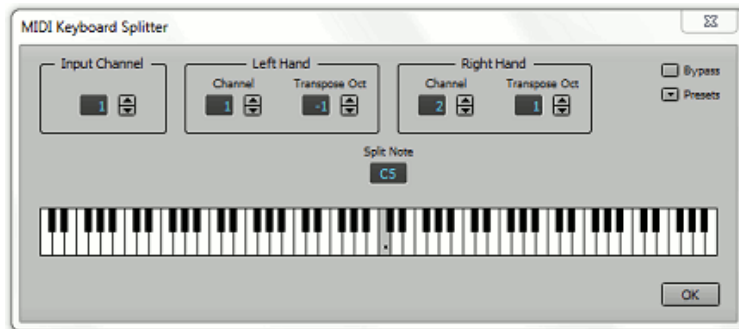
The keyboard shortcuts are not visible in touchscreen mode.

The fader on the left can be moved while playing the keyboard if you're using a multi-touch screen.

The keyboard and string layout support finger vibrato when using a touchscreen. The Options button lets you turn it on. The string instruments support string bends, this requires a multi-touch screen. Only monophonic parts can be played while finger vibrato or string bends are enabled. Both finger vibrato and string bends generate MIDI pitch events.

The drum layout allows for performing hihat pedal movements on a touchscreen: put a finger on the HH Open pad to hit it with a stick. Then move the finger to the HH Close pad to close it with the pedal.

## Keyboard Splitter



*Keyboard Splitter window*

If you want to play two instruments using only one keyboard you can use the Keyboard Splitter, which is available from the Recording options menu. The Keyboard Splitter splits a MIDI keyboard in a left and right hand part. MIDI messages on one channel are intercepted and separated. All notes below the split note are routed to the left hand channel. All other notes and all controller events are routed to the right hand channel. Each output channel can be transposed up to three octaves up or down.

## Autodetect Keyboard

If the Recording options menu's Autodetect Keyboard option is active (this is the default setting) recording MIDI tracks will respond to messages on all channels. This means that you won't have to worry about the actual MIDI channel being used, it just works.

The Autodetect Keyboard feature will disable itself automatically if there are multiple recording MIDI tracks and they're not all recording the same channel. This means that you won't have to turn it off in order to be able to record two tracks using two keyboards.

You can turn Autodetect Keyboard off if data is coming in on multiple MIDI channels and you don't want to record all of them.

## 4.4 Multiple Takes

It typically requires more than one take to get a track right. MultitrackStudio offers two ways to record multiple takes:

- **Alternate Takes:** a new file is created, the existing file is closed and the new one opened.
- **Partial Takes:** the recording is recorded to a new file. When the transport is stopped the part is pasted in the existing track. It appears as a tweakable edit, so you can move or resize the new part.

There are basically two approaches to multiple take recordings:

- **Use alternate takes and decide which parts to use afterwards ("track comping"):**  
Record some takes until you think all parts are played OK at least once. Then use the track's file options menu to load the takes one by one to determine which is the best. Other takes can be loaded in new tracks via rightclicking them in the file options menu. Then the part you want to copy can be dragged from the track's editor to the track containing the best take. Note that track comping using partial takes is possible as well. Clicking one in the file options menu opens it in a new track.
- **Use partial or punch in takes and make all decisions immediately:**  
Record a full take, and then record partial takes over the weak parts. You can select the part first and then record it (punch in recording), or you can record the part and then tweak the selected part in the editor to only contain the part you want (partial take). If the new take is not successful you can use the track editor's Undo button and try again.

## 4.5 Alternate Take

Using the **Alternate Take** option from the Recording Options menu, you can quickly create a new file and set up the track for recording a new take of the last recorded track. This is what happens:

1. The last record Track's File Options Menu's Alternate Take option is executed.

2. The transport's position rewinds to the position the last recording started.

If you keep down the Ctrl key (Windows) / Command key (Mac) while clicking the Alternate Take menu item a new track will be created. This is what happens:

1. The last recorded track's Play and Rec buttons are deactivated.
2. A new track is added and switched to Record mode.
3. A file is created having the same name as the last recorded file, but with a number added. If the name ended with a number, that number is incremented.
4. The transport's position rewinds to the position the last recording started.

You can keep down the Shift key while clicking to keep the transport from rewinding.

Invoking Alternate Take automatically clears the Punch button.

## 4.6 Partial Takes

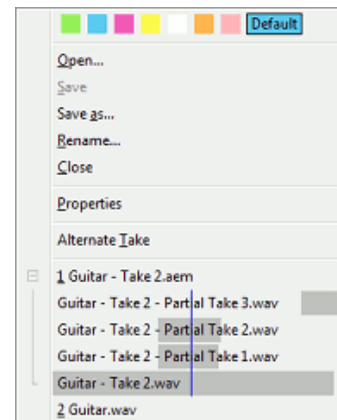
If you record to a track which already contains data the new part becomes a partial take.

The recorded part appears as a tweakable edit in the track's editor, so you can move and resize it to make it fit if necessary. The track editor can also be used to undo the recording. After undoing the file containing the partial take is still available from the track's File Options menu.

If it's an audio track an .aem file will be created if the track isn't using one already.

Partial takes appear on the track's file options menu if the take they're recorded in is expanded (see picture). Clicking one will open it in a new track.

The menu shows which part of the song is covered by a partial take in gray. The vertical blue line represents the current transport position.



A track's File Options Menu

### Under the hood

Partial audio take files are BWF (Broadcast Wave File) files. This is a .wav file with additional information on where the starting point is. MultitrackStudio discards the *bext* chunk unless the words "MultitrackStudio Partial Take" are in the Description field.

Partial MIDI take files are just plain MIDI files.

## 4.7 Punch In/Out

Punch in/out recordings are a special kind of partial takes. You can select the part to record beforehand, and you'll hear the existing track before and after this selected part. The track's editor is used to define the part being recorded (see selecting a part). This should be done before recording starts. The new recording becomes a tweakable edit, so you can modify the punch in/out points afterwards.

Punch in/out recording can be activated using the **Punch** button at the top of the main window.

The existing track, before and after the punch-in region, is audible during punch in/out recording, except for MIDI tracks which have a External MIDI Instrument in their instrument slot. This is accomplished using invisible copies of the track's software instrument and/or effects, hence it won't work with demo versions of VST/AU/DX plugins which are limited to a single instance or can't save their settings.

The software instrument, or the recorded audio signal if Soft Monitoring is active, is audible in the punch-in region only by default. Turning on the Recording Options menu's **Full Punch In/Out Monitoring** option makes your performance audible all the time. It will also pan the existing track to the other side, so if you pan the track to one side before starting punch-in recording you'll hear the existing track on one side, and the performance you're recording on the other side. This can be a convenient way of working if you're using headphones.

If a MIDI track has multiple streams (not recommended) all streams will use the punch in/out points defined by the track's main editor.

## Punch-In Recording step-by-step

- Open the editor of the track you want to record.
- Select the part you want to record in the editor.
- Move the transport position to the point where you want to start playback. This will typically be at least a couple of seconds before the point where you want the punch in recording to start.
- Make sure the Punch button at the top of the screen is red.
- Make sure the track's Rec button is red.
- Start the transport.
- Record the part and stop the transport when done.
- Now you can resize the selected part in the editor if necessary. You can also use the EDIT button and change the punched-in part's volume etc.

## 4.8 Sound on Sound recording

Sound on Sound recording lets you record without erasing the existing part (ie. the recording is added to the existing part). This can be used to add some notes to an existing MIDI part. It also works with audio. The existing part is audible, except when using an External MIDI Instrument.

Sound on Sound recording can be turned on/off using the **SoS** button at the top of the window.

After stopping the transport the recording appears in the track's editor as a tweakable edit, so you can resize the selected part, undo the recording or use the editor's Edit button to change the recording's volume etc. Note that only the newly recorded part is affected by these actions, the original part remains untouched.

## 4.9 Cycle Recording

Using cycle recording you can record multiple takes automatically. It also works with punch-in recording. To start cycling right click the Transport's start button and select "Start cycling". Alternatively you can keep the "c" key down while clicking the start button.

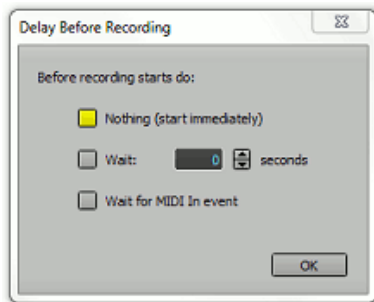
### Cycle Recording step-by-step

- Add a Marker at the point where you want the cycle region to end. This isn't necessary if you want this point to be at the end of the song.
- Move the Transport position to the point where you want to start recording.
- Make sure the track's Rec button is red.
- Right click the Transport's start button and select "Start cycling".
- Choose a cycle region end point from the list that appears and click the OK button. The Transport will now run until the cycle region end point, and then start again.
- When you think you've recorded a good performance stop the Transport.
- Now the takes are available from the track's File Options Menu (the small button below the file name box). You can open a take in a new track by pressing the Shift key while clicking the mouse. You'll typically want to copy the best parts to one track. It's best to start with the track you think is best. Then copy better parts from other tracks to this track. This can be done easily if you keep the Shift key down while dragging the part from one track's editor to another. The Shift key keeps the part from moving left or right.

### Cycle Punch-In Recording step-by-step

- Open the editor of the track you want to record.
- Select the part you want to record in the editor. Note that the cycled punch-in recordings won't be available as tweakable edits, so you should make sure the start and end points are in silent or otherwise suitable parts.
- Move the Transport position to the point where you want to start playback. This will typically be at least a couple of seconds before the point where you want the punch in recording to start.
- Make sure the Punch button at the top of the screen is red.
- Make sure the track's Rec button is red.
- Right click the Transport's start button and select "Start cycling".
- Select the "End of Punch Region" item from the list that appears and click the OK button. The Transport will now run until two seconds after the end of the selected part, and then start again.
- When you think you've recorded a good performance stop the Transport.
- Now you can use the editor's Undo and Redo buttons to select the best version.

## 4.10 Delay Before Recording



*Delay Before Recording window*

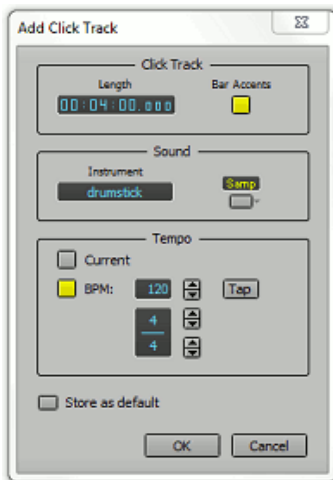
The Delay Before Recording window has several options that can be useful when you are recording on your own. Delay Before Recording allows you to walk to your guitar/microphone etc. before recording starts. There are two ways of doing this:

1. **Wait:** The transport simply waits for a specified number of seconds to elapse.
2. **Wait for MIDI In event:** The transport waits for a MIDI Note or Controller event on the MIDI In port. This works for audio recording as well. If you have a MIDI sustain pedal you can use this to start the transport. Any channel on the MIDI In port can be used to start the transport.

*Note: the settings are used only if there is at least one track in record mode.*

## 4.11 Add Click Track

The Clk button at the top of the window can be used to add a click track (metronome) to the song.



*Add Click Track window*

**Length** is the length of the click track in minutes.

**Bar Accents** increases the volume level of the first beat in every bar. Other subtle accents may be added as well, depending on the time signature.

**Instrument** is the Drum Instrument to be used.

The **MIDI Instrument** slot can contain any MIDI Instrument. If you plan on adding a drum track later using an editor, then it's a good idea to use the instrument you'll be using for the drums in order to avoid any timing differences.

The **Tempo** section specifies the tempo to use. **Current** uses the current tempo, this option can only be selected if the song contains at least one MIDI track. Using the **BPM** option you can specify a new tempo. The **Tap** button pops up a 'BPM Tapper' window, which lets you play the tempo on the space bar.

Click the **Store as default** button if you want MultitrackStudio to remember the current settings.

## 4.12 Monitoring

Monitoring means: hearing the track you're recording. The best way to achieve this is in hardware ("direct monitoring"), as this doesn't introduce a delay. Soft Monitoring can be used if you need to hear effects like the Guitar Amp while recording. It can also be used if your hardware doesn't support direct monitoring.

### Direct Monitoring

Some sound devices come with a software control panel that allows for direct monitoring. Some devices have a hardware knob to control direct monitoring. Not all sound devices have monitoring features though, in this case you can consider using an analog mixer.

Windows XP/2000: If you're using the WinSound driverset you can access the sound device's internal mixer using the Studio menu's Audio Output Control option. Turn up the Mic or Line input (the one you're using) so you can hear it. Note that more faders can be made visible using the Options menu's Properties window. Cheap or onboard sound devices typically support this.

### Soft Monitoring

*Note: this option does not work with the WinSound driverset.*

If this option is used recording audio tracks will send the signal they're recording to the Audio Out Device after having applied any effects. This way effects (like Guitar Amp or Reverb) can be played "live".

It is not recommended to use this feature as a means of monitoring the dry signal you're recording, as there is an inherent latency between the input and the output signal. Using a low latency will increase the risk of glitches in the recordings. All these problems can be avoided using direct monitoring.

## 4.13 Practice Mode

These days many instruments are software based. This isn't only true for software MIDI instruments like the Sampler or VSTi plugins, but for guitar amp simulators like the Guitar Amp effect as well. Practice Mode lets you use these instruments without actually recording them, so you can practice or just try things.

### MIDI instruments

If a MIDI instrument's window is visible at the time the transport is started the instrument will work if neither the track's Play button nor the Rec button are "on".

### Audio effects

Similarly, an audio track's effects can be used if one of the effect windows is visible at the time the transport is started and neither the track's Play button nor the Rec button are "on". Obviously, Soft Monitoring should be used in order for this to work.

An audio tracks can not be in practice mode if there are any recording audio tracks.

### Practicing while the transport is stopped

Practice Mode also works while the transport is stopped, regardless of the track's Play/Rec buttons.

Alternatively you can switch on a track's Rec button, in this case there's no need for any effect or instrument window to be visible. This method also allows for running multiple tracks. In case of audio tracks the usual channel assignment rules apply.

# 5 Playback and Mixing

## 5.1 Playback and Mixing

In order to be able to play audio or MIDI files they should be opened in a track. To play a track you should activate its Play button (it turns green) and start the transport.

Tracks have mixing and effect processing capabilities.

You can expand the mixer by adding any number of Group or Effect Return sections.

All Tracks, Groups and Effect Returns are routed through the Master section.

### Playing MIDI

If a track's Play button is engaged and the transport is running, all streams in that track will be played.

If the Instrument slot contains an External MIDI Instrument the track's output will be sent to the corresponding MIDI Out Device. In this case the track is not affected by any Group, Effect Return or Master sections.

If a software instrument (Sampler, VST Instrument etc.) is being used the track's output will be routed through any mixer sections, and eventually be sent to the Audio Out Device, as if it were an audio track.

## 5.2 Tracks

A MultitrackStudio track is a combination of a mixer's channel strip, a tape recorder's record/playback switch and a piece of tape, the latter being replaced by an audio or MIDI file on the hard disk. Tracks can be added using the Add Track menu's Add Audio Track, Add Midi Track or Import Audio/MIDI File options. The latter can import multiple files in one go using the Shift key or the Ctrl key (Windows) / Command key (Mac). Tracks can be removed by dragging them to the Garbage Bin in the bottom left corner of the screen. The order in which the tracks appear can be changed using drag-and-drop.

All tracks have the following basic features:



Track (No file opened)

- **File Display:** The File Display shows the name of the opened file. The lower text line indicates the type of the file:
  - "mono audio (.wav)": Mono audio file of the .wav type.
  - "stereo audio (.wav)": Stereo audio file of the .wav type
  - "midi": MIDI file with one stream.
  - "multi midi": MIDI file with multiple streams.
  - "not opened": The file isn't opened, probably because the file does not exist or it's an unsupported file type. In this case the Play, Rec and Edit Buttons are disabled.
  - the "(r)" appendix means the file is opened as read-only.
- **File Options Menu** (appears on clicking the File Display)
  - The file options menu contains the following items:
    - **Color:** Here you can choose a different color than the default color, which is blue in the standard theme. The color is used for the File Display and the track's editor.
    - **Open:** Open an existing Audio/MIDI file, or create a new one. A standard file dialog will appear that lets you specify a file to load. **Windows:** If the file doesn't exist it will be created. The type of the file is determined by the file's extension ('piano.mid' loads or creates a MIDI file, 'piano.gjm' loads or creates a .GJM Audio file). If no extension is entered a .WAV Audio file is opened or created. Files can be opened as Read Only. If a track's file is opened this way recording isn't possible.
    - **Save:** Save MIDI or .aem file to disk. Use this if you want to save performed edits. This item is available for MIDI tracks and edited audio tracks only. It is disabled if the file is unmodified. *Note: The tracks are saved automatically whenever the Song menu's Save option is invoked, so saving tracks explicitly usually isn't necessary.*
    - **Save As:** Copies the file to a new file and opens the new file.
    - **Rename:** Rename the file. *Note: the file will be closed and reopened, so the editor's undo history will be lost.*
    - **Close:** Unload the file.

- **Properties** : Shows the file's properties. If it's an .mp3 file you can edit its tags from it as well.
- **New Stream**: (MIDI track only). Adds a stream to the MIDI file.
- **Split Streams**: (multiple stream MIDI track only). Splits the MIDI file in separate single-stream files, these new files will be opened in new tracks.
- **Alternate Take**: Creates and opens a new file and puts the track in record mode, so you can quickly record an alternate take. The files will appear on the menu so they can be opened easily. The new file will appear in a new track if you keep the Ctrl key (Windows) / Command key (Mac) down while clicking the mouse.
- **Copy live performance to clipboard**: (MIDI software instrument track only) After a software instrument has been played 'live' without actually recording it, the performance can be copied to the clipboard, and subsequently pasted in a track.
- **File History**: Every time a file is opened it is added to the menu. Using this item you can reload the file. This can be very useful for auditioning Alternate Takes. If you press the Shift key while clicking the file will be opened in a new track. You can rightclick (Windows) / Ctrl-Click (Mac) for more options. The "Remove from list" options allows the Find Unused Files tool to mark the file unused.
- **Play and Rec** buttons: Put track in playback or record mode. Starting the transport will actually start playback/recording.
- **Volume** fader: This fader sets the playback volume for the track.
- **Mute** button: Pressing this button will mute the track.
- **Solo** button: Pressing this button will solo the track. The signal will still be routed through any Group and/or Effect Return sections. Use the Effect Return's Mute button if needed. Multiple tracks can be soloed by keeping the Ctrl key down while clicking additional Solo buttons.
- **Pan**: This knob (with a blue dot) sets the Pan position for the track (0% = left, 50% = center, 100% = right).
- **Level Meter**: The Level Meter shows the sound level.
- **Edit** button: Shows/hides the track's editor.

The Play, Rec, Mute and Edit buttons operate on all tracks if the Ctrl key (Windows) / Command key (Mac) is down when the button is clicked.

## Audio Tracks

Audio tracks (tracks with an audio file) have the following additional features:



Audio track

- **Effect Send**: An Effect Send knob determines the level of the (mono) signal sent to the corresponding Effect Return section. Effect Sends are of the 'post fader' (and 'post effects') type: the Effect Send signal is affected by the Volume fader, the Mute button and the effects.
- **Effect Slots**: The Effect slots can contain effects such as an EQ or a Compressor. Effects processing takes place before volume and pan processing, so compressor settings don't need any adjustments when moving the Volume fader.
- **Output Selector**: The Output Selector determines the routing of the Track's output. You can choose between the Master section or one of the Group sections. If there are no Group sections the selector does not appear.

## MIDI Tracks



MIDI track (Instrument: External MIDI Instrument)

MIDI tracks (tracks with a MIDI file) have an Instrument slot that determines where the track's output will be routed to. If it contains a software instrument, like the default MultitrackStudio Instruments, the MIDI data will be converted to audio and the output routed through the mixer. If it contains an External MIDI Instrument the output will be sent to an external hardware synthesizer. See the MIDI Instruments section for more information on this subject.

MIDI tracks using a software instrument have all the extra controls audio tracks have (except for the first Effect Slot, which is replaced by the Instrument Slot).



MIDI track (Instrument: Sampler)

## 5.3 Group

Audio tracks can send their output straight to the Master section, or to a Group section. The Group section's output is routed to the Master section (they can be routed to sound device output channels as well using the Pro Plus edition). Group sections can be added using the Add Track menu and removed by dragging them to the Garbage Bin.

Group sections have the following features:



Group section

- **Volume** fader: This fader sets the volume for the group.
- **Mute** button: Pressing this button will mute the group.
- **Solo** button: Pressing this button will solo the group.
- **Pan**: This knob (with a blue dot) sets the Pan position for the group.
- **Effect Send**: An Effect Send knob determines the level of the (mono) signal sent to the corresponding Effect Return section. Effect Sends are of the 'post fader' (and 'post effects') type (the Effect Send signal is affected by the Volume fader, the Mute button and the effects).
- **Effect Slots**: The Effect Slots can contain effects such as an EQ or a Compressor. Effects processing takes place before volume and pan processing, so compressor settings don't need any adjustments when moving the Volume Fader.
- **Output Selector** (*Pro Plus edition only*): The Output Selector determines the routing of the group's output. The output can be sent to the Master section or to a pair of channels (3/4, 5/6...) of the Audio Out Device (the Pan knob can be used to send the signal to one channel only). The selector does not appear if the song uses only one stereo output (see Song Properties).
- **Level Meter**: The Level Meter shows the actual output level (that is the level after applying effects and volume/pan).

Care should be taken in situations where tracks routed through the group use the same Effect Sends: Effects in the group sections can cause phase shifts that could lead to unexpected coloration.

A Label can be stuck to a group section to show its purpose (ie. 'Backing Vocals').

The order in which the groups appear can be changed using drag-and-drop.

## 5.4 Effect Return

Each audio track (and MIDI tracks using a software instrument) and each Group will have a corresponding number of Effect Send knobs. All Effect Send signals are routed to the corresponding Effect Return. Here they can be processed and mixed with the tracks. Effect Returns are typically used for adding reverb. The Effect Return sections do not affect MIDI tracks using an External MIDI Instrument. Effect Return sections can be added using the Add Track menu and removed by dragging them to the Garbage Bin.

Effect Return sections have the following features:



Effect Return section with Reverb effect

- **Volume** fader: This fader sets the volume for the Effect Return.
- **Mute** button: Pressing this button will mute the Effect Return.
- **Solo** button: Pressing this button will solo the Effect Return.
- **Pan**: This knob sets the Pan position for the Effect Return.
- **Effect Slots**: The Effect Slots can contain effects such as Reverb or Echo.
- **Output Selector** (*Pro Plus edition only*): The Output Selector determines the routing of the Effect Return's output. The output can be sent to the Master section or to a pair of channels (3/4, 5/6...) of the Audio Out Device (the Pan knob can be used to send the signal to one channel only). This feature can be used to send the effects bus to an external hardware effect unit (eg. a reverb unit). The selector does not appear if the song uses only one stereo output (see Song Properties).
- **Level Meter**: The Level Meter shows the actual output level (that is the level after applying effects and volume/pan).

A Label can be stuck to an Effect Return to show its purpose (ie. 'Reverb').

The order in which the Effect Returns appear can be changed using drag-and-drop.

## 5.5 Master

The Master section affects all Tracks, Groups and Effect Returns (except MIDI tracks using a External MIDI Instrument).

The Master section has the following features:



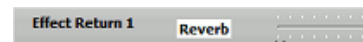
Master section with Master Limiter effect in last slot

- **Volume** fader: This fader sets the master volume.
- **Mute** button: Pressing this button will mute everything.
- **Pan**: This knob sets the master Pan position.
- **Mono** button: Pressing this button forces mono output (both stereo channels carry the same signal). This can be used for checking mono compatibility.
- **Effect Slots**: The Effect Slots can contain effects such as an EQ or a Compressor. Effects processing takes place after volume/pan processing, thus allowing the Master Limiter effect to clip at the correct level.
- **Level Meter**: The Level Meter shows the actual output level (that is the level after applying effects and volume/pan). This means that the distortion takes place when the meter hits the red section.
- **View** button: Shows/hides an oscilloscope view of the output signal.

## 5.6 Labels

The Add Track menu's Label item can be dragged and dropped onto mixer sections. A name can be typed immediately after dropping a label, press Enter when done. Labels can be removed by dragging them to the Garbage Bin in the bottom left corner of the window.

You can for example stick a 'Reverb' label to an Effect Return section.



Effect Return with "Reverb" label

## 5.7 Collapsing Mixer Sections

Mixer sections can be collapsed in order to save space on the screen. This can be useful if the song contains a large number of tracks. Sections can be collapsed, and expanded again, by leftclicking the small button in the top-right corner of the section. While collapsed only the section's name is visible, all controls are hidden. In case of a track the name appears in green or red if the track is in playback or record mode respectively.

More powerful options are available if you rightclick (Windows) / Ctrl-Click (Mac) the button:

- **Expand/collapse all sections**
- **Expand related sections only** (appears on tracks and groups): expand all sections contributing to the sound of the current one and collapse all other sections.
- **Expand/collapse same color tracks only** (appears on tracks): expand all tracks having the same color as the current one and collapse all other tracks.

## 5.8 Mixer Section Templates

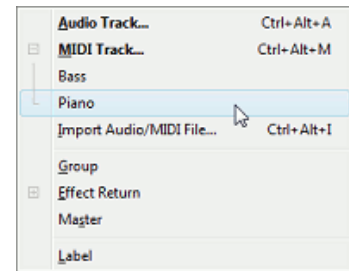
Templates of mixer sections can be created by dragging a mixer section to the Add Track menu button and dropping it there. A small window will pop up where you can specify the name of the template.

The Add Track menu will show an 'expander' icon on the left if templates are available for a certain mixer section type. After clicking it the menu

shows the templates. If you click a template a mixer section will be added based on the template (ie. it will have the same effects, the same volume fader level etc.). Tracks will also have a new audio or MIDI file, you'll be prompted for a name before the track is actually created.

Examples of templates include MIDI track templates for your favorite instruments, and audio track templates for your favorite vocal effects.

Templates can be renamed or deleted by right clicking them. They can also be deleted by dragging them to the garbage bin.



*Add Track menu (MIDI track templates expanded)*

## 5.9 Disabling the Mixer

If you want to play a single audio file with the highest possible sound quality you can disable the mixer (to avoid redithering the signal). The mixer can be enabled/disabled using the Song menu's Properties window.

Take the following considerations into account when not using the mixer:

- Tracks don't have any mixer related controls (including Effect Slots).
- The number of audio tracks you can play is limited by the Audio Out Device being used. The device's output channels are assigned to playback tracks in order of appearance. E.g., with a stereo device and two mono tracks the first (upper) track will use the left channel, and the second (lower) track will use the right channel.
- You can't use software instruments. You can load them, but they will refuse to play.
- The Soft Monitoring function does not work.
- No scrubbing in editors, and MIDI editors won't play a note when clicked.

## 6 Mastering and Mixdown

### 6.1 Mastering

Traditionally the multitrack recording is mixed-down to a stereo tape recorder. This stereo recording is then 'mastered', which usually means that EQ and (multi-band) compression is applied. When mastering for vinyl, EQ and compression had to be applied to keep the needle from jumping out of the groove.

Using MultitrackStudio, mastering after mixdown-to-stereo does not make sense, as all the settings involved in the mix are stored in the song file and can be recalled at any time. You can add effects to the mixer's Master section and use them for mastering purposes. Typically an EQ, a Compressor and a Master Limiter effect will be used. The Master Limiter should be the last effect. If multiband compression is required a Band Effect with compressors can be used.

When mastering a couple of songs that belong together (a CD for instance) it is very important that the songs sound 'the same'. They should be equally loud, have the same tonal balance etc. MultitrackStudio's songlist feature can be very convenient for this job. Using a songlist you can audition your CD before actually mixing the individual songs down to stereo.

The song can be mixed down using the Mix Down menu's "Mix down to audio file" option.

### 6.2 Preparing MIDI Tracks for mixdown

Before you can mixdown the song, any MIDI tracks using an External MIDI Instrument should be recorded to one or more audio tracks. To do this you should:

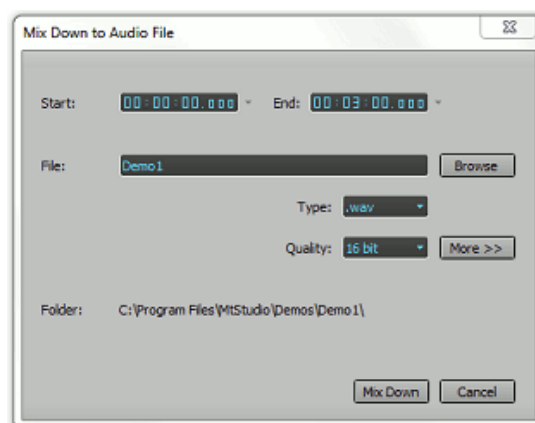
- Connect your synthesizer's output to your Audio In Device. If the synth is on your soundcard it may be possible set up the soundcard to record the synth without any external wires.
- Switch the MIDI track(s) to playback mode. Mute all other tracks.
- Add a new audio track and switch it to record mode.
- Start the transport and stop it when the whole MIDI track has been played.

You can now use the audio tracks instead of the MIDI tracks. To make the audio tracks sound just as loud as the original tracks did adjust the Volume fader while switching between the tracks using the Solo or Mute buttons.

### 6.3 Offline Mixdown

This Mix Down menu's **Mix down to audio file** option can be used to mix down the current song to a single audio file. The **Start** and **End** boxes determine the part of the song that is going to be mixed down. The down arrows next to the boxes can be used to load marker positions. The **Browse** button invokes a standard file save dialog. The **File** box displays the file name. You can change the name without using the Browse button as well. The **Type** box lets you choose the file type (.wav, .mp3 etc.). The **Quality** box is available if the file type offers multiple audio qualities.

An additional **Include Varispeed** button is visible if the Pro Plus edition's VariSpeed setting does not equal zero. This button is engaged by default, so the VariSpeed's effect is applied to the file. Speeding up a song slightly to make it a bit catchier is a widely used trick.



Mix Down to file window

The **More** button unhides some advanced settings. The **Channels** box can be used if you want to mix down to a mono file. The **Sample Rate** box can be used to make the audio file's samplerate different from the song's samplerate (eg. to mix down a 96 kHz Song to a 44.1 kHz file). The **Noise Shaping** button can be used to avoid applying noiseshaping to the dither signal. If the **Remember Folder** button is engaged the current folder will be used by default when the "Mix down to audio file" appears. If it's not engaged the file will be placed in the folder the current song is in by default.

*Note: Any MIDI tracks using an External MIDI Instrument should be recorded to audio tracks before mixing down.*

The Mix Down menu's **Playback mixed down file** option closes the current song, and loads the audio file created using the "Mix down to audio file" option in a new song. You can browse for an audio file if there's no mixed down file available (i.e. in case the "Mix down to audio file" hasn't been used since opening the current song).

## 6.4 Realtime Mixdown

Certain sample based VSTi plugins can suffer from audio drop-outs using offline mixdown. This typically happens if the samples don't fit the computer memory. In this case realtime mixdown can be used to record a master file.

Follow these steps to record a master file in real time:

- Add a new track with an audio file (for instance: mix.wav). Use a stereo 16 bit .wav if the file is to be burned to CDR.
- Activate the **Record Master** option in the Recording Options menu. Now a recording audio track will record the output of the master section instead of your soundcard's inputs.
- Switch the new track to record mode. Make sure all tracks that should be on the master are in playback mode.
- Start the transport, and stop it when the song has reached the end.

This way you can record a stereo .WAV file that can be used for CD burning etc. Note that this file will always start at position 0, if you want to "top" or "tail" the file (remove unwanted parts at the beginning or end) you can open the file in a track and use the track editor's Export option to export the part you want to a new file.

Audio CD's always use a samplerate of 44.1 kHz. If you did not use a samplerate of 44.1 kHz use the Samplerate Converter. Pro Plus edition users can mix down to a 24 or 32 bit file in order to avoid rounding errors. Note that the final file that will be burned to CDR must be a 16 bit file in any case.

Note that stopping the transport automatically resets the Record Master option.

## 7 Effects

MultitrackStudio features a large number of built-in high-quality effects. In addition VST/AU/DX plugins can be used.



Effect Slot

Effects are reached via Effect Slots. Effects can be selected by clicking the slot's down arrow (or by right-clicking the slot). The Effect Selector contains all native MultitrackStudio effects, VST/AU/DX plugins, Convolver impulse responses and effect presets. A search text can be typed to filter the list. VST, AU and DX list items have invisible tags so you can use 'vst', 'au' or 'dx' search terms to hide the other type of plugin. When an effect's user interface is visible you can press the F3 key (Windows) / Option-Command-F (Mac) to pop up the selector list. It remembers the search text, so you can try the next effect which matches the search text easily.

Leftclicking the slot's button will show the effect's user interface. All effects have a **Bypass** button. If the effect is not actually active (it's either bypassed or its controls are in neutral position) the text in the effect slot's display appears dimmed. Inactive effects do not use any processing power.

Effects can be moved using drag-and-drop, keeping the Ctrl key (Windows) / Option key (Mac) down while doing this will copy the effect instead of move it. Adding or removing effects can be done while the transport is running.

The following effects are available:

- **Automated Fader**
- **Band Effect**
- **Chorus**
- **Compressor**
- **Convolver**
- **Deesser**
- **Doubler**
- **Dynamics**
- **Echo**
- **EQ**
- **Exciter**
- **Flanger**
- **Guitar Amp (\*)**
- **Master Limiter**
- **Mid/Side Effect (\*)**
- **Multi Effect**
- **Noisegate**
- **Parallel Effect**
- **Phase Inverter**
- **Phaser**
- **Pseudo Stereo**
- **Reverb**
- **Rotor**
- **Saturator**
- **Stereo Effect**
- **Transposer**
- **Tremolo**
- **Tuner**
- **Vibrato**
- **Vocal Tuner**
- **VST Plugins**
- **AU Plugins**
- **DX Plugins**

(\*): Pro Plus edition only

### Presets

Presets can be loaded or created using the Presets button which appears on the effect's user interface.

### Controlling the Transport

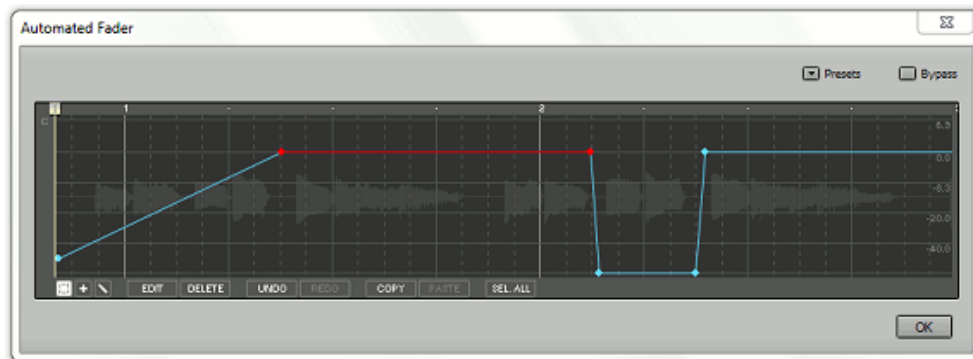
You can use either the keyboard or the mouse to control the transport while an effect's user interface is on screen. In particular the Alt+Left Arrow (Windows) / Command-Left Arrow (Mac) key combination will be useful when setting up effects. Some VST/AU/DX plugins can gain "keyboard focus", which makes it impossible to control the transport using the keyboard. You can click the righthand part (the "MultitrackStudio part") of the plugin window to restore keyboard focus.



Effect Selector (Pro Plus edition)

## 7.1 Automated Fader

The Automated Fader is a volume control that can be programmed to change over time. It can be used to attenuate, amplify or mute part of a track. It can also be used to turn off Reverb or Echo effects if used in an Effect Return section or in a Parallel Effect.



*Automated Fader window (two dots selected)*

The fader will move in a linear fashion from one dot to another. Dots can be added, removed or moved using the editor.

The editor can work in one of three modes:

- **Select:** clicking a dot selects it, pressing the mouse in "empty space" and moving it selects dots. Selected dots can be moved.
- **Add:** clicking in "empty space" adds a dot, clicking a dot selects it. Moving the selected dot(s) is possible as well. You can add 4 dots in one go by moving the mouse horizontally while clicking to add a dot. After moving a certain distance (approx. a centimeter) 4 dots will appear.
- **Draw:** draw free-hand.

The buttons in the bottom left corner can be used to switch mode. The Alt key (Windows) / Option key (Mac) can be used to temporarily switch between Select and Add mode. Selected dots appear in red.

**Delete** removes the selected dot(s).

**Sel. All** selects all dots.

**Undo** and **Redo** let you undo and redo edits.

**Copy** and **Paste** let you exchange data between Automated Faders, MIDI Controller editors and Automation editors

**Edit:** if a single dot is selected the Edit button pops up a window where you can type a new value for the selected dot (eg. "-20" to move the dot to -20 dB). If multiple dots are selected the Edit button pops up a window where you can 'amplify' the selected dots, so the vertical distance between them changes.

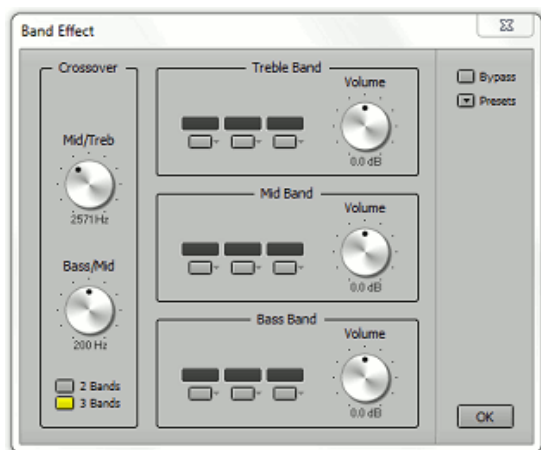
Editing the fader is not possible while the Transport is running.

If used in a track the track's audio/MIDI data is displayed in the background. Scrubbing will be available as well, it doesn't include any effects (including the Automated Fader itself).

*Note: Editing tracks in Ripple mode does not update Automated Faders, the Song Editor does.*

## 7.2 Band Effect

The Band Effect splits the audio signal in two or three frequency bands. Each band can have its own effects. After effects processing the three bands are mixed, where the **Volume** knobs control the band levels.



*Band Effect window*

The bands are split using first order filters.

Using the Band Effect you can build a three band compressor for mastering purposes, for example.

### Vocal Removal

The Vocal Removal preset is a vocal remover built with a Band Effect. The Mid Band includes a Stereo Effect with a Phase Inverter effect in order to remove the sound at the center of the stereo image. As a result, the mid frequencies at the center of the stereo image are removed. The Bass/Mid and Mid/Treble knobs can be adjusted to keep as much bass and treble as possible while still attenuating the vocals sufficiently. Vocal Removal only works if the audio signal is stereo, the vocals are panned center, and there's not an excessive amount of stereo reverb on the vocals.

## 7.3 Chorus

The Chorus effect adds thickness and warmth to the signal. The output signal is a mix of the input signal and a delayed copy of it. The delay time is modulated.



*Chorus window*

The **Delay** knob sets the average delay time. The **Speed** and **Depth** knob control the modulation.

The **Mix** knob sets the dry/wet ratio (0% being dry only, 100% being wet only). If you use an Effect Return for adding Chorus set Mix to 100%. If used as an insert effect Mix will usually be set below 50%.

The **No Color** button removes the coloration traditionally associated with Chorus effects. This works best with Mix values of approximately 50%.

When the **Stereo** button is active a stereo chorus effect will be applied to mono signals (this is usually the effect you're looking for). The **Reverse St.** button is identical, except that the signal will 'spin' in opposite direction.

## 7.4 Compressor

The Compressor attenuates loud parts, while leaving soft parts untouched. Apart from this, it can make sounds 'fatter' or just make them fit better in the mix without any significant compression taking place.



Compressor window

**Threshold** controls the level above which compression takes place

**Attack** controls how fast the Compressor will attenuate loud signals, while **Release** controls the time it takes to stop attenuating after a loud signal ended. Low Release times can cause distortion at low frequencies.

**Gain** sets the amount of gain applied after the compressing action is done. As the Compressor attenuates loud parts the overall level drops. The Gain control compensates for this level drop. By activating the **Auto Gain** button the Compressor will automatically adjust the Gain control.

**Program** selects the program used:

- **Clean** is as transparent as possible. This is a 'feedforward' compressor, which is the way typical modern compressors work.
- **Vintage** is less transparent, but has more character. This is a 'feedback' compressor, which is the way older (tube or opto) compressors work.
- **Warm Vintage** is like Vintage, but modified so it produces more even harmonics.

The **Side Chain** section is available with the Clean program only.

Typical applications of Side Chain section's effect slot are:

- Use an EQ effect to attenuate the bass frequencies in order to avoid the compressor overreacting to it, which can lead to "pumping".
- Use an EQ effect to boost certain unwanted frequencies, so the compressor attenuates them

The **Transfer Curve** (bottom left) shows the effect of the Threshold, Ratio and Knee settings. It ignores the effect of the Gain knob. The horizontal axis represents the input, the vertical axis represents the output. The **Level History** (top left) shows the relative amount of time the input signal is at a certain level (the higher the bar, the more time). The Level History will be reset when either the Transport is started or the Compressor window pops up. You can be reset it manually by pressing the F5 key (Windows) / Command-R (Mac).

## 7.5 Convolver

The Convolver effect processes the audio signal using an impulse response file. Its main purpose is generating Reverb. In this case the effect will typically be used in an Effect Return section.



Convolver window

In simple terms the Convolver works like this: If you clap your hands in a hall you hear a few seconds of reverb. It's not hard to imagine that knowing this reverb it is possible to calculate the hall's response to a guitar (or any sound). This indeed is the case. We use ideal handclaps (impulses) and generalized reverbs (impulse responses). When viewed in an editor an impulse looks like one small dot (and the rest is just

silence). Now you can understand what the convolutor does: a recording of a guitar contains lots of dots in the editor, and the convolutor treats every single dot as a handclap. Adding all the handclaps makes the hall's response to the guitar!

Note that if you whistle in a hall the hall's response only contains tones you whistled. This is a necessary condition for creating the exact response: the thing you want to model may not generate frequencies you didn't put in. This means you cannot use the Convolutor to generate distortion or to shift pitch.

Using the **Load** button you can load an impulse response file. The Pro Plus edition comes with the "Vintage Reverbs", a collection of 4 plate reverbs, 2 spring reverbs and 2 digital reverbs. You can organize your own impulse responses just like you can sampler patches (see Organizing your patches).

**Length Limit** controls the part of file that's actually being used. The lower this value, the lower the Convolutor's CPU usage.

Use the **Use mono impulse on mono input** button if you don't want mono input signals to be converted to stereo (this happens if the impulse file is stereo). Doing this halves the Convolutor's CPU usage. Clicking the Mono Button has no effect until the Transport is restarted.

**kHz** should be set to the samplerate of the impulse response file. MultitrackStudio will detect this value automatically on loading a file if the file provides samplerate information. Impulse response file are typically sampled at 44.1 kHz.

**Volume** controls the output level. This control will be updated automatically when a new file is loaded using the Load button.

Use the **Delay** knob to add a delay to the processed signal. This can be useful for reverb applications.

The **Mix with input** button adds the input signal to the output of the effect.

The Convolutor is 'zero latency', so it doesn't add a delay to the signal. If the Convolutor is used 'live' (either in a recording MIDI track with a software instrument, or in a recording audio track using the Soft Monitoring feature) a small latency may occur if the sound device buffer size isn't a power of two (256, 512, 1024 etc.).

### Recording impulse response files

You can create your own impulse response files using the Impulse.gjm file. This file contains a single impulse at about 50 ms from the start of the file (to make sure that is gets at the output of your sound device, even if it has some kind of fade-in algorithm to avoid clicks).

**Windows:** Impulse.gjm is located in the folder where MultitrackStudio is installed (usually C:\Program Files\MtStudio).

**Mac:** To use Impulse.gjm you should Ctrl-click MultitrackStudio.app and choose Show Package Contents. Now copy the Impulse.gjm from the Contents/MacOS folder to a more convenient location.

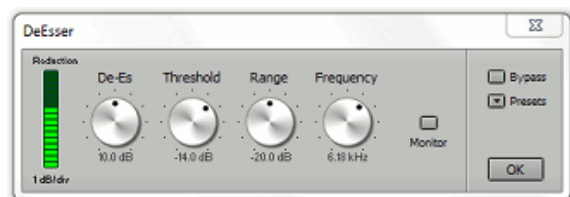
Recording an impulse response file is easy:

1. Connect your sound device's output to the input of the piece of gear you want to use.
2. Connect the piece of gear's output to your sound device's input.
3. Load 'Impulse.gjm' in a track. The track should be in playback mode.
4. Set up another track that will record the impulse response file.
5. Record a few seconds and then use the recording track's Editor to check the level of the recording: it should be just below full scale. If necessary record it again.
6. Export the piece of the recording that contains the impulse response. The starting point is just before the pulse appears in Impulse.gjm. The ending point is where the impulse response has faded (look at editor and/or listen). Impulse responses typically have a length of 1..4 seconds for reverbs. For other things 0.5 seconds usually will do.

If your sound device makes clicking sounds when you start the Transport you should edit Impulse.gjm so that the impulse is at about 1 second from the start.

## 7.6 Deesser

The Deesser effect reduces 'S' sounds in vocals in a very unobtrusive manner.



Deesser window

**De-Es** controls the amount of attenuation applied to 'S' sounds. Applying too much attenuation will result in unnatural sounding vocals.

**Threshold** controls the level above which the Deesser becomes active.

**Range** controls the dynamic range the Deesser operates on. The threshold can be made to float within a certain range, so low-level parts can also be effectively deessed.

**Frequency** controls the frequency above which 'S' sounds are detected. If this control is set too low the Deesser will be too sensitive (i.e., sounds that are not a 'S' will be attenuated). By activating the **Monitor** Button you can hear the filtered signal the Deesser uses. You can use this option to judge whether the Frequency control is set at the right position (ideally you only hear 'S' sounds and nothing else!).

## 7.7 Doubler

The Doubler emulates "Artificial Double Tracking" as it was done with tape recorders in the sixties. It is typically used on vocal tracks to make the vocals sound a bit 'fatter'.

The Doubler mixes a delayed copy of the signal with the original signal. The delay time is modulated with a randomized triangle wave. This results in slight timing and pitch differences between the two voices.

The **Delay** knob sets the average delay time. Low delay values result in a 'fatter' voice rather than two separate voices. High delay values result in two separate voices. The **Speed** and **Depth** knob control the modulation.



Doubler window

The **Mix** knob sets the dry/wet ratio (0% being dry only, 100% being wet only). Lower values result in a subtle thickening of the sound without noticeable doubling.

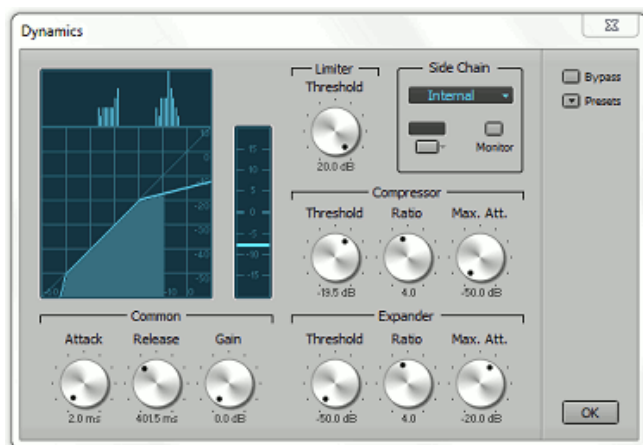
If you want to pan the two voices to a different position in the stereo image you can use a Stereo Effect. Load a Doubler in one channel and set its Mix control to 100%. You can then use the Stereo Effect's Pan controls.

The Doubler effect can also model sixties style phasing/flanging effects, since these were done with tape recorders in a similar setup as well. The following settings can be used as a starting point for this: Speed=0.18 Hz, Depth=1.5 ms, Delay=2 ms, Mix=46%, Phase Invert=On.

The **Phase Invert** button inverts the phase of the delayed signal. This results in a different sound, particularly at lower delay settings.

## 7.8 Dynamics

The Dynamics effect combines a Limiter, a Compressor and an Expander in one effect. The Transfer Curve Display shows what the effect is doing.



*Dynamics window*

**Attack** controls how fast the Compressor and Limiter will attenuate loud signals, while **Release** controls the time it takes to stop attenuating after a loud signal ended. Low Release times can cause distortion at low frequencies.

**Gain** sets the amount of gain applied after dynamics processing has been done.

**Limiter Threshold** controls the level above which the limiting action takes place.

The **Expander** can be used to attenuate background noise.

The **Transfer Curve** shows the effect of the current settings. The horizontal axis represents the input, the vertical axis represents the output. The **Level History** (top left) shows the relative amount of time the input signal is at a certain level (the higher the bar, the more time). The Level History will be reset when either the Transport is started or the Dynamics window pops up. You can be reset it manually by pressing the F5 key (Windows) / Command-R (Mac).

## 7.9 Echo

The Echo effect produces one or more echoes, depending on the **Feedback** control. If Feedback is zero, only one echo is produced. Otherwise a decaying sequence of echoes is produced.



*Echo window*

**Delay** controls the time it takes for the first echo to arrive (and the time between two consecutive echoes). The delay time is displayed in milliseconds and notes.

**Lo-cut** sets the frequency below which attenuation takes place (this typically happens in tape echo units).

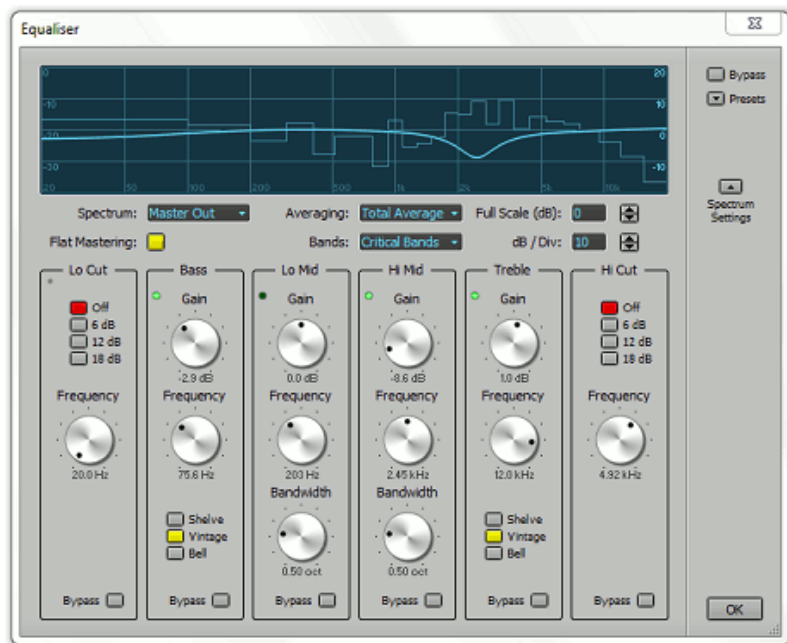
**Hi-cut** sets the frequency above which attenuation takes place (this also happens in nature and in tape echo units).

**TapeSound** controls the amount of flutter and distortion.

**Mix** controls the level of the echoes that are mixed with the dry (input) signal (0% is dry only, 100% is echo only).

## 7.10 EQ

The EQ effect consists of six tone control sections. The overall transfer is showed in the display at the top. Each section has its own Bypass button.



EQ window

## Lo Cut

The Lo Cut section is a lo cut filter. The cut off rate can be 6,12 or 18 dB/octave. The cut-off frequency can be 20 Hz up to 2 kHz.

## Bass

The Bass section can be a shelving or bell-type equalizer. Boost/Attenuation can be -12 dB to +12 dB. Frequency can be 20 Hz to 1 kHz. If the Vintage button is active the equalizer follows the classic Baxandall curves: cutting low frequencies will be accompanied with a slight boost of the lower-middle range and vice versa. If the Shelve button is active no dipping or peaking will occur. If the Bell button is active the equalizer will affect a one octave band only.

## Lo Mid

The Lo Mid section is a parametric equalizer. The center frequency can be 50 Hz up to 2 kHz. The Bandwidth can be 0.05 to 2 octaves. The Gain can be -12 dB to +12 dB. The section is inactive when Gain is zero (the green indicator will dim).

## Hi Mid

The Hi Mid section is a parametric equalizer. The center frequency can be 500 Hz up to 12 kHz. The Bandwidth can be 0.05 to 2 octaves. The Gain can be -12 dB to +12 dB. The section is inactive when Gain is zero (the green indicator will dim).

## Treble

The Treble section can be a shelving or bell-type equalizer. Boost/Attenuation can be -12 dB to +12 dB. Frequency can be 1 kHz to 20 kHz. If the Vintage button is active the equalizer follows the classic Baxandall curves: cutting high frequencies will be accompanied with a slight boost of the upper-middle range and vice versa. If the Shelve button is active no dipping or peaking will occur. If the Bell button is active the equalizer will affect a one octave band only.

## Hi Cut

The Hi Cut section is a hi cut filter. The cut off rate can be 6,12 or 18 dB/octave. The cut-off frequency can be 500 Hz up to 20 kHz.

## Spectrum Display

The actual frequency spectrum of the audio signal can be shown in the graph. This can be a great help in setting up the EQ.

Clicking the button at the bottom-right corner of the graph will show a menu that controls the frequency spectrum that's shown in the graph:

One of the following signals can be shown:

- EQ input
- EQ output
- Master section's output (if the EQ is used in the mixer's Master section) (*Pro Plus edition only*)
- Other sidechains (*Pro Plus edition only*)

The realtime behavior can be one of the following:

- Real time: This option looks nice, but isn't of great value when it comes to setting up the EQ.
- Average: a moving average is displayed.
- Total Average: The average is displayed.

The averages will be reset automatically when either the Transport is started or the EQ window pops up. You can reset the averaging mechanism manually by pressing the F5 key (Windows) / Command-R (Mac).

The full scale value can be 0, -10, -20 or -30 dB. The scale can be either 10 or 20 dB/division.

The spectrum can be shown using:

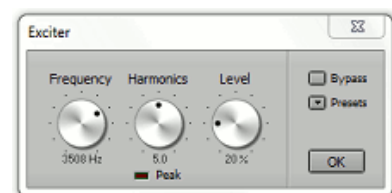
- No Bands: high resolution, but of little psycho-acoustic value.
- 1/3 Octave Bands: Similar to Critical Bands at higher frequencies, but higher resolution in the lower range.
- Critical Bands: this is the way the human ear works.

Well mastered recordings typically have a spectrum that's flat at frequencies below 500 Hz, and decreases at 20 dB/decade (6 dB/octave) above this frequency. The **Flat Mastering** option boosts frequencies higher than 500 Hz with 20 dB/decade, so a well mastered recording will show a flat spectrum. Potential problems can be easily found this way.

## 7.11 Exciter

The Exciter effect adds harmonics to the treble part of the audio signal. The harmonics generator is modeled after a vacuum tube.

The **Frequency** knob controls the frequency above which harmonics are added. For best performance only the top octave of the input signal should be used. If Frequency is set too low the output will sound distorted instead of excited.



*Exciter window*

The **Harmonic** knob controls how hard the internal harmonics generator is driven. The higher its value, the more harmonics will be generated. If the harmonics generator is driven too hard the signal will be limited to avoid excessive distortion, and the **Peak** indicator will light. This is to be avoided, as the effect is intended to add more harmonics when the signal is loud.

The **Level** knob controls the level of the added harmonics.

The Exciter can be set up this way:

1. Make sure the Transport is started.
2. Set the Frequency and Level knobs to their maximum value, set the Drive knob to its middle position.
3. Turn down the Frequency knob until you hear the highest frequencies of the signal.
4. Adjust the Harmonics knob. If set too low, the level of the generated harmonics will be too low (you'll just hear a high-pass filtered version of the original signal). If set too high, the Peak indicator will light during signal peaks.

5. Set the Level knob to its minimum value.
6. Turn up the Level knob until you're satisfied with the sound.

## 7.12 Flanger

Flanging is the effect that occurs when two tape recorders playing back the same signal run slightly out of sync.



Flanger window

The **Delay** knob sets the average delay time. The **Speed** and **Depth** knob control the modulation.

The higher the **Feedback** position, the more effective the effect is.

When the **Stereo** button is active the delay times of both stereo channels will be modulated with out-of-phase signals. With low delay settings this sounds like a rotating speaker. **Reverse St.** button is identical, except that the signal will 'spin' in opposite direction.

## 7.13 Guitar Amp

*Note: this feature is available in the Pro Plus edition only. The WinSound driverset doesn't allow for playing the amp live.*

The Guitar Amp effect emulates three vintage guitar amps: Combo USA, Combo UK and Stack. It emulates the amp, its speaker and the microphone recording it.



Guitar Amp window

### Guitar section

The **Input** knob controls the level of the guitar signal presented to the amp. The three lights located next to the knob serve as level indicator. They can be used to make the amp see the same input level a hardware amp would. The SC (single coil) light will light if the level equals the output of a single coil pickup. The HB (humbucker) light will light if the level equals the level of a humbucker pickup. The Hot light will light if the level is even higher, in this case you're using a virtual booster stomp box. Note that the lights assume you're playing the guitar as hard as possible (eg. some powerful rhythm chords). The lights are supposed to light during the loudest signal peaks only. Don't worry if no light ever lights while playing more subtle parts: a real amp would see a lower level too.

The lights are just a way to make it easy to set up the amp to work just like the hardware version. You can ignore them if you like. You can, for example, use a higher setting to get more distortion.

A guitar amp's 'Lo' input is typically 6 dB less sensitive than the 'Hi' input. You can turn the Input knob down 6 dB in order to virtually plug your guitar in the Lo input.

The guitar's sound can be made less bright using the **Shrill Kill** knob. Several things can cause a guitar to sound overly bright ("glassy"): bad strings, a short guitar cable or an audio interface which doesn't provide the relatively high input capacitance a tube amp would. The Shrill Kill knob compensates for these effects.

### Microphone section

The **Cntr/Edge** controls the position of the recording microphone. 0% is at the center of the guitar cab's speaker, 100% is at the edge. The knob offers 7 positions.

The **Output** knob controls the output level. The meter on the right shows the output level. It is important to stay out of the red section if the amp is played live, in order to avoid clipping. Typical values range from 0 dB (overdrive sounds) to approx. 10 dB (clean sounds).

### Amp section

The **Model** buttons control the type of amp that's being used. The other controls are different for each amp model.

The **Combo US** model features **Volume**, **Treble**, **Mid** and **Bass** knobs and a **Bright** switch. The Bright switch has no effect if the Volume knob is all the way up.

The **Combo UK** model features three channels. The **Brilliant** channel features **Volume**, **Treble**, **Bass** and **Cut**. The Cut knob attenuates high frequencies. The **Normal** channels features **Volume**, **Bass** and **Cut** knobs. The Bass knob cuts a certain amount of bass, closely emulating the the bass response of various versions of this particular amp. The **Booster** channel is in fact the normal channel with a built-in treble booster. The **Boost** knob controls the amount of boost. The Booster channel doesn't feature a Bass knob.

The **Stack** model features **Volume**, **Treble**, **Mid** and **Bass** knobs. In addition there are **Bottom**, **Hot** and **Gain** buttons. These buttons change certain components of the amp, and hence change the sound. All variations correspond to versions of the hardware amp being modeled.

### Using the Guitar Amp

It's best to connect your guitar to a high impedance input. Low impedance inputs compromise the guitar pickup's treble response. Some sound devices have a dedicated instrument input. A high-impedance DI box or preamp can be used if your sound device doesn't have one. You can also try using a stomp box effect as DI box.

To play the Guitar Amp live you should click the Track's Rec button, and turn on the Mon (Soft Monitoring) button (located at the top of the main window). This only works with the AsioSnd or VistaSound driversets.

You can use effects to further enhance the sound. You can, for example, use Echo, Reverb (set Width to zero to make it mono) and/or Tremolo effects with one of the combo amps. Use them in this order, and before going through the Guitar Amp, to be as close to the real thing as possible. You can place them in a Multi Effect if you run out of effect slots.

The Guitar Amp's output signal is similar to the signal coming from a microphone placed close to a guitar cab. One will typically apply studio type effects like EQ, compression and reverb to it. Clean guitar sounds will benefit from a Compressor effect (turn up the Attack knob to approx. 25 ms.).

The Guitar Amp uses significantly more CPU power than most other effects because it runs at a higher samplerate internally. It is, however, much more efficient if the input is silent (because the guitar plays the chorus only, or it plays the solo and the outro only etc.). You can take advantage of this feature by using an Automated Fader effect before the Guitar Amp to mute the silent parts in recordings. This is necessary because the noise which is always present in recordings will be seen as a non-silent signal by the Guitar Amp.

## 7.14 Master Limiter

The Master Limiter can be used to maximize the level of the mix. It's supposed to be used in the last (right hand) effect slot of the Master section.

Note that the output signal will be delayed by the amount of time set by the Ahead control.



Master Limiter window

**Drive** controls the amount of amplification.

The Master Limiter 'looks ahead into the future', so it can turn down the level before the signal peaks. **Ahead** controls how far the limiter will look into the future. The attack time of the limiter depends on the Ahead control (the shorter this time, the faster the attack).

The Master Limiter automatically optimizes the limiter's release time (ie. the time it takes to turn up the level again after the signal peaked) to ensure fast release times while keeping distortion low. The **Release** control acts as a multiplier for this value.

The level is always limited just below the digital full scale level (-0.3 dB). This small margin serves to avoid distortion in samplerate converters, CD players, soundcards etc.

The **RMS Output** meter indicates the perceived loudness. A pop song's chorus typically reads approx. -17 dB, that's why this level is marked by a triangle. Classical music typically read approx. -23 dB during forte parts.

*Note: the -17 dB and -23 dB levels correspond to the 0 dB levels of the K-14 and K-20 metering systems respectively.*

The **Peak Statistics** display shows the relative amount of time the input signal is at a certain level (the higher the bar, the more time). This gives you an idea as to what the limiter is doing to the audio signal. There's a colored 'curtain' on the right side of the display that can be moved using the Drive knob. The vertical bars that are covered by the curtain are limited. You'd typically want to limit a couple of small bars only. The statistic display will be reset when either the Transport is started or the Limiter window pops up.

The small horizontal bar at the bottom of the Peak Statistics display shows the current input peak level.

In short, setting up the Master Limiter goes like this:

- Make sure the Master Limiter's window is on screen.
- Start the Transport and play a chorus. Adjust the Drive knob so the RMS Output meter reads approx. -17 dB.
- Make sure the Peak Statistics display doesn't indicate too much limiting (ie. no large bars are behind the curtain). You may have to turn down the Drive knob a bit, or apply more compression before the Master Limiter.



Limiter Slot

The amount of gain reduction is shown in the effect slot containing the limiter, so you can get an idea of what the limiter is doing without having to open its user interface. It appears in a modest color up to 6 dB, and in red from 6 dB on.

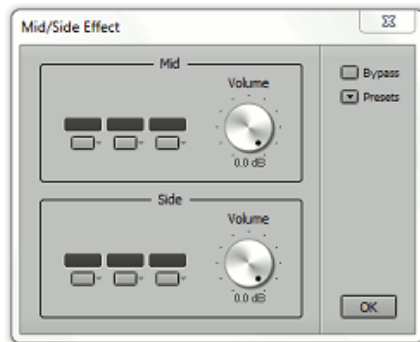
The **No gain** button can be used while toggling the Bypass button in order to compare the sound using the Master Limiter to the sound without. The No gain button compensates for the gain that's applied by the Drive knob, so the signals have equal levels.

## 7.15 Mid/Side Effect

*Note: this feature is available in the Pro Plus edition only.*

The Mid/Side Effect lets you apply effects to the Mid and Side parts. The incoming stereo channels (left and right) are converted to Mid and Side parts. Then any effects or level changes are applied. Finally the Mid and

Side parts are converted back to left and right channels.



Mid/Side Effect window

The Mid/Side Effect can be used to correct problems in a full mix. In a typical pop song lead vocals and bass will be in the Mid part exclusively, while many backing instruments are in the Side part or in both parts. An EQ is the most commonly used effect. You can use it in the Mid section to EQ the lead vocals. You use it in the Side section to make the cymbals a bit louder without affecting the vocals, for example. Another idea is to use a Band Effect with a Dynamics effect in one of it's bands, in order to make the vocals a bit louder or brighter etc.

The Mid/Side Effect has no effect if the input signal is mono.

*Note: mid/side tricks typically come into play when it's not possible to redo the mix. Redoing the mix is often easier and better.*

## 7.16 Multi Effect

The Multi Effect is a container for other effects. Use it if you need more effect slots than available.



Multi Effect window

When loading a Multi Effect the effect which is currently in the slot is moved to the Multi Effect. If you keep down the Ctrl key (Windows) / Command key (Mac) while clicking the effect selector's Multi Effect item all related effect slots will be moved to the Multi Effect (eg. all the track's effects, all a Stereo Effect's Left Channel effects etc.).

The Multi Effect can also be used for making effect presets consisting of more than one effect (for instance a 'vocal channel' consisting of EQ, Compressor and Deesser).

## 7.17 Noisegate

The Noisegate attenuates signals below a certain level. It can be used to remove noise (or headphones recorded by a vocal mic) from a track.



Noisegate window

**Threshold** determines the level below which the signal is attenuated. **Reduction** controls the amount of

attenuation applied to signals below the threshold. Applying lots of attenuation can make a Noisegate slow.

**Attack** controls the time it takes for the Noisegate to open (ie. let the signal through). **Release** controls the time it takes for the Noisegate to close (ie. attenuate the signal). Attack and Release show the time needed for 60 dB attenuation change. **Hold** sets an absolute time to wait after the signal drops below the threshold. The release phase starts when the Hold time has elapsed.

The **Open** indicator lights when the gate is open.

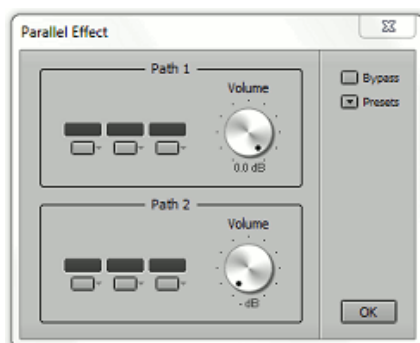
The **Level History** on the left shows the relative amount of time the sidechain signal (after effects processing) is at a certain level (the higher the bar, the more time). Also, the current input level is shown horizontally at the bottom. This Level History makes it very easy to set up the threshold. There's a colored 'curtain' on the left side of the display that can be moved using the Threshold knob. The signal bars that are covered by the curtain are muted (the gate is closed). The Level History will be reset automatically when either the Transport is started or the Noisegate window pops up. You can be reset it manually by pressing the F5 key (Windows) / Command-R (Mac).

In short, setting up the Noisegate goes like this:

- Make sure the Noisegate's window is on screen.
- Press the Space bar to start the Transport, play the whole song and press the Space bar again to stop.
- If there are two distinct groups of vertical bars, then adjust the Threshold knob so that the 'curtain' covers the left group. If there's just one group, or two groups that aren't separated very well, then you can try using an EQ effect in the Side Chain section.

## 7.18 Parallel Effect

The Parallel Effect has two signal paths. Each path has its own effect slots. The outputs of the two paths are mixed using the **Volume** controls.



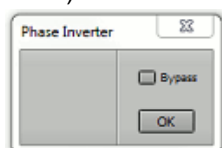
*Parallel Effect window*

The Parallel effect can be used to add effects. For example, echo can be added to a part of a track using an Echo and an Automated Fader effect in one of the paths.

Another application is parallel compression, which is popular in classical music. By using a Compressor effect in one of the paths the dry and compressed signals can be mixed.

## 7.19 Phase Inverter

The Phase Inverter simply inverts the phase of the signal. This effect can be used to correct out-of-phase stereo recordings. Another possible application is larger-than-live stereo positioning (using the Stereo Effect).



*Phase Inverter window*

## 7.20 Phaser

The Phaser effect has a selectable number of **Notches** (frequency regions that are attenuated) that can be moved through the frequency spectrum slowly. Traditional stomp-box type of phaser used with electric guitars typically have two notches, expensive studio devices have a higher number of notches. The Phaser effect is particularly suited for electric piano and electric guitar.



*Phaser window*

**Frequency** controls the tonal character of the effect.

**Range** determines the distance the notches move. High values can lead to noticeable pitch shifts.

**Speed** controls the speed used to move the notches.

**Depth** controls how deep the notches are (the deeper the notches, the more intense the effect).

The **Stereo** button can be used to create a stereo effect by moving the left and right channel notches in opposite directions.

## 7.21 Pseudo Stereo

The Pseudo Stereo effect converts a mono signal to stereo using a filter.



*Pseudo Stereo window*

Two filter types are available:

- **Shelve:** Low frequencies are directed to the left channel, high frequencies are directed to the right channel. The Color knob controls the crossover-frequency.
- **Comb:** A delayed signal is added to the left channel and subtracted from the right channel. The Color knob controls the distance between the notches of the comb filter.

The **Spread** knob controls the resulting stereo width. The **Reverse** button reverses the left and right channels.

The effect doesn't do anything if the input signal is stereo. The Pseudo Stereo effect is mono compatible (if the stereo outputs are summed the resulting signal is equal to the original mono input signal).

## 7.22 Reverb

The Reverb effect contains four programs:

- **Room** is a small room program, can be used to add 'ambience' to vocals.
- **Chamber** is an echo chamber program.
- **Hall** is a concert hall program.
- **Plate** is plate program.

The Reverb effect is typically used in an Effect Return section.



Reverb window

The Main section contains the most important controls.

**Rvrb time** controls the reverb time.

**Mix** mixes the wet (ie. reverb) and the dry (ie. input) signal. 0 % is dry only, 100% is wet only. 100% will be used if the effect is used in an Effect Return section.

**Width** controls the stereo width of the reverb.

**Pre Delay** controls the time it takes for the first reflection to appear.

The Color section contains controls that affect the tonal character of the reverb.

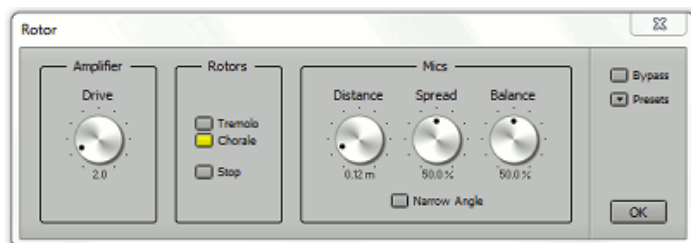
**Lo Mult** is a multiplier for the low frequency reverb time, while **Lo Freq** sets the frequency below which Lo Mult is active.

**Hi Cut** sets the frequency above which the reverb time is decreased gradually.

If **Spin** is not zero some of the reverb algorithm's parameters are modulated with a low frequency signal. This makes the reverb more random and smoother. Too much Spin will introduce noticeable pitch shifts in the reverb (easily noticeable on piano parts). Percussion parts may benefit from a higher Spin setting.

## 7.23 Rotor

The Rotor effect simulates a rotating speaker. It consists of bass and treble speakers rotating independently. The speakers are driven by a tube amplifier and two microphones are used to pick up the sound.



Rotor window

The Amplifier section contains the **Drive** control that controls the level the 'tube amplifier' is operating on. This can be used to add tube distortion.

The Rotors sections controls the speaker's rotation speed. **Tremolo** is fast, **Chorale** is slow. Your MIDI keyboard's Modulation wheel can be used to switch speed if the Rotor is used in a Wheel Organ's effect slot. (Controller #1: 64 or higher is Tremolo, lower values correspond to Chorale.) The **Stop** button can be used to keep the rotors at a fixed position.

The Mics section controls the microphone placement used to record the speaker cabinet. **Distance** controls the distance between the mics and the cabinet. **Spread** controls the stereo channel separation. **Balance** controls the relative levels of the treble and the bass speakers. The cabinet is miked with two microphones at a 180 degree angle. This angle can be reduced to 90 degrees using the **Narrow Angle** button.

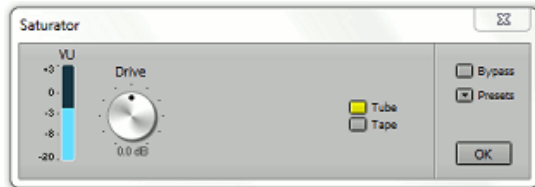
## 7.24 Saturator

The Saturator effect adds either Tube or Tape type distortion, depending on the **Tube** and **Tape** buttons. The Drive knob controls the amount of distortion. The output level is approximately equal to the input level.

## Tube

The Tube program simulates a preamp with an output transformer. The preamp mainly generates second order harmonics, the transformer generates lower order odd harmonics. The Tube program adds harmonics, not unlike an exciter effect.

**Drive** controls the signal level that's fed to the virtual preamp's input. The VU meter shows the average value. At 0 dB total harmonic distortion is approx. 2%.



*Saturator window ('Tube')*

## Tape

The Tape program models distortion, high frequency compression, low frequency peaks and wow & flutter. It can be used on individual tracks to make them sound a bit warmer. The Tape program can also be used on a full mix (ie. in the Master section). This makes the tracks blend better.

**Drive** controls the virtual recording level. The VU meter shows the average value of the recording level. At 0 dB VU total harmonic distortion is approx. 1%.

**LF Peak** controls low frequency peaks ("bumps"). **Flutter** controls the amount of wow & flutter.



*Saturator window ('Tape')*

## 7.25 Stereo Effect

The Stereo Effect has separate groups of effect slots for the left and right channels. After effects processing the two signals are mixed to stereo using their **Volume** and **Pan** controls.



*Stereo Effect window*

Use the Stereo Effect if you want to apply different effects to the left and right channels. You can, for instance, apply tremolo, vibrato or echo to one channel only.

The Stereo Effect can also be used to narrow stereo-width or swap the channels (using the Pan knobs), or to mute one of the channels. If the input signal is mono, both channels will receive this mono signal. As a result, the effect can be used as a 'parallel effect loop' for mono signals.

## 7.26 Transposer

The Transposer effect shifts the pitch of the audio signal by the amount set by the **Semitones** and **Cents** knobs. Pitch can be shifted up to one octave up or down. The Transposer features two programs: **Monophonic** and **Polyphonic**.

### Monophonic

The Monophonic program is optimized for monophonic ("one note at a time") audio. It features a Formant knob which shifts the formant of the sound. Pitch shifting sounds most natural if the formant is shifted in the other direction (ie. if pitch is shifted up 2 semitones the formant should go down two semitones).



Transposer window ('Monophonic')

### Polyphonic

The Polyphonic program is optimized for polyphonic audio. It is extremely CPU efficient while still producing good sounds. Part of the efficiency comes from a limited headroom, which is where the **Level** knob comes in. If the light above it lights up the audio signal is clipped and you should turn the Level knob down a bit. This typically won't happen, but it may if the signal has been amplified by other effects. If a track has been recorded at a very low level you can turn up the Level knob to maximize sound quality.



Transposer window ('Polyphonic')

*Note: the Transposer only works if delay compensation is available. In short this means it doesn't work 'live' using Soft Monitoring.*

## 7.27 Tremolo

Tremolo modulates the level of the signal with a sine wave.

Modulation **Speed** and **Depth** can be adjusted.

The **Stereo** button can be used to create a stereo effect by modulating the right channel with phase shifted version of the sine wave.

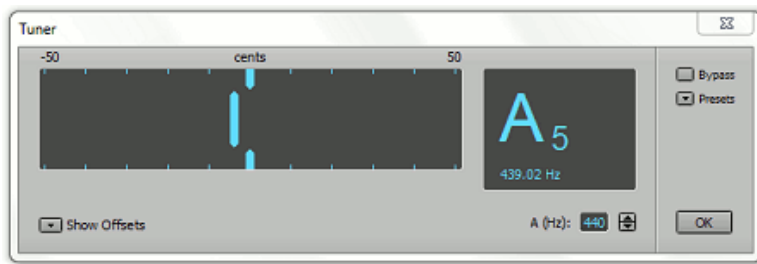
If the **Vintage** button is checked the characteristics of a vintage analog tremolo effect are emulated. The Tremolo effect can also be used as an 'analog warmer' (set Depth to zero).



Tremolo window

## 7.28 Tuner

The Tuner effect can be used to tune instruments like guitar, bass etc.



Tuner window

The Tuner typically works best if it's used before any other effects (like the Guitar Amp).

The **A** box determines the frequency of note A5. The Tuner effect can be used to measure the frequency of an A5 played on, for example, a piano. This value can be entered in the A box, so other instruments can be tuned to the same pitch.

*Note: in order to use the Tuner effect you should engage the track's Rec button. Alternatively you can make sure Practice Mode is being used.*

## 7.29 Vibrato

Vibrato modulates the pitch of the signal with a sine wave.



Vibrato window

Modulation **Speed** and **Depth** can be adjusted.

## 7.30 Vocal Tuner

The Vocal Tuner can be used to correct out-of-tune vocals. It features two programs: **Natural**, which corrects pitch in a very unobtrusive manner, and **Modern**, which sounds a bit synthetic and robot-like. The Vocal Tuner is a mono effect, you can use it on a stereo track but the signal will be converted to mono.



Vocal Tuner window: gray curve is input, blue curve is output pitch

## Natural

The Natural program works as unobtrusively as possible.

The **Speed** knob sets the speed at which pitch is corrected. A slow setting leaves note onsets and vibrato intact.

**Preserve Formant** corrects the formant so the results sound more natural. This isn't necessary if pitch is shifted by a small amount only.

## Modern

The Modern program sounds a bit synthetic and robot-like. This sound has become quite popular in recent years.

The **Correction** knob sets the amount by which out-of-tune notes are corrected. At 100% pitch is perfect, which usually sounds rather synthetic. Lower settings allow for more natural sounds. The **ignore** sections contains knobs that make the tuner ignore certain parts of the sound in order to avoid unwanted artifacts.

**Ambient** ignores background noise during silent parts. **Sibilant** ignores unpitched sounds like "s". Note that the Vocal Vocal doesn't do anything if you turn an "ignore" knob up by too much.

## The key editor

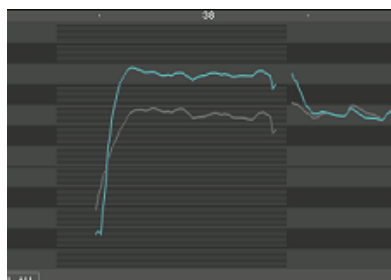
Pitch is quantized to the closest key. Using the key editor you can turn keys off for certain parts. If a key is off pitch is quantized to the closest key which is on. The key editor looks like a one-octave pianoroll. You can select part of a horizontal bar that represents a key using the mouse, and use the ON or OFF buttons to switch the selected part on or off. Selecting multiple adjacent keys is possible as well.

The key editor shows both the input pitch (dimmed color) and the output pitch (bright color). The pitch curves appear while the transport is running, so you need to replay the part you've edited in order to see the result.

The best way to use the Vocal Tuner depends on the vocal track:

- If it's more or less OK you can use a Vocal Tuner to add some polish, no editing required.
- If the vocals are really good but a few notes are off you can process just those notes. To do this you can click "SEL. ALL" followed by "OFF" to turn all keys off. Then find the bad notes, select all 12 keys in those places and switch them on.
- If the vocals are pretty bad the Vocal Tuner may quantize to the wrong notes. This can happen if, for example, an F is so low it's closer to E than to F. You can solve this by selecting the E key and turning it off.

The Vocal Tuner can be used to change the melody. In the picture below all keys are off except A, so the G is turned into an A.



Vocal Tuner editor, all keys off except A

*Note: the Vocal Tuner only works if delay compensation is available. In short this means it doesn't work 'live' using Soft Monitoring.*

## 7.31 VST Plugins

VST plugins are third party plugins. Many commercial and free plugins are available in this format.

**Windows:** VST plugins are .dll files. In the Studio menu's Preferences window a folder can be selected where the VST plugins are located. MultitrackStudio looks for VST plugins in this folder and its subfolders.

**Mac:** VST plugins are .vst files. They're located in the user or system Library/Audio/Plug-ins/VST folder.

VST plugins can be loaded in an effect slot using the slot's down arrow. The VST plugins appear in the effect selector's "VST and DX plugins" section (Windows) / "VST and AU plugins" section (Mac).

Plugins that do supply a graphical user interface will be shown in a window with Bypass and Presets buttons. Plugins that do not have their own user interface will be made to look like native MultitrackStudio effects.

Any presets coming with the plugin appear in the Presets menu. The presets can be factory presets (stored in the plugin itself), presets stored in .fxb bank files or presets stored in .fxp files. MultitrackStudio looks for matching .fxb/.fxp files in the folder where the plugin is located, and all of its subfolders.

If a VST plugin gets in a bad state somehow you can press the F5 key (Windows) / Command-R (Mac) while the plugin interface is visible. This will save the settings, reload the plugin and load the settings again.

There are a couple of 'powered' plugins on the market that come with their own dedicated hardware to run on. These kind of plugins are not supported.

*Note: if you install VST plugins while MultitrackStudio is running you may have to restart MultitrackStudio in order for the new plugin to be listed (the plugins are collected only once per session).*

## Bridging

*Note: bridging is available for Windows only. The Mac version supports 32 bit plugins only.*

Both 32 and 64 bit versions of MultitrackStudio support 32 and 64 bit VST plugins. 64 bit Windows is required to run 64 bit plugins. 64 bit MultitrackStudio runs 32 bit plugins 'bridged', or 'out-of-process' in computer lingo. Similarly, 32 bit MultitrackStudio runs 64 plugins bridged. This happens automatically.

Bridging plugins has some drawbacks: there's some performance overhead, and you may hear glitches while recording them at low ASIO/VistaSound latencies. It's best to use mostly 64 bit plugins with the 64 bit version of MultitrackStudio.

*Note: not all VSTi plugins are happy running bridged. Some seem to work fine running one instance, but weird things happen if you add more instances. Some copy protection mechanisms may fail. Some won't work if UAC (User Account Control) is enabled on Windows Vista and newer.*

If a bridged plugin crashes it should not tear down MultitrackStudio. You can choose to run a buggy plugin bridged for that reason. To force a plugin to run bridged you can right-click it in the instrument selector, and check the **Run bridged** option. From now on, all new instances of the plugin will run bridged. The window title bar of a bridged plugin reads "VST plugin (bridged): name".

## Under the hood

Each bridged plugin appears in the Windows Task Manager as "MtStudioVSTServer.exe" (32 bit plugin) / "MtStudioVSTServer64.exe" (64 bit plugin).

## Customizing the VST folder

On Windows the Preferences window allows for specifying one VST folder. On Mac there are two default VST folders, and you can specify an additional one in the Preferences window. If you need more flexibility you can place an MtStudioLinks.txt file in the VST folder, a folder that's included by an MtStudioLinks.txt file or any of the subfolders. MtStudioLinks.txt must be a plain text file. NotePad (Windows) / TextEdit (Mac) can be used to create/edit such files.

This example file demonstrates the options:

### Windows:

```
g:\TheFolder\  
g:\OtherFolder\TheReverb.dll  
-SamplesDir\  
-BuggyPlugin.dll
```

### Mac:

```
/Volumes/MyDrive/TheFolder/  
/Volumes/MyDrive/OtherFolder/TheReverb.vst  
-SamplesDir/
```

-BuggyPlugin.vst

The first line includes the TheFolder folder. The second line includes the TheReverb plugin. The third line excludes the SamplesDir subfolder, this can be useful if folders with huge amounts of samples slow down plugin scanning. The last line excludes the BuggyPlugin plugin.

## 7.32 AU Plugins

*Note: AU Plugins are supported in the Mac version only. If a song with an AU plugin is opened with MultitrackStudio for Windows a Missing Effect placeholder will appear.*

AU (Audio Unit) plugins are .component files located in the user or system Library/Audio/Plugins/Components folder. OS X comes with several AU plugins, and many third parties offer AU plugins as well.

AU plugins can be loaded in an effect slot using the slot's down arrow. The AU plugins appear in the effect selector's "VST and AU plugins" section. The plugin will be shown in a window with Bypass and Presets buttons. Any presets coming with the plugin appear in the Presets menu.

If an AU plugin gets in a bad state somehow you can press Command-R while the plugin interface is visible. This will save the settings, reload the plugin and load the settings again.

*Note: if you install AU plugins while MultitrackStudio is running you may have to restart MultitrackStudio in order for the new plugin to be listed (the plugins are collected only once).*

## 7.33 DX Plugins

*Note: DX Plugins are supported in the 32-bit Windows version only. If a song with a DX plugin is opened with a different version of MultitrackStudio a Missing Effect placeholder will appear.*

DX (DirectX) plugins can be loaded in an effect slot using the slot's down arrow. The DX plugins appear in the effect selector's "VST and DX plugins" section. The plugin will be shown in a window with Bypass and Presets buttons.

MultitrackStudio automatically detects whether the plugin supports mono in to stereo out conversion (reverbs usually do). Some plugins do not support this, if this is the case you can force the plug in to operate in stereo in to stereo out mode by adding a Stereo Effect just before the DX plugin.

*Note: if you install DX plugins while MultitrackStudio is running you may have to restart MultitrackStudio in order for the new plugin to be listed (the plugins are collected only once).*

## 7.34 Automatic Delay Compensation

Some effects introduce a delay which would make tracks go out of sync. Automatic Delay Compensation (often called Plugin Delay Compensation or PDC) serves to compensate for the effect's delay automatically.

Automatic Delay compensation is available in:

- Tracks which are in playback mode. The delay is compensated if it's 10 ms or more.
- Group and Master sections. The delay is compensated if it's 1 ms or more.
- Effect Return sections. There's no minimum delay here.
- Multi Effects, Stereo Effects, Parallel Effects and Mid/Side Effects loaded in the aforementioned mixer sections. There's no minimum delay here.
- MultitrackStudio Instruments (playback mode).
- The Output mixer of VST/AU plugins that have more than 2 outputs.

Delay compensation is NOT available in:

- The "Side Chain" box of sidechaining effects (Dynamics etc.).
- DX/DXi plugins are not compensated.

## 7.35 External Sidechain Routing

*Note: this feature is available in the Pro Plus edition only.*

All version of MultitrackStudio feature "internal sidechaining". In this scenario an effect (typically an EQ) can be inserted in the sidechain, while the sidechain input is always connected to the effect input. The Pro Plus edition also features "external sidechaining", where the sidechain input can be connected to sources outside the effect.

The Compressor, Dynamics and Noisegate effects, as well as some VST/AU plugins, feature sidechain inputs that can be connected to various signals:



*Sidechain section*

- **Internal:** the effect's input.
- **Track:** the output of an audio or soft instrument track.
- **Group Bus:** the sum of the tracks that are routed to a specific Group (available if the effect is in a Group, Effect Return or Master section).
- **Effect Send:** the mix of the Effect Sends of Tracks and Groups (available if the effect is in a Group, Effect Return or Master section). Effect Send signals of Groups will not be sent to effects that are in a Group section, but they will be sent to Effect Return and Master sections.
- **Band Effect In:** the Band Effect's input (available if the effect is in a Band Effect).

### Track sidechaining

Track sidechaining can be used to perform "ducking" (i.e. mute background music whenever the announcer speaks, or mute bass guitar every time the kick drum hits). Example: load a Compressor in the bass guitar track, switch it to the Clean program (which supports sidechaining) and select the kick drum track as sidechain input.

The only limitation that applies to track sidechaining is that sidechains can't "feed" themselves, eg. Track 1 can't use Track 2 as sidechain input if Track 2 uses Track 1 as sidechain input already. This typically isn't a problem in practice.

Some VST plugins can use the right channel of a stereo pair as sidechain input. To take advantage of this you can use a Stereo Effect before the VST plugin, with a Dynamics effect in the right channel effect section. Click the Dynamic effect's Monitor button and select the sidechain input, which will now be routed to the VST plugin. You might want to use another Stereo Effect after the VST plugin to mute the right channel and pan the left channel center.

### Group Bus sidechaining

Group Bus sidechaining can be used instead of track sidechaining if you want to control multiple tracks with another track as sidechain source, or if you want to control a track with the sum of several other tracks.

### Effect Send sidechaining

This was the only way to do "ducking" until track sidechaining was introduced. It is rather complicated to set up, but it can still be useful.

Effect Send bus sidechaining is best explained using an example:



*Using Effect Send bus as sidechain input*

In this example the level of the lower track will be muted when the upper track is loud. The upper track's Effect Send (the rotary knob with the black dot) sends the track's signal to the Effect Send bus. The lower track's output is sent to Group 1. One of this Group's Effect Slots contains a Compressor effect using Effect Send 1 as sidechain input.

Effect Return 1's fader is all the way down in order to avoid sending the signal to the Master section.

In this example the upper track will be audible (the Effect Send is connected post-fader, so the fader can't be all the way down). If you don't want this you can send its output to an additional Group and mute the Group.

The Compressor can be placed in a Band Effect to compress a specific frequency range only.

*Note: the Group's Effect Send does not affect the signal sent to the Compressor's Sidechain input, however the signal is sent to the Effect Return section as expected.*

### **Band Effect sidechaining**

The Band Effect In input can be used to build your own dynamic noise filters (using a Noisegate or Dynamics effect's expander in the treble band) etc.

### **VST/AU Plugin sidechaining**

VST and AU effect plugins which have more than 2 input channels will get a Side Chain box just like the one in the Dynamics/Compressor/NoiseGate effects. Input channels 3 and 4 will receive the sidechain source signal.

VSTi/AUi plugins which have audio inputs get a Side Chain box as well. You can, for example, load vocal pitch correction plugins in an instrument slot and route the vocal track to it using the Side Chain box. Now you can use the track's MIDI editor to enter notes which the plugin can use to determine the correct pitch.

Some VSTi/AUi plugins have more than 2 output channels. The outputs of these plugins are available as sidechain sources. Up to 30 outputs per plugin can be used as sidechain sources. This feature is especially useful with drum plugins. You can, for example:

- Use the kick drum channels as sidechain source for a Compressor or Dynamics effect in the bass track.
- Route the plugin outputs to tracks, so you can mix the drum instruments in the main window instead of the plugin's Output Mixer. A VSTi output can be routed to a track by adding an audio track and loading a Dynamics effect in its first effect slot. In this Dynamics effect you can select the sidechain source and click the Monitor button. If you route all the drum VSTi outputs to tracks this way you can use the VSTi track's Mute button to mute it. Note that you'll have to unmute this track if you want to play the VSTi live, or in order to hear notes when clicked in the track's editor. This is because the sidechains only work when the track is playing back.

Some VST plugins come with proprietary sidechain input plugins. This is a secondary plugin that picks of the sidechain source and routes it to the primary plugin. This setup won't work without glitches in MultitrackStudio on multiple CPU machines without telling MultitrackStudio these plugins belong together. If you rightclick a VST plugin in an effect/instrument selector you can check the "Has sidechain input plugin" option. New instances of the plugin will now get a Sidechain Plugin box. This box is identical to a Side Chain box, except that its output is ignored. You can load the secondary plugin in the effect slot and choose the sidechain source. Now MultitrackStudio's sidechaining mechanism will make sure it works OK under any circumstances.

## 8 MIDI Instruments

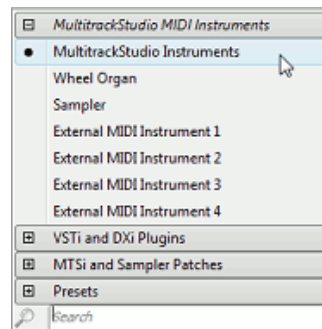
MIDI Instruments are used to convert MIDI messages to audio. These instruments are available:

1. MultitrackStudio Instruments, a GM compatible instrument collection.
2. Wheel Organ, emulates wheel organ.
3. Sampler, generates audio using samples.
4. External MIDI Instruments, can be either an external hardware synth, a synth on your soundcard, or a software emulation of such a device.
5. VSTi Plugins, a VST Plugin that can convert MIDI to audio.
6. AUi Plugins, an AU Plugin that can convert MIDI to audio.
7. DXi Plugins, a DX Plugin that can convert MIDI to audio.



*Instrument Slot*

MIDI Instruments are reached via Instrument Slots. An instrument slot appears on any track containing a MIDI file, replacing the left hand effect slot. Instruments can be selected by clicking the slot's down arrow (or by right-clicking the slot). The Instrument Selector contains all native MultitrackStudio instruments, VSTi/AUi/DXi plugins, sampler patches and instrument presets. A search text can be typed to filter the list. VSTi/AUi/DXi list items have invisible tags so you can use 'vsti', 'aui' or 'dxi' search terms to hide the other type of plugins. The items in the 'MTSi and Sampler Patches' section have invisible 'mtsi' and 'sampler' tags. When an instrument's user interface is visible you can press the F3 key (Windows) / Option-Command-F (Mac) to pop up the selector list. It remembers the search text, so you can try the next instrument which matches the search text easily.



*Instrument Selector (Pro Plus edition)*

Instruments can be copied from one instrument slot to another using drag-and-drop.

Leftclicking the slot's button will show the instrument's user interface. When this window appears the instrument will be 'live', so it responds your MIDI keyboard. The instrument will be live while the track's Rec button is engaged as well. All instruments feature a red indicator on the right hand side that lights when the instrument is currently responding to messages received on the MIDI In Device (ie. your MIDI keyboard). If an instrument is live and the Transport is not running (ie. its user interface is visible or the Rec button is engaged) the instrument will be deactivated if a 'buffer error' occurs because of CPU usage being too high. The red indicator will go off. If this happens the instrument can be activated again by either hiding and showing its user interface or by reactivating the track's Rec button.

### Presets

Presets can be loaded or created using the Presets button which appears on the instrument's user interface.

### Using software instruments in record mode

Real time audio processing on a computer involves a trade-off between latency and reliability. MultitrackStudio is designed for high reliability in order to minimize the possibility of glitches to occur. The downside of this approach is a fairly high latency (usually slightly higher than 0.5 seconds). This means that it takes about half a second until you hear the effect of moving a Volume fader or any other control.

Obviously playing a MIDI keyboard would be impossible to do with such a high latency between playing and hearing the actual sound. Therefore MultitrackStudio takes a different approach when recording using a software instrument. The output of tracks containing software instruments will not be routed through the mixer, but straight to the Audio Out Device instead. The track's Effect Sends and Output Bus Selector are not available in this situation.

The software instrument latency can be set in the driverset's Properties window.

## "Freezing" software instruments

MIDI tracks using a software instrument can be saved to an audio file using the track's Save As option. This can be very useful if a software instrument uses a lot of CPU power. The software instrument is effectively replaced by an audio file, but all effects and mixer settings etc. stay the same, so the sound is identical. The track's File Options Menu can be used to load the MIDI file again (it appears in the File History at the bottom of the menu). The software instrument will be reloaded automatically. This feature is usually called 'freeze'. A software instrument's output level could be too high for an audio file, so the signal gets clipped. If this happens you can use the MIDI track's Controller editor to turn down the Volume or Expression controllers. Pro Plus edition users can use 32 bit float type .wav files. These files do not clip the audio signal so the problem won't occur.

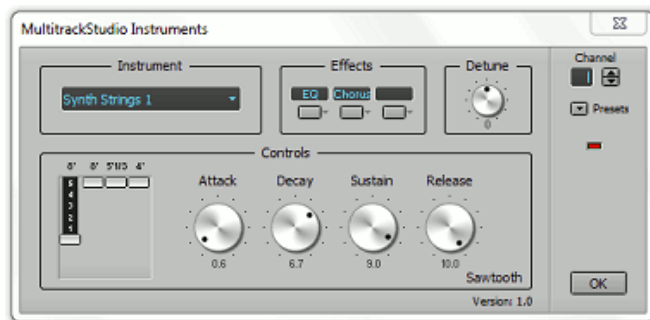
## 8.1 MultitrackStudio Instruments

The MultitrackStudio Instruments are a General MIDI compatible instrument collection. It contains over 100 instruments including a drum kit.

*Note 1: The MultitrackStudio Instruments do not have any reverb, so a Reverb effect should be used to add reverb.*

*Note 2: You can play back a MIDI track containing multiple streams ("instruments"). However, it is recommended to click the track's file name box and choose "Split Streams". This gives you more control over instrument sounds, levels and reverb send levels.*

*Note 3: The electric guitars use the Guitar Amp effect, which appears in the Pro Plus edition only. They will sound clean and unplugged in lower editions.*



MultitrackStudio Instruments window ("Synth Strings 1")

The **Instrument** box let's you pick an instrument. The instruments appear in five categories: Keyboard, String, Wind, Percussion and Synth. You can type (part of) an instrument name in the Search box to find an instrument quickly.

The **Controls** contains knobs, drawbars or buttons which control the sound of the selected instrument. Not all instruments offer controls.

The **Effects** section contains three effect slots. Some instruments use one or more effects by default.

### Keyboard instruments

Acoustic and electric piano's feature a Strength knob which controls how hard the piano is played. It adds a value to a note's velocity. '2.5' is neutral position.

The electric piano's Dynamics knob controls the velocity curve, ie. it controls how sensitive the piano is to key pressure. Bass and Treble are tone controls, as found on amplifiers or even some electric pianos.

The Percussive Organ is percussive even if another note is playing. This is different from the Wheel Organ which follows the traditional style.

## String instruments

Bass guitars feature a Strength knob which controls how hard the bass is played. It adds a value to a note's velocity. '5' is neutral position.

Violin Section, Violin Section 2, Viola Section, Cello Section and Contrabass Section are specialized versions of String Ensemble 1. There are two violin sections in order to lessen phasing problem with unison notes. Bowed strings feature a Vibrato knob similar to the winds (see below).

## Wind instruments

Most wind instruments feature a Vibrato knob. Vibrato is applied automatically depending on the musical context (especially note duration). The knob controls the amount of vibrato. You can avoid vibrato on certain notes by programming MIDI controller #1. The value at approx. 300 ms after the note onset is the value that counts. It's not possible to add vibrato where the automatic system thinks it's not appropriate.

## Percussion instrument

The Drum Kit uses MIDI channel 10 in order to be compatible with General MIDI. A suitable channel is picked automatically when you load an instrument, so you typically don't need to pay attention to the **Channel** box.

## Synthesizers

Almost all synth sounds use the same synthesizer which comes in three versions: square, sawtooth and triangle. The bottom-right corner of the Controls box shows the version. The sawtooth version is used for most sounds.

The four drawbars control the level of four oscillators. **8'** is the root note. Two slightly detuned 8' oscillators are available. **5<sup>1</sup>/<sub>3</sub>** is a fifth and **4'** is one octave up.

The **Attack**, **Decay**, **Sustain** and **Release** knobs represent a classic ADSR envelope. If Sustain is higher than "5" the level will rise during the decay phase. The pad sounds use this swelling effect.

## Muting notes

Some instruments, like Harp and Drum Kit, ignore note-off events. A sustain-off event will mute all sounding notes for which a note-off event has been received, so you can use the sustain pedal to mute harp strings or cymbals etc.

## MIDI Implementation

The MultitrackStudio Instruments respond to Volume (#7), Pan (#10), Expression (#11) and Sustain (#64) controllers. Pitch Bend is also supported.

Brightness and Treble knobs respond to #74. Vibrato knobs respond to #1. Attack, Decay and Release knobs respond to #73, #75 and #72 respectively. Drawbars respond to #12, #13, #14 etc.

## GM compatibility

The MultitrackStudio Instruments are largely compatible with GM level 1. Some notable differences are:

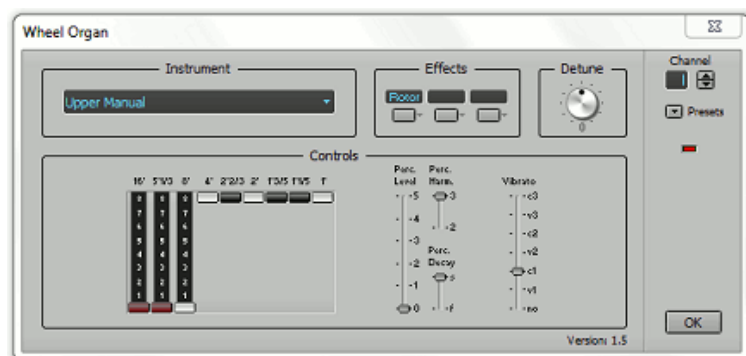
- The "Sound Effects" programs, like Helicopter or Gun Shot, are not available.
- A couple of percussion instruments are not available: vibraslap, guiro and cuica.
- The MultitrackStudio Instruments contain a couple of instruments which are not part of GM. The MIDI file will contain a program number which matches the sound closely. For example: if you pick "Violin Section" the MIDI file will contain the "String Ensemble 1" program, so the file plays back correctly using any GM player.
- The MultitrackStudio Instruments are typically limited to the 'real' instrument's note range. Violins, for example, won't play notes below the open G string.

## Under the hood

The MultitrackStudio Instruments are modeled, they don't contain any samples. This allows for randomizing many parameters, so each note has a unique sound which helps reducing "machine gun" effects.

## 8.2 Wheel Organ

The Wheel Organ is a software version of the classic B3 tonewheel drawbar organ. All its typical characteristics have been modeled including the key clicks, the scanner vibrato, the tonewheel crossfeed and the harmonic foldback.



Wheel Organ window ("Upper Manual" instrument)

### Instrument

The Instrument section offers a choice of four different combinations of organ manuals / pedals:

1. **Upper Manual:** The upper manual spans five octaves ranging from C3 (note 36) to C8 (note 96).
2. **Lower and Upper Manual:** The lower manual spans five octaves ranging from C0 (note 0) to C5 (note 60). The upper manual spans five octaves (minus the lower C) ranging from C#5 (note 61) to C10 (note 120).
3. **Pedal, Lower and Upper Manual:** The pedal spans two octaves ranging from C0 (note 0) to C2 (note 24). The lower manual spans three octaves (minus the lower C) ranging from C#2 (note 25) to C5 (note 60). The lower manual does not have the lowest and highest octave of the five octave version. The upper manual spans five octaves (minus the lower C) ranging from C#5 (note 61) to C10 (note 120).
4. **Upper Manual M-type:** This one has the same range as the normal Upper Manual instrument. It has no harmonic foldback, and the volume levels of the tonewheels are a bit different.

### Effects

The Effects section contains three effect slots. By default, one of them contains a Rotor effect.

### Drawbars

The manuals have 9 drawbars each, the pedal has only two. Moving drawbars does not affect notes that are currently playing (unlike the real tonewheel organ's drawbars). The drawbars also serve to set the relative volume levels of the upper/lower manuals and pedal keyboard.

The 8' drawbar is the fundamental tone. The 4', 2 2/3', 2', 1 3/5', 1 1/5' and 1' drawbars correspond to the 2nd, 3rd, 4th, 5th, 6th and 8th harmonic respectively. The 16' drawbar is one octave below the fundamental, and the 5 1/3' is the third harmonic of the 16' drawbar's frequency.

Drawbar settings (traditionally called 'registrations') are usually written as a sequence of 9 numbers like 88 8000 000. In this example the three drawbars on the left are pulled out all the way ('8'), while the other six aren't pulled out at all ('0'). 88 8000 000 and 88 8800 000 are widely used, but any other setting can be used.

### Percussion

The percussion feature adds a short sound when a key is pressed. The percussion signal is added to a new note only if there's no other key being pressed, so the percussion can be controlled by playing 'legato'. Percussion is applied to the upper manual only.

**Perc. Level** controls the level of the percussion signal (off, 1..5). The original tonewheel organ has only two levels: 'Soft' (equals '5') and 'Normal' (equals '3'). A few more levels have been added to the Wheel Organ, as tweaking the percussion level is one of the most popular modifications to tonewheel organs. **Perc. Harm.** controls whether the percussion signal is the 2nd or 3rd harmonic of the note being played, these harmonics correspond to the 4' and 2 2/3' drawbars respectively. **Perc. Decay** controls the decay time of the percussion

signal (slow or fast).

## Vibrato

The vibrato control has seven positions: Off, V1/2/3 and C1/2/3. Most, if not all, of the time one of the C (Chorus) positions will be used. The V positions provide Vibrato. Vibrato is applied to all manuals and pedals.

## Playing instrument 2 or 3 with one MIDI keyboard

MultitrackStudio's Keyboard Splitter can be used to play instrument 2 or 3 using only one MIDI keyboard. Follow these guidelines to set up the Keyboard Splitter:

- Make sure the Left Hand and Right Hand section's Channel values equal the Channel Indicator in the bottom-right corner of the Wheel Organ window.
- The Split Note can be set at C5 for a start.
- The Left Hand Transpose Oct can be set at -3, the Right Hand Transpose Oct can be set at 2.

The Split Note and Transpose Oct controls can be adjusted to reach different parts of the manuals.

## Playing instrument 2 or 3 with two MIDI keyboards

MultitrackStudio Pro Plus supports multiple MIDI In devices. Instrument 2 or 3 can be played using two MIDI keyboards if the MIDI keyboards have an octave-shift function. Using 5-octave keyboards, the lower keyboards will be shifted 3 octaves down, and the upper keyboard will be shifted 3 octaves up.

## MIDI Implementation

The Wheel Organ responds to Volume (#7), Expression (#11) and Sustain (#64) controllers. Pitch Bend is also supported. Note that the original tonewheel organ didn't have Sustain or Pitch Bend features.

The upper manual drawbars respond to #12 to #20, the lower manual drawbars respond to #21 to #29, the pedal drawbars respond to #30 and #31.

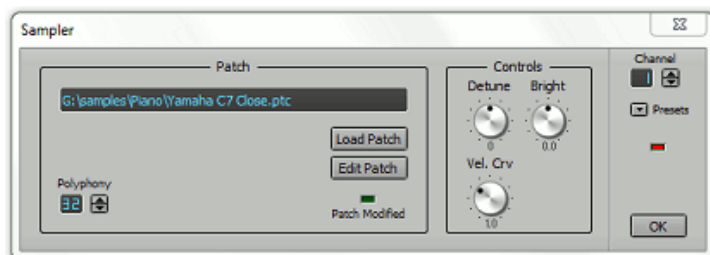
Percussion can be controlled with #70 (volume), #71 (decay) and #72 (harmonic).

Vibrato can be controlled with #76.

The Rotor effect's rotation speed can be controlled with the Modulation (#1) controller.

## 8.3 Sampler

MultitrackStudio includes a disk-streaming sampler. Samples can be played direct from disk, so patches can be larger than the amount of RAM memory available.



*Sampler window*

Using the **Load Patch** button you can load a patch. Sampler patches are files with .PTC extension. Other formats (.SF2, .GIG or .SFZ files) can be selected as well, doing this will invoke the built-in patch converter. See also Organizing your patches.

The **Edit Patch** button invokes the Patch Editor.

The **Polyphony** setting can be used to limit the number of sampler that can be played simultaneously in order to reduce CPU or disk usage. For example: the number of playing samples can become quite large while playing piano if the sustain pedal is kept down for a long time. Reducing polyphony can help in this situation.

The controls in the Controls section override the values stored in the Patch (as set by the Patch Editor).

The Sampler responds to messages on all MIDI channels, so the **Channel** value typically doesn't matter. It does matter if you're recording using the Keyboard Splitter or using multiple keyboards: in these situations you want only messages received on this channel to be recognized.

The Sampler supports the following MIDI messages:

- Note On/Off
- Volume (cont. 7)
- Pan (cont. 10)
- Expression (cont. 11)
- Sustain (cont. 64)
- Legato (cont. 68)
- Brightness (cont. 74)
- Pitch Bend

*Note that sending pan events does not affect notes that are currently playing.*

If the MIDI file consists of multiple streams the Sampler uses only the first stream.

Simple Patches, containing just one sample can be created easily by dragging an audio file from Windows Explorer (Windows) / Finder (Mac) to a MIDI track's Instrument Slot. A Sampler will be loaded in the Instrument Slot and a Patch will be created which plays the audio file at its original pitch if you press the C5 (middle C) key. You can also drag audio clips from the Shelf, or parts of an audio track's editor, to an Instrument Slot.

The Sampler stores all samples in memory if enough memory is available. The amount of memory the Samplers are allowed to use can be specified in the Preferences window. Samples aren't stored in memory at all if there's not enough memory available. In this case they're streamed from disk directly. Should the data arrive too late silence will be played instead if the Sampler is used in record mode. You don't need to worry about this: the sound will be OK during playback.

## Organizing your patches

You can easily browse your sampler patches if you store them in separate folders (see left picture). The Patch Converter does this automatically.



*Folders in Windows Explorer Categories (left) and Patches (right)*

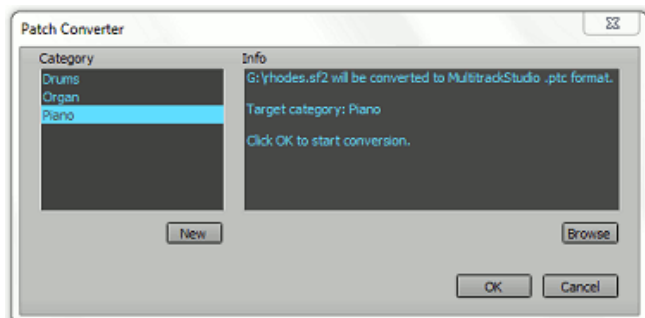
In the Studio-->Preferences window you can specify the folder containing all patches ('C:\Samples' in this example). If this folder is specified the Sampler's **Load Patch** button will start the Patch Selector (see right picture) instead of the file-browser. The Patch Selector's left pane shows all available categories, the right pane shows all available patches in the selected category.

The Patch Selector's **Browse** button lets you browse for a patch file, including .SF2 and .GIG files. The Patch Converter will be invoked automatically if necessary.

## Patch Converter

The Patch Converter converts third party sampler patches to MultitrackStudio .PTC format patches. Currently .SF2, .GIG and .SFZ files are supported. An audio file is generated for every single sample used in

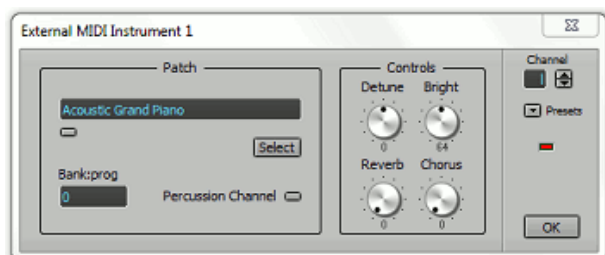
the sampler patch. Furthermore a .PTC file is generated for every instrument in the sampler patch. The new patch will be placed in the category that's highlighted in the Category box. New categories can be added using the **New** button. Typically, categories will be called Piano or Drums etc. Alternatively the **Browse** button can be used to specify a custom folder.



*Patch Converter window*

## 8.4 External MIDI Instruments

An External MIDI Instrument sends the track's MIDI data to a MIDI Out device. This can be either a MIDI (or USB) connector, a synth on the soundcard, or a software emulation of such a device.



*External MIDI Instrument window*

### Patch section

The large display in the **Patch** section shows the name of the patch. Clicking the **Select** button lets you select a patch by name. The names are stored in a Patch Map file. The small button can be used to select the Patch Map file that corresponds to your MIDI device (the default file can be selected in the MIDI Out Device Options window).

The **Bank:prog** display indicates the bank (optional) and the program used. Bank and program are numbers (0..16383 and 0..127 respectively) separated by ':' (for example: 1:2 means Bank 1 and Program 2). The bank/program value can be altered by left clicking it. Pressing Enter will accept the new value. Pressing Esc will cancel the operation. You can use the Page Up/Down and Up/Down Arrow keys to change the bank and program values.

**Channel** indicates the MIDI channel being used. If this channel is a special percussion channel (according to the Patch Map) the **Percussion Channel** button will light. This button can be used to toggle between the percussion channel and a non-percussion channel. The button doesn't appear if the Midi Out Device doesn't have a percussion channel.

### Controls section

The **Controls** section affects the way the patch sounds.

**Detune** detunes the patch using Pitch Bend messages (the pitch bend range is assumed to be 2 semitones). The value is stored in the MIDI file as RPN 1.

**Bright**, **Reverb** and **Chorus** control MIDI controllers 74, 91 and 93 respectively. Some synths (e.g. SoundBlaster Live!) may need to be set up properly in order to respond to controllers 91 and 93 (Reverb and Chorus). Controller 74 (Brightness) may not be supported by your synthesizer.

## The MIDI Out Device

A MIDI Out Device can be either a MIDI connector or a synth on the soundcard. MultitrackStudio Professional supports two MIDI Out devices, the Pro Plus edition supports four. The devices are made available to MultitrackStudio by a driverset. In the Studio -> Devices window the driverset's properties can be altered, so you can select the MIDI Out devices you want to use.

The MIDI In and MIDI Out port are connected by default (messages received on an incoming channel are forwarded to the corresponding outgoing channel). When a software instrument is used in record mode the MIDI In channel being used is disconnected from the MIDI Out channel.

*Note: Interconnecting a MIDI In and MIDI Out port creates a loop that will slow down (and ultimately halt) your computer. MultitrackStudio will detect this loop and disconnect the MIDI in and out devices in order to avoid freezing the computer.*

## Virtual MIDI channels

A MIDI Out Device contains 16 MIDI channels. MIDI Out devices are virtualized by MultitrackStudio, meaning that a single MIDI channel on a MIDI Out device can be used by more than one stream. MultitrackStudio will automatically take care of playing each note using its own stream's patch and controllers. Obviously, this only works if streams using the same MIDI channel don't play notes at the same time.

The following controllers have a default value, and don't need any attention:

- Modulation (#1)
- Volume (#7)
- Pan (#10)
- Expression (#11)
- Sustain (#64)
- Soft (#67)
- Brightness (#74)
- Reverb (#91)
- Chorus (#93)
- Aftertouch
- Pitch

All other controllers do not have a default value. If they are used in one stream they should be defined in all other streams using the same channel on the same MIDI Out Device.

## 8.5 VSTi Plugins

A VSTi (VST Instrument) is a VST Plugin that can convert MIDI events to audio. You can select a VSTi by clicking the instrument slot's down arrow. The VSTi plugins appear in the list's 'VSTi and DXi Plugins' section (Windows) / 'VSTi and AUi Plugins' section (Mac).

A VST or VSTi plugin will initially appear in both Effect and Instrument selectors. The first time it is loaded MultitrackStudio determines whether it's an effect and/or an instrument. From then on it will appear in the appropriate selector only.

VST Instruments look like VST Plugins. They have an additional **Channel Selector**. Some VSTi plugins respond to all MIDI channels the same way, in this case the channel setting doesn't matter unless you're recording using the Keyboard Splitter or multiple keyboards. Other plugins, especially the ones providing many different sounds, do always require the correct channel to be specified.

VST Instruments respond to all the streams that are in the track's MIDI file. However, in most cases it will be easier to use multiple tracks (each using an instance of the VSTi) instead.

If the plugin has more than two outputs an **Output** button will be available. On clicking this button the Output Mixer window will appear. This mixer mixes the plugin's outputs down to stereo.

*Tip (Pro Plus edition only): The outputs of a multiple output VSTi plugin can be routed to tracks using sidechaining (see Effect Sidechain Routing). You can use this if you'd rather mix the outputs in the main window rather than the VSTi Output Mixer window. This is especially useful for drum plugins.*

If a VSTi plugin gets in a bad state somehow you can press the F5 key (Windows) / Command-R (Mac) while the plugin interface is visible. This will save the settings, reload the plugin and load the settings again. This doesn't work while the transport is running.

## 8.6 AUi Plugins

*Note: AUi Plugins are supported in the Mac version only. If a song with an AUi plugin is opened with MultitrackStudio for Windows a Missing Instrument placeholder will appear.*

An AUi (Audio Unit Instrument) is a AU Plugin that can convert MIDI events to audio. You can select an AUi by clicking the instrument slot's down arrow. The AUi plugins appear in the list's 'VSTi and AUi Plugins' section.

AU Instruments look like AU Plugins. They have an additional **Channel Selector**. Some AUi plugins respond to all MIDI channels the same way, in this case the channel setting doesn't matter unless you're recording using the Keyboard Splitter or multiple keyboards. Other plugins, especially the ones providing many different sounds, do always require the correct channel to be specified.

AU Instruments respond to all the streams that are in the track's MIDI file. However, in most cases it will be easier to use multiple tracks (each using an instance of the AU Instrument) instead.

## 8.7 DXi Plugins

*Note: DXi Plugins are supported in the 32-bit Windows version only. If a song with a DXi plugin is opened with a different version of MultitrackStudio a Missing Instrument placeholder will appear.*

A DXi (DirectX Instrument) is a DX Plugin that can convert MIDI events to audio. You can select a DXi by clicking the instrument slot's down arrow. The DXi plugins appear in the list's 'VSTi and DXi Plugins' section.

DX Instruments look like DX Plugins. They have an additional **Channel Selector**. Some DXi plugins respond to all MIDI channels the same way, in this case the channel setting doesn't matter unless you're recording using the Keyboard Splitter or multiple keyboards. Other plugins, especially the ones providing many different sounds, do always require the correct channel to be specified.

DX Instruments respond to all the streams that are in the track's MIDI file. However, in most cases it will be easier to use multiple tracks (each using an instance of the DX Instrument) instead.

If a plugin is available in both VSTi and DXi format it is recommended to use the VSTi plugin as they have less overhead and better timing accuracy.

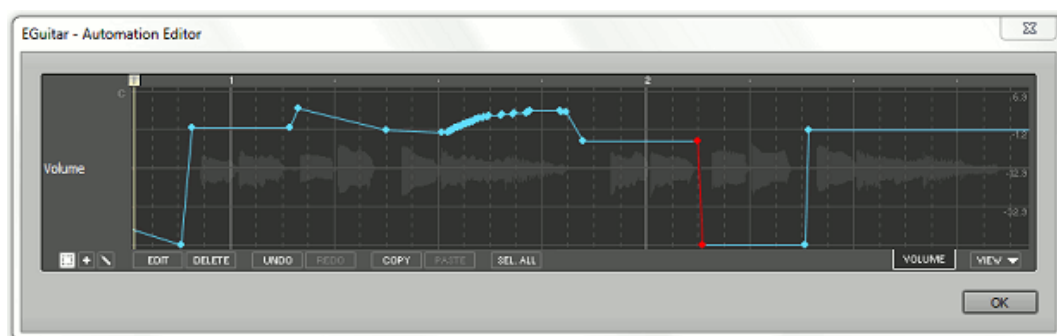
## 9 Automation

*Note: this feature is available in the Pro Plus edition only.*

The mixer sections and audio effects can be automated (ie. the knobs can be programmed to turn automatically while the transport is running). This can be used to change a track's pan position, to add more reverb to part of a track etc.

All automation movements have to be programmed using a control's Automation Editor, which works just like an Automated Fader effect. It's not possible to record fader or knob movements directly. To pop up a control's Automation Editor you should click the Automation button in the bottom right corner of the main window first, and then click the control. Alternatively you can simply rightclick the control. The **VIEW** button can be used to add tabs for other automatable parameters of the mixer section/effect. Using the tabs you can switch between parameters easily.

If the mixer section is a track or the effect is in a track the track's audio/MIDI data is displayed in the background. Scrubbing will be available as well, it uses the parameter values at the needle position and doesn't include any effects.



*Automation Editor*

A small blue square appears in the bottom right corner of an automated control. Automation can be undone by deleting all dots in the editor (click Sel. All followed by Delete). An automated control can still be controlled using the mouse. This will move the whole automation curve, as it appears in the control's Automation Editor, up or down.



*Automated fader and rotary knob (note the blue squares)*

### 9.1 Mixer Automation

A mixer section's Volume fader and the Pan and Effect Send knobs can be automated. Automation has no effect on MIDI tracks using an External MIDI Instrument.

### 9.2 Effect Automation

The rotary knobs of all audio effects can be automated. The Convolver and the Band Effect cannot be automated. The Compressor's Autogain button has no effect if the Threshold, Ratio or Gain knobs are automated.

Some knobs will require quite a lot processing power while turning because of automation. It's best to move these knobs abruptly in a quiet part rather than moving them slowly. This applies to the following knobs:

- Compressor: Threshold, Ratio, Gain and Knee.
- Dynamics: all.
- Phaser: Range and Frequency.
- Saturator: Drive, most notably with Tape program.

'Delay' type knobs may cause glitches while turning. It's best to move these knobs in a quiet part. This applies to the following knobs:

- Chorus, Doubler, Echo, Flanger: Delay.
- Master Limiter: Ahead.
- Reverb: Predelay.
- Pseudo Stereo: Color (Comb mode only)
- Vibrato: all.
- Guitar Amp: Cntr/Edge (not a 'delay type knob', but it does glitch)

VST, AU and DX plugins can be automated too. To pop up the effect's Automation Editor you should click the Automation button in the bottom right corner of the main window first, and then click the right hand side of the effect window (the area where the Bypass and OK buttons are). Right clicking this area also works, and even right clicking the plugin's user interface will work with many plugins. The plugin user interface knob movements will lead by approximately 0.75 seconds compared to the audible results (ie. you see the knobs move before you hear their effect on the sound). VST plugins that don't supply their own user interface (the ones that get the standard MultitrackStudio knobs) suffer only partially from this phenomena: knob rotations don't lead, but the values below the knobs do lead.

A multiple output VST plugin's output mixer can be automated too.

## 10 Editing

Each track has an editor that can be opened using the Edit button located on the right hand side of the track. The Tempo Editor affects the tempo of MIDI tracks, and optionally audio tracks as well. The Song Editor can remove or insert parts and affects "everything" (tracks, automation, markers etc.).

All editors feature a "needle" which indicates the current transport position (its position equals the value of the transport's position indicator). The thumb at the top of the needle can be moved using the mouse. At the top of every editor is a Time Bar that shows either seconds or bars (can be changed in the Editing Options section). Clicking this bar will move the needle to the corresponding position and the transport's position indicator will be updated accordingly. You can also grab the time bar with the mouse and drag it left or right. In this case the transport position remains unchanged unless the needle moves out of the visible area. Double-clicking the needle thumb starts the transport, clicking the time bar stops it.

Editing is not possible while the transport is running.

### Selecting a part

A part can be selected by left-clicking the editor's display and dragging the mouse while keeping the mouse button down. The selection can be resized by dragging its beginning or end. The editor will scroll horizontally automatically if the mouse approaches the left or right side of the editor.

Selecting on-the-fly is possible as well: click on the editor's display while the transport is running and keep the mouse button down until you hear the end of the part you want to select. In this case it doesn't matter where you click but when you click.



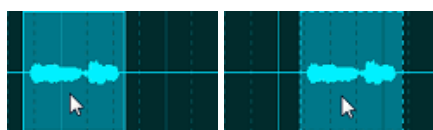
*Selecting, before and after*



*Resize, before and after*

### Moving or copying a part

The selected part can be moved. The part is copied if the Ctrl key (Windows) / Option key (Mac) is pressed while moving.



*Move, before and after*



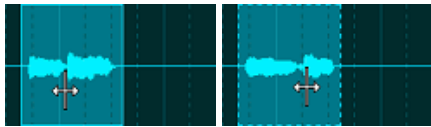
*Copy (Ctrl key (Windows) / Option key (Mac)), before and after*

### Stretching or warping a part

Resizing the selected part while the Alt key (Windows) / Command key (Mac) is pressed stretches (or shrinks) the part. The part can be 'warped' using this key as well. It's recommended to make sure any monophonic audio tracks use the monophonic transpose algorithm. Use their editor's Edit button to access this option (a part needs to be selected for this button to be enabled).



Stretch (use Alt key (Windows) / Command key (Mac)), before and after



Warp (use Alt key (Windows) / Command key (Mac)), before and after

## Tweakable Edits

MultitrackStudio features 'tweakable edits', which means that after performing an edit (for instance pasting some audio) you can tweak the edit (for instance adjust position and length of the pasted part, adjust volume, or even add effects). Every time you make an adjustment the initial edit will be completely redone, thus ensuring optimal sound quality. Note that Undo will undo the whole (initial) edit, not the last tweak only. An edit is tweakable as long as the selected part is surrounded by a dotted line.

## Common Editor features

Most editors feature the following buttons:

- **Undo:** Undo edit.
- **Redo:** Redo an edit that was undone previously.
- **Copy:** Copies the selected part to the clipboard.
- **Paste:** Paste from the clipboard to the editor. The data on the clipboard will be placed at the current transport position (that's where the needle is).
- **Delete:** Deletes the selected part.
- **Sel. All:** Selects all.

In addition the "More" buttons offers:

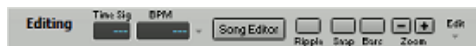
- **Cut:** Copies the selected part to the clipboard and then deletes the selected part.
- **Repeat:** Repeats the selected part a number of times.

All editors have a popup menu with these options:

- **Find Selected Part:** Adjusts the transport position so the selected part becomes visible.
- **Unselect**
- **Select Left:** Select left hand part.
- **Select Right:** Select right hand part.

## Editing Options

The editing options area at the top of the main window contains several options concerning editing.



Editing options

- **Time Sig / Tempo:** Editing these values change the Time Signature or Tempo of the whole song (from start to end). If the tempo isn't constant throughout the song the various tempo value's will be adjusted proportionally. Right-clicking either box shows the Tempo/Time Signature Editor. *These options are available only if there is at least one MIDI track, they don't affect audio tracks.* The down arrow next to the Tempo box offers 3 options:
  - **Tempo / Time Signature Editor:** open this editor.
  - **Tap Tempo:** tap a new tempo on the space bar.
  - **Extract tempo from Track:** This track has to contain beats only (ie. you can't extract tempo from an album track or a guitar solo track). Typically, one will have to record a track while playing back the song. The track can be either MIDI (tap the beat on the MIDI keyboard) or audio (clap your hands to the beat, counting "one two three four" will probably work too if done "staccato"). The track containing the beats can be selected from a list containing all the song's tracks. Also,

you can specify what the beats represent (quarter notes, 8th notes etc.). After extracting the tempo you can edit the Time Signature manually. Typically, the length of the first measure (#0) will be adjusted so the second measure (#1) coincides with the start of the song. This might require the use of a weird time signature like 27/4 in the first measure.

- **Song Editor:** shows the Song Editor.
- **Ripple:** When active pasted (or drag-and-dropped) parts will be inserted. Existing data will be overwritten otherwise. Ripple mode will usually be off in order to avoid misaligned tracks.
- **Snap:** Turning on Snap makes the start and end point of all currently selected parts snap to the (visible) grid. All subsequent mouse movements will snap to the grid as well. Use the Zoom In and Zoom Out functions to change the grid.
- **Bars:** Grid in bars. Also, MIDI paste and drag operations will be done in beats instead of seconds (e.g., if you move a slow part to a fast part it will be made faster).
- **Zoom In/Out:** Use the Zoom In and Zoom Out functions to change the horizontal scale of the editors (all editors have the same time scale). The current scale is displayed on the Status Bar. Scale 1:1 means that one screen pixel represents one audio sample. Zooming out will put more samples on a pixel.
- **Editing Options menu:** provides access to various editors. If the main window is small some items from the editing options area may be moved to the menu.

## 10.1 Editing Tracks

Each track has an editor that can be opened using the Edit button located on the right hand side of the track. MIDI tracks are capable of editing individual events when viewed as Pianoroll, Score or Drum (see MIDI Event Editing). The Controller Editor can be used to edit MIDI controllers like Volume or Sustain.

### Common track editor buttons

Track Editors feature the following buttons:

- **Edit:** Shows an Edit Control window. Using this window volume changes, fades etc. can be applied to the selected part. Edit Controls can have different features on different editors.
- **Undo:** Undo edit.
- **Redo:** Redo an edit that was undone previously.
- **Copy:** Copies the selected part to the clipboard.
- **Paste:** Paste from the clipboard to the editor. The data on the clipboard will be placed at the current transport position (that's where the needle is).
- **Delete:** Deletes the selected part.
- **Sel. All:** Selects the whole track.

The More button offers:

- **Cut:** Copies the selected part to the clipboard and then deletes the selected part.
- **Merge:** Works like Paste, but existing data is not deleted.
- **Repeat:** Repeats the selected part a number of times.
- **Export:** Save the selected part to a new file.

### Moving audio or MIDI between tracks.

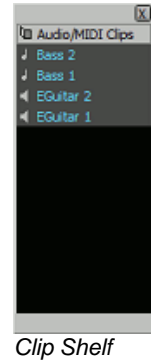
Data can be copied to another track by dragging and dropping, or by using the clipboard functions. In either case MultitrackStudio automatically converts between mono and stereo audio if necessary. MIDI is converted to audio and vice versa automatically as well. Audio to MIDI conversion works with monophonic (ie. just one note sounds at a time) audio only. The reliability of the note recognition process depends on the audio signal. Some editing will typically be necessary to fix some errors. MIDI to audio conversion makes use of a software instruments. This software instrument appears on the Edit Control window of the receiving track.

Using an editor's Cut, Copy and Paste options you can move or copy a part to this or another editor. This process uses the clipboard. MultitrackStudio doesn't use the operating system clipboard, but temporary files instead.

## Audio/MIDI Clips

Clips (pieces of audio or MIDI) can be stored on the Clip Shelf. The clip shelf appears upon clicking the vertical bar on the left side of the MultitrackStudio window.

Pieces of audio or MIDI can be dragged from track editors to the clip shelf and vice versa. Clips can be removed by dragging them to the Garbage Bin in the bottom left corner of the window.



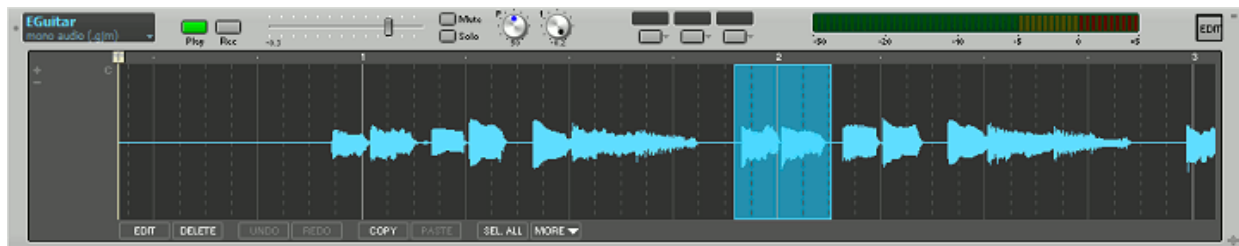
Clip Shelf

## Dropping audio/MIDI files on track editors

Audio and MIDI files can be dragged from Windows Explorer (Windows) / Finder (Mac) to a track's editor. Some VST plugins allow dragging audio or MIDI from their user interface to a track editor as well. The sample rate of audio files will be converted to the song's samplerate if necessary. "ACIDized" wav files will be converted to the song tempo.

## 10.2 Editing Audio Tracks

The Edit button shows/hides the track's editor. The editor shows a graphical representation of the audio signal. A part of it can be selected using the mouse (press left button and drag).



Audio track (mono) with editor

The two channels of a stereo track will be displayed separately. Editing just one channel of a stereo track is not possible.

At the bottom of the editor the common editor buttons appear (see Common Editor Features).

### Understanding audio editing

Audio editing is always non-destructive. This means that the file containing the original recording remains unaffected. When an audio file is being edited for the first time a .aem file will be created. This file contains a reference to the original audio file. It can contain references to one or more edit files as well. An edit file replaces a part of the original file. Edit file names look like "trackname - Edit123456.wav", where 123456 is a unique sequence of random characters.

Example: Guitar.gjm is being edited. Guitar.aem will be created. A file called "Guitar - Edit123456.wav" will be created (this file contains audio data). Guitar.aem contains information on what files to play when.

The files referenced by a .aem file can be viewed in a track's Properties window.

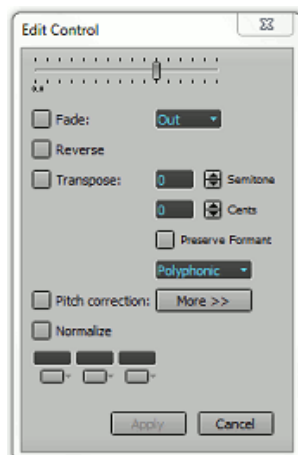
*Note: Do not delete edit files manually in order to avoid losing edits or punch-in recordings. Use the Clean up Song Folder tool instead.*

Crossfades are applied automatically in order to avoid clicks. The crossfades behave just like traditional tape splices.

### Audio Edit Control

The Audio Edit Control, invoked by clicking the **Edit** button, can be used to manipulate the selected part in

various ways.



Audio Edit Control window

Audio Edit Controls have the following features:

- **Volume** fader: Changes the volume of the selected part. Note: In most cases it is better to use an Automated Fader effect to change volume levels of certain parts of a track, as this leaves the audio file untouched.
- **Fade:** Performs a fade in or fade out on the selected part.
- **Reverse:** Reverses the select part.
- **Transpose:** Pitch shifts the audio signal by the specified amount of semitones and cents. This features is powered by DSP Dimension's Dirac Pro technology.  
**Preserve Format** corrects the formant to make the transposed signal sound like the original (ie. to avoid the 'chipmunk' effect).  
Two algorithms are available: **Polyphonic** and **Monophonic**. If the audio track is monophonic you can switch to Monophonic which is faster and offers better sound quality. The selected algorithm is used for stretching and warping as well.
- **Pitch correction:** see Vocal Pitch Correction.
- **Normalize:** Makes the selected part as loud as possible.
- **Effect Slots:** The Effect Slots can contain effects such as EQ or reverb.

*Note: Normalizing a file introduces rounding errors and thus compromises sound quality, especially with 16 bit files. Both normalizing individual tracks and normalizing the final mix are bad habits. The Master Limiter effect should be used to make the final mix as loud as possible.*

### Dragging audio by a small amount

For best results the Ctrl key (Windows) / Option key (Mac) can be pressed while dragging audio by a small amount. This is best explained using an example:

Consider a word in a vocal track that's a bit too early. You can select the word (including some surrounding "studio silence") and drag it to the right. Now a piece of silence will appear on the left side of the selected part. This happens because the original word is removed. Better result may be obtained using the Ctrl key (Windows) / Option key (Mac). Now the piece is copied instead of moved, so the original word will stay in place. The result is that the background noise that appears just before the word is repeated once. This usually is less objectionable than plain silence.

### Deleting audio

A part of an audio track can be deleted using the track editor's Delete button. However, it can be more convenient to take advantage of the Tweakable Edit feature. After selecting the part you want to delete click the Edit button and drag the Volume fader all the way left and click Apply. Now the part is deleted, and you can fine-tune the edit by dragging and/or resizing the selected part. In critical cases, where the Delete function results in noticeable silence, you can consider pasting a recording of "studio silence" instead of using the Delete function.

Sometimes you might want to truncate a file destructively (eg. a master file which appears to be a bit too long), rather than turning it into a .aem file. You can rightclick an audio track's editor and choose "Truncate File" to truncate the file at the mouse position. Note however that this is a destructive operation which cannot be undone. Use a track editor's Export function instead if you feel you don't fully understand this.

## Scrubbing

The editor has a built-in "scrubber", meaning that you can actually hear the part being selected. This can help in finding the desired location, in addition to the visual clues given by the editor. With tape recorders this was done by moving the reels manually ("reel rocking"), now it can be done by moving the mouse. The scrubber is active while moving the needle, while selecting a new part, and while resizing an existing selection.

The speed and pitch of the scrubbing sound are determined by the mouse movements. Spectral filtering is applied to avoid damage to loudspeakers or ears by excessive high or sub-low frequency content.

This feature can be turned on/off in the Preferences window.

## 10.3 Vocal Pitch Correction

The audio track editors feature vocal pitch correction powered by DSP Dimension's Dirac Pro technology. It's typically easier to use the Vocal Tuner effect instead. Using the editor options can be a better choice in these situations:

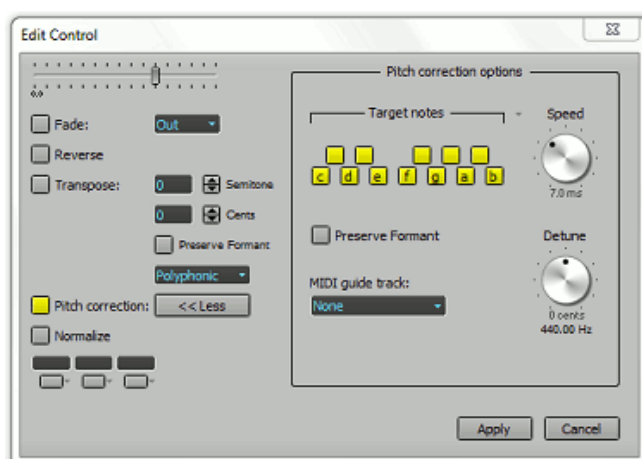
- The vocal track is stereo (the Vocal Tuner is a mono effect).
- You want to use a MIDI guide track (see below).
- You're computer is too slow for running the Vocal Tuner effect in real time.

### Basic pitch correction

Pitch correction is very easy if the vocal track is just a little bit out of tune:

1. Select the part you want to process in the track's editor.
2. Click the editor's Edit button to pop up the Audio Edit Control.
3. Click the Pitch Correction button and then click Apply.

The **More** button shows more pitch correction controls. **Speed** controls the speed of the pitch correction. If it's fast the result will sound synthetic (the "Cher effect"). If it's too low the first part of a note may not be fully pitch corrected. **Detune** can be used if the song isn't in concert pitch.



Audio Edit Control, Pitch correction options opened

### Excluding notes

If the vocal track has severe pitch problems you may find that the Basic pitch correction method produces the wrong notes. That happens if the vocals are so much out of tune it's closer to a neighbouring note than to the intended note. You can exclude notes to solve this problem:

1. In the Audio Edit Control click the More button to show the "Pitch correction options".
2. In the "Target notes" section you can turn off notes which aren't in the selected vocal part. After applying pitch correction the vocal track will have "on" notes only. Clicking the down arrow pops up a menu which offers various presets like major and minor scales.
3. Now click Apply to apply the new settings.

## Changing the melody

If excluding notes doesn't give you enough flexibility, or if you want to change the melody, you can use a MIDI track to specify the notes. If you don't have a suitable MIDI track already you can use the built-in audio to MIDI conversion feature to create a MIDI track:

1. Add a MIDI track using the "Add Track" menu.
2. Open the MIDI track's editor and the vocal track's editor.
3. In the vocal track editor select the part you're interested in, drag it to the MIDI track editor and drop it there.

Now you can use this MIDI track to guide the pitch correction:

1. In the Audio Edit Control make sure the "Pitch correction options" are visible.
2. Select the MIDI track in the "MIDI guide track" box.
3. Now click Apply to apply the new settings.

If you're not happy with the results you can edit the MIDI track, go to the Audio Edit Control and click Apply again.

**Preserve Formant** can be used if the pitch changes more than approx. a semitone.

*Note: the "Target Notes" section can still be used while using a MIDI guide track, but it only affects the parts where no MIDI notes are playing.*

## 10.4 Editing MIDI Tracks

The Edit button on the righthand side of the track shows/hides the track's editor. The editor can show the MIDI notes in three different ways: Pianoroll, Score and Drum. The tabs on the right (Piano/Score/Drum) can be used to switch between these editors. The default editor is Pianoroll, this can be changed in the Preferences window.

All three editors can edit MIDI as if it were audio, and they can edit the MIDI notes themselves as well. This section deals with editing MIDI as if it were audio, the next sections cover editing notes and controllers.



*MIDI track with pianoroll editor*

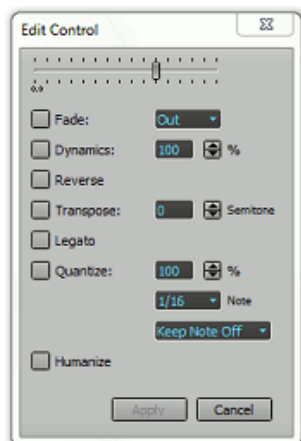
At the bottom of the editor the common track editor buttons appear (see Common track editor buttons). Editing actions, like paste, delete or undo, affect both notes and controllers.

MIDI edits are not written to disk immediately. When a track is closed (this also happens when the song is closed) a window appears asking whether to save the changes or not. If you want to save the changes explicitly you can use the File Options Menu's **Save** option.

MIDI tracks have built-in scrubbing features similar to audio tracks.

## MIDI Edit Control

The MIDI Edit Control, invoked by clicking the editor's **Edit** button, can be used to manipulate the selected part in various ways.



MIDI Edit Control window

MIDI Edit Controls have the following features:

- **Volume** fader: Changes the volume of the selected part.
- **Fade**: Performs a fade in or fade out on the selected part.
- **Dynamics**: Compress (0..100%) or expand (100..400%) the dynamic range of the notes.
- **Reverse**: Reverses the selected part.
- **Transpose**: Transpose all notes in the selected part by a number of semitones.
- **Legato**: Note durations are adjusted to make note-to-note transitions smoother. Can be used to make 'smooth' instruments like violins sound more natural.
- **Quantize**: Notes that are not exactly on a 1/1, 1/2, 1/4, 1/8, 1/16 or 1/32 note position (use the **Note** button) are moved towards the exact positions. Quantizing to triplets (1/4, 1/8, 1/16 or 1/32) is possible as well. The amount of correction can be from 5% up to 100% ('hard quantizing'). Three types of quantization are available:
  - **Full**: quantize both note-on and note-off.
  - **Keep Note-Off**: quantize note-on, don't touch note-off. This is the default type.
  - **Keep Duration**: quantize note-on, move note-off to keep duration the same.
- **Humanize**: Shifts note events a (small) random amount of time, and changes the note volumes slightly.

## 10.5 Editing Notes

The Pianoroll, Score and Drum editors not only can select a part of a track (like an audio editor), they can select or add notes as well. You can use this to correct the odd mistake, but you can also use it to build tracks from scratch.

The Pianoroll, Score and Drum editors share many common properties:

### Editor Modes

The editor can work in one of three modes:

- **Select Part**: works just like an audio editor, ie. the mouse doesn't "see" the notes at all.
- **Select Notes**: clicking a note selects it, pressing the mouse in "empty space" and moving it lassoes notes. Selected notes can be moved.
- **Add Notes**: clicking in "empty space" adds a note, clicking a note selects it. Moving the selected note (s) is possible as well.

The buttons in the bottom left corner can be used to switch mode. The Alt key (Windows) / Option key (Mac) can be used to temporarily switch between Select Notes and Add Notes mode: in Select Notes mode you can add a note using this key, in Add Notes mode you can lasso notes using this key.



Mode buttons

## Adding Notes

In Add Notes mode notes can be added by clicking the mouse.

## Selecting Notes

In Select Notes or Add Notes mode a note can be selected by clicking it. Multiple notes can be selected by keeping the Ctrl key (Windows) / Command key (Mac) down while clicking a note. In Select Notes mode you can also lasso a rectangular region. Selected notes appear in red.



Lasso in action

## Moving Notes

Notes can be moved using the mouse. The editor will scroll automatically if the mouse approaches any of the four sides of the editors. Notes that are being added, dragged or selected are audible. This feature can be turned on/off in the Preferences window.

## Changing Note Volume

The Note Editor (see below) can be used to change a note's volume (velocity). It can be done faster using the 'V' mouse modifier key (see Mouse Modifiers): press the left mouse button while keeping the 'V' key down. A vertical slider pops up which can be controlled by moving the mouse. The slider disappears upon releasing the mouse button.



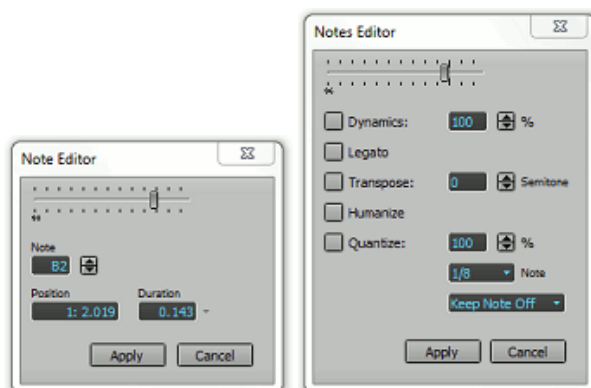
Note Volume

## Note Editor

If a single note is selected clicking the **Edit** button will pop up the Note Editor. Alternatively you can double-click the note.

If the Time Scale is set to bars the **Position** of the note is expressed in bars and beats, and the **Duration** of the note is expressed in musical notes (ie. 0.25 is a quarter note). Values like '1/4' can be typed in the Duration box as well. The down array next to the Duration box can be used to select a value from a predefined list.

The Edit button pops up a slightly different window if multiple notes are selected.



Note Editor

Multiple Notes Editor

## Pop-up menus

Right-clicking (Windows) / Ctrl-clicking (Mac) a note pops up a menu offering Edit and Delete functionality. Doing the same in 'empty space' pops up a menu to add notes or chords.

## 10.6 Pianoroll Editor



Pianoroll editor

In Add Notes mode notes can be drawn by moving the mouse horizontally while keeping the left mouse button down. Clicking the mouse without dragging it will add a note having the same duration as the last one. Notes can be dragged or resized using the mouse in both Select Notes and Add Notes mode.

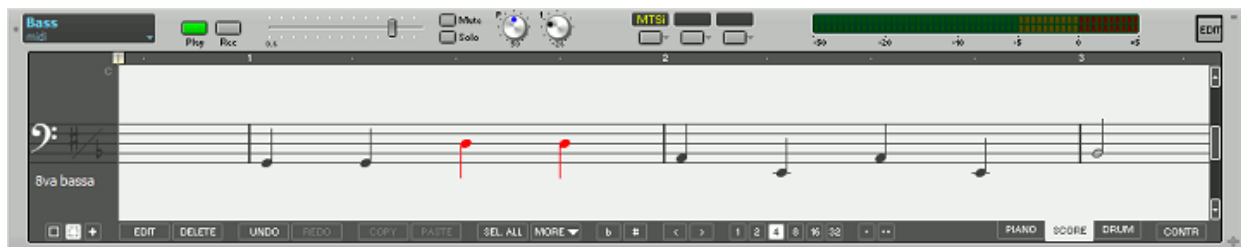
The name of the chord constituted by the selected notes will be displayed in the editor while selecting. Right clicking a note pops up a menu to (among other things) split the note or to join it with the previous note.

### Step Recording

The Pianoroll editor can be used for step recording. If the vertically oriented piano on the left is clicked while the Ctrl key (Windows) / Command key (Mac) is held down, the corresponding note will be recorded at the current transport position. Also, the transport position will move to the end of the new note. The duration of the new note equals one step of the current grid. You can add the Shift key to go one step to the left before the note is added, so you can easily add a couple of notes at the same position.

Clicking while keeping the Alt key (Windows) / Options key (Mac) down adds a rest (ie. the transport position moves to the right). You can add the Shift key to go one step to the left instead.

## 10.7 Score Editor



Score editor

### Adding Notes

In Add Notes mode notes can be added by leftclicking the mouse. The buttons labeled **1, 2, 4, 8, 16, 32**, meaning whole note, half note etc., determine the duration of newly added notes. Dotted or double-dotted notes can be added as well. Keeping the S or F key down while clicking the mouse adds or subtracts a semitone ('Sharp' or 'Flat'), so you can add notes that are not in the current scale directly.

The **b** and **#** buttons can be used to transpose the selected notes one semitone down or up. The **<** and **>** buttons can be used to make the selected notes longer or shorter. Right clicking a note pops up a menu to (among other things) join the note with the previous note.

In order to improve readability notes will be moved horizontally, so notes are spaced nicely without any overlaps. This means that, unlike all other MultitrackStudio editors, the notes don't necessarily line up visually with other tracks. The bar lines, however, always do. In Add Notes mode a one-bar helper grid will be displayed to help you find the position of new notes. You may have to zoom in a bit in order to be able to put short notes (16th, 32th) at the place you want them to be.



Helper grid

The Score editor has a resolution of 1/32th note. It snaps to the grid automatically, regardless of the Gridsnap setting. Although it is possible to use the Score editor when the time scale is set to seconds, this obviously doesn't make sense.

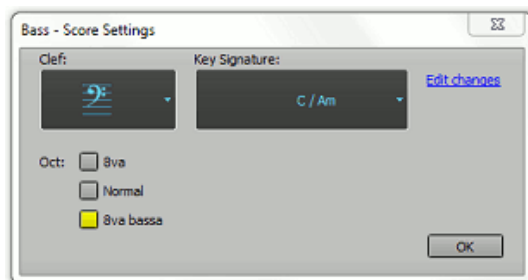
## Tuplets

Triplets, quintuplets and septuplets are recognized automatically. Tuplets can be added easily by right clicking the editor, and picking one out of the items in the menu's Add Tuplet section.

## Clef and Key Signature

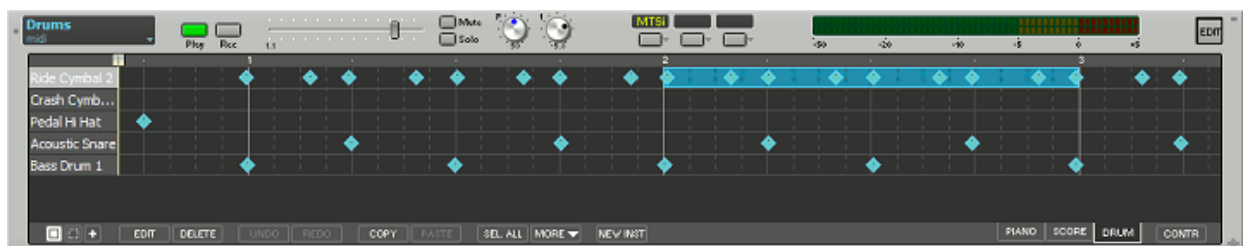
The section on the left shows the clef and the key signature. Clicking this section pops up the editor's Score Settings window. In this window you can choose the **clef**, possible values are Bass, Treble, both Bass and Treble, Tenor and Alto. The **Oct** setting, which is available for single staff only, can be used for instruments which are notated one octave off. The 8va bassa setting is suitable for bass guitar and double bass, for example. When both Bass and Treble staves are used the **Split Point** setting determines which notes appear on either the Bass or the Treble staff. The Oct setting isn't available in this case.

The **key signature** is a value ranging from 7 flats up to 7 sharps. Key signature changes throughout the song can be programmed after clicking the **Edit Changes** link. Key signature changes always occur at the start of a bar. When any changes are present the left hand section shows the key signature of the first bar that's (partially) visible. The key signature settings affect all MIDI tracks. It is stored in the MIDI files.



Score Settings

## 10.8 Drum Editor



Drum editor

The Drum Editor features a horizontal strip called a Drum Instrument Editor for each instrument used. New instruments can be added using the **New Inst** button. The drum instrument's name is shown on the left hand side of the Drum Instrument Editor. A different instrument can be selected upon doubleclicking it. Every instrument corresponds to a MIDI note (eg. C3 is a bass drum, E3 is a snare and B4 is a hihat in General MIDI). The note corresponding to the instrument will be shown in case no name is available. Drum Instrument Editors work like any other MultitrackStudio editor.

In Add Notes mode notes can be added by leftclicking the mouse. Notes appear in the editor as diamond shapes. The note's volume is indicated by a small black dot (the higher the dot the higher the volume).

In Select Part mode you can select a part of the track by moving the mouse vertically while selecting a part. If the mouse ends on the same instrument as it started only this instrument is selected, if it ends on a different one all instruments are selected. The **Select All** button selects only the instrument if a part of an instrument is selected, it selects all instruments otherwise. You can switch from 'one instrument' mode to 'all instruments' mode and vice versa by clicking an instrument's name.

If audio is pasted on an instrument editor only beats are detected (no pitch), so you can record hand claps etc. in an audio track, and drag them to a Drum Instrument Editor. It's best to make sure there are at least two instruments, so you can select a part of one of them and thus ensure the data goes to the instrument rather than to the track.

## Selecting similar notes

A menu appears if you rightclick a note. It has a **Select similar notes** option which selects all similar notes in similar bars. "Similar note" means a note at the same position (eg. at beat 1). "Similar bar" means a bar having the same time signature. You can use this feature to, for example, select all hihat hits which are on beat 1 and make them all a bit louder.

If multiple notes are selected "Select similar notes" will work on the selected notes only. You can, for example, lasso all choruses and then select a particular note within the choruses.

## 10.9 Controller Editor

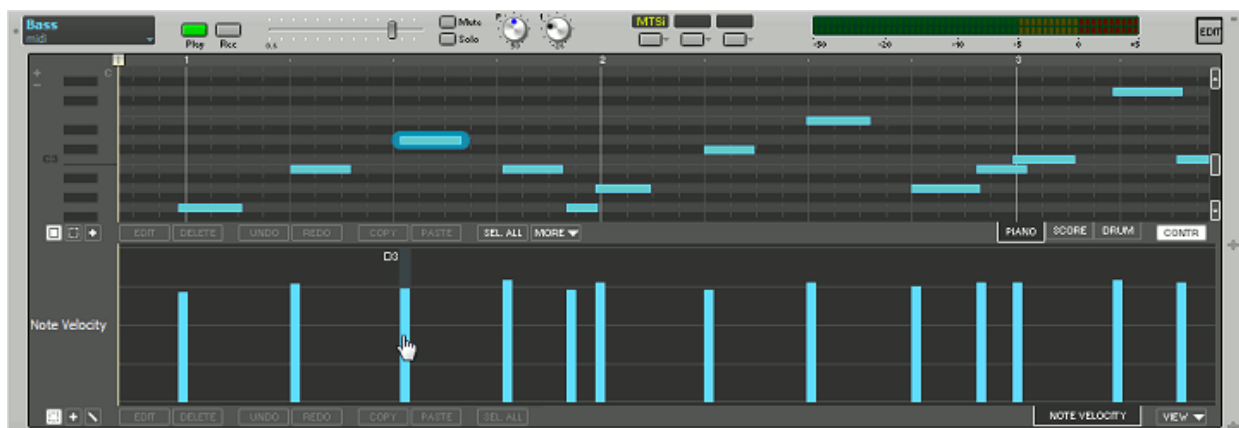
MIDI instruments can use controller events to alter the sound they generate. A track editor's **CONTR** button opens/closes the Controller Editor. The editors appear as tabs, which can be added or removed using the **VIEW** button. All controllers are supported except the data entry and RPN controllers (#5, #38 and #96...101).

*Note: the controller editor's Undo/Redo buttons do exactly the same as the main editor's, ie. both work on both note and controller edits.*

### Note Velocity Editor

The editor that appears by default actually doesn't control a MIDI controller but note velocities instead. Note velocities are represented by vertical bars which can be moved up or down with the mouse. A halo appears around the corresponding note in the pianoroll/score/drum editor so you can easily see which note the bar belongs to.

The Mode buttons in the bottom-left corner have no effect on the Note Velocity Editor.



Note Velocity Editor

### Switching Controller Editors

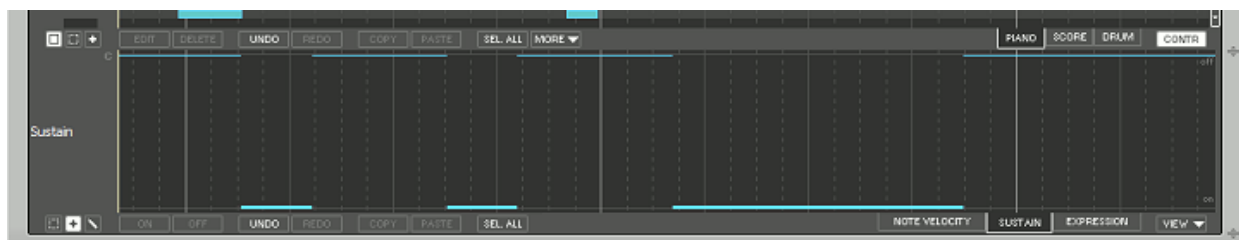
Controllers #64..#69 are 'switching' controllers: they are either 'on' or 'off'. The Sustain and Soft controllers are of the switching type. A switching controller's editor is a horizontal line that can be up or down. Up means off, down means on, just like a piano sustain or soft pedal.

The editor can be in one of two modes:

- **Select**: the mouse selects a part. You can then use the **On** or **Off** buttons.
- **Add/Draw**: the mouse draws a line. Doing this on the upper half of the editor switches the controller off. Using the lower half switches it on.

The buttons in the bottom left corner can be used to switch mode. There's no difference between Add and Draw mode. The Alt key (Windows) / Option key (Mac) can be used to temporarily switch between Select and Add mode.

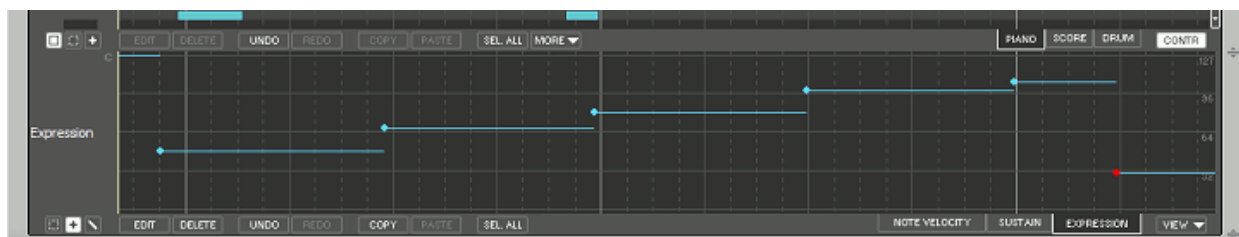
Scrubbing is available for all modes.



Switching Controller Editor

## Continuous Controller Editors

All other editors use dots to represent the controller value. They work just like Automated Fader effects. Scrubbing is available in Select mode only.



Continuous Controller Editor

## Pitch Bend Range

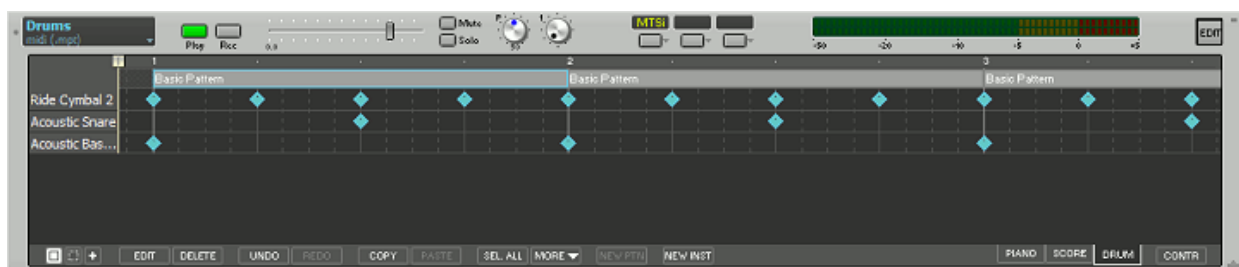
The Pitch editor features a small button labeled **R** in the bottom left corner. It pops up a window which let's you change the pitch bend range. Valid values are 0..24 semitones. External MIDI Instruments won't pick up the new value until the transport is restarted. Other instruments will pick up the new value when a pitch bend event appears.

*Note: External MIDI Instruments and VSTi/DXi plugins may not support changing the pitch bend range.*

## 10.10 MIDI Pattern Editing

MIDI pattern editing can be started by loading a .mpt file in a track. Alternatively, a .mid file can be loaded and then be saved in .mpt format using the File Options Menu.

Once an .mpt file has been loaded a Pattern Bar will appear on top of the track's editor.



Drum track with patterns

A pattern is a small piece of MIDI music. It will generally have a size that makes sense in musical terms (eg. a bar, four bars, or a verse).

A new pattern can be created in two ways:

- Select a part of the Pattern Bar and click the **New Ptn** button. The Pattern Editor will appear automatically.
- Select a part of the track editor and click the **New Ptn** button. A new pattern will be created and all notes that were in the selected part will be moved to the pattern.

The most important feature of the pattern editing concept is that a pattern can have multiple instances (the pattern can appear more than once on the Pattern Bar). Changing the pattern will change all instances.

A new instance of a selected pattern can be created in three ways:

- Dragging the pattern while keeping the Ctrl key (Windows) / Option key (Mac) down copies the pattern.
- Using the Repeat button
- Using Copy and Paste.

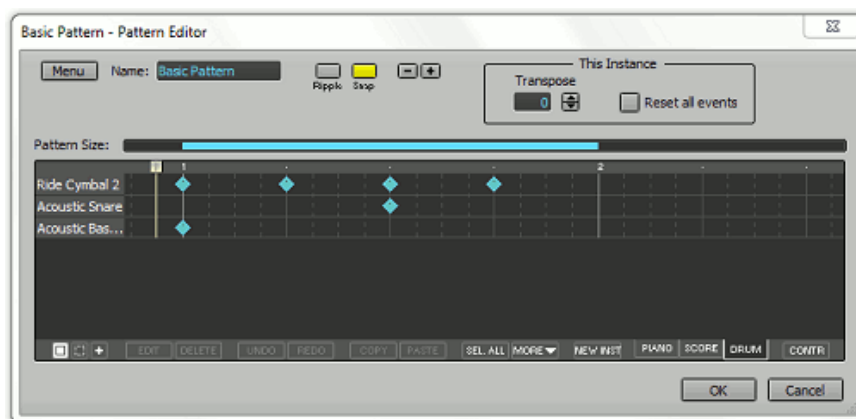
All editor buttons (Cut, Copy, Paste etc.) work as expected when working on the selected part of the Pattern Bar. You can select either a single pattern (by clicking it), or a part with all patterns that are in it (you can press the Alt key (Windows) / Command key (Mac) while selecting to avoid selecting a single pattern).

The track editor can be used as if it's an ordinary MIDI track. Patterns that are in the selected area will be moved or removed when the selected area is dragged or deleted. Editing individual notes is also possible. If a note that belongs to a pattern is modified the modifications will be remembered by the particular instance of the pattern. If the pattern itself is changed the modifications will be applied to the note again. This works in an additive manner: the offsets (in beats) as remembered by the instance will be added to the note's position and length. Similarly any offsets to the note itself and it's volume will be added.

When a pattern is selected the **Edit** button will invoke the Pattern Editor. Alternatively you can double-click a pattern.

### Pattern Editor

The Pattern Editor can be used to edit a pattern. On clicking the **OK** button the selected pattern, and all other instances of it, will be updated.



Pattern Editor (showing a one bar drum pattern)

Clicking the **Menu** button will bring up a menu with three items:

- **Clone**: Create a new Pattern that is identical to this one. All other instances of the original pattern will remain untouched.
- **Import**: Import a pattern from a MIDI file.
- **Export**: Export the pattern to a MIDI file.

The **Name** box contains the name of the pattern. All instances of the pattern will have the same name. This name doesn't mean anything to the program, ie. changing it to another pattern's name won't make the two patterns identical. Using the same name for different patterns obviously is a bad idea.

The **This Instance** section contains controls that affect the selected pattern only (it does not affect any other instances of the pattern).

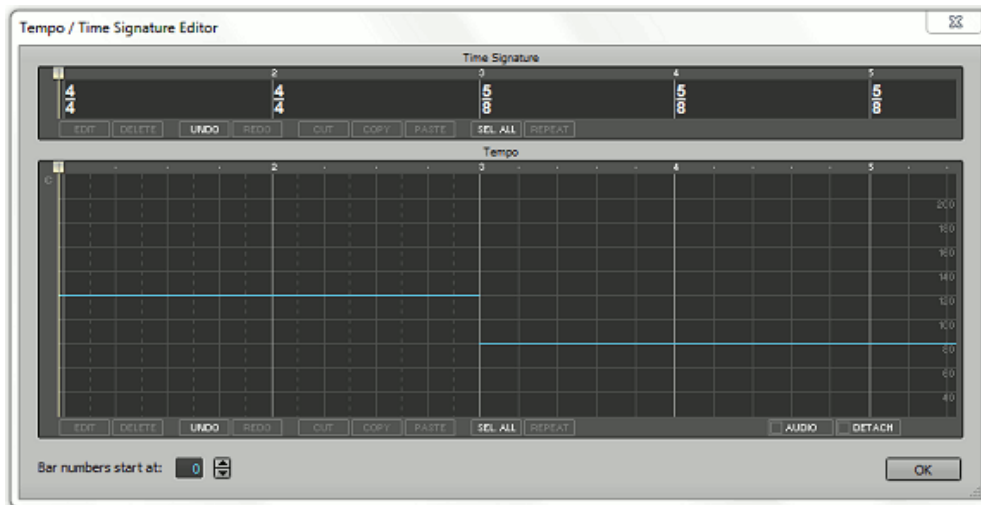
**Transpose** can be used to transpose this instance by a number of semitones. If, for example, the pattern is in C, you can use this feature to transpose a couple of instances to F or G.

The **Reset All Events** button clears all changes that have been made to this instance's events, except for the ones that have been done with the Pattern Editor.

The **Pattern Size** bar determines the size of the pattern as it will appear in the track's editor.

## 10.11 Tempo/Time Signature Editing

The Tempo / Time Signature Editor window contains the Time Signature Editor and the Tempo Window Editor. It also lets you set the number of the first bar.



*Tempo / Time Signature Editor window*

The Tempo / Time Signature Editor window is available only if at least one track contains a MIDI file. That's because time signature and tempo information is stored in the MIDI files.

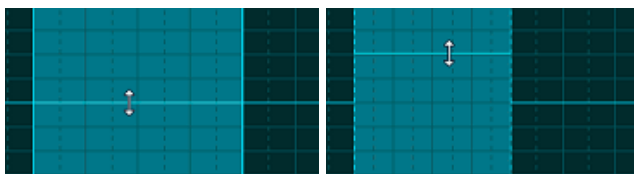
### Time Signature Editing

The Time Signature (nominator/denominator) of a selected part can be changed using the Edit button. Editing the time signature does not affect the actual notes or controller values of MIDI tracks, use the Song Editor instead to achieve that.

The Paste and Repeat buttons take into account the global Ripple setting. The Cut and Delete buttons always act as if Ripple is on (ie. the righthand part shifts left if you delete a part).

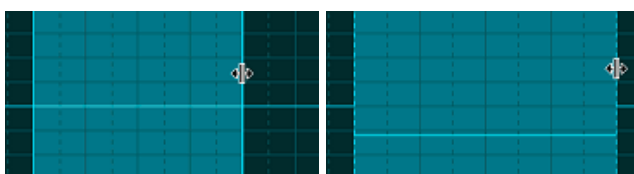
### Tempo Editing

Using the Tempo Editor the tempo (beats per minute, BPM) of the selected part can be changed by dragging the line up or down. Alternatively, the **Edit** button pops up a window which lets you type a BPM value. In this window, the **Tap** button pops up a 'BPM Tapper' window, which lets you play the tempo on the space bar.



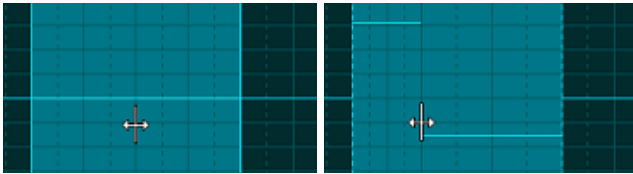
*Dragging tempo line vertically, before and after*

If the right hand side of the selected part is dragged while keeping the Alt key (Windows) / Command key (Mac) down the tempo will be adjusted accordingly:



*Stretch (use Alt key (Windows) / Command key (Mac)), before and after*

Any grid line in the selected part can be moved if the Alt key (Windows) / Command key (Mac) is down:



*Warp (use Alt key (Windows) / Command key (Mac)), before and after*

The Tempo Editor features tweakable edits, thereby minimizing any rounding errors.

The Paste and Repeat buttons take into account the global Ripple setting. The Cut and Delete buttons always act as if Ripple is on (ie. the righthand part shifts left if you delete a part).

By default the tempo editor affects MIDI tracks only. If the **Audio** button is checked audio tracks are affected as well. It's recommended to make sure any monophonic audio tracks use the monophonic transpose algorithm. Use their editor's Edit button to access this option (a part needs to be selected for this button to be enabled).

Edit operations affect the following items:

- MIDI Tracks (the MIDI file, Automated Fader effects and automation data)
- If the Audio button is checked: Audio Tracks (the audio file, Automated Fader effects and automation data)
- Automated Fader effects, Vocal Tuner effects and automation data of Groups, Effect Returns and Master sections are affected only if either the song contains no audio tracks or the Audio button is checked.

The **Detach** button detaches the Tracks from the Tempo Editor. In this situation the tempo can be edited without affecting the notes in the Tracks. This feature can be used to match the tempo to a 'freestyle' recording, or to go from, for example, 100 measures at 120 BPM to 50 measures at 60 BPM.

### Bar Numbers

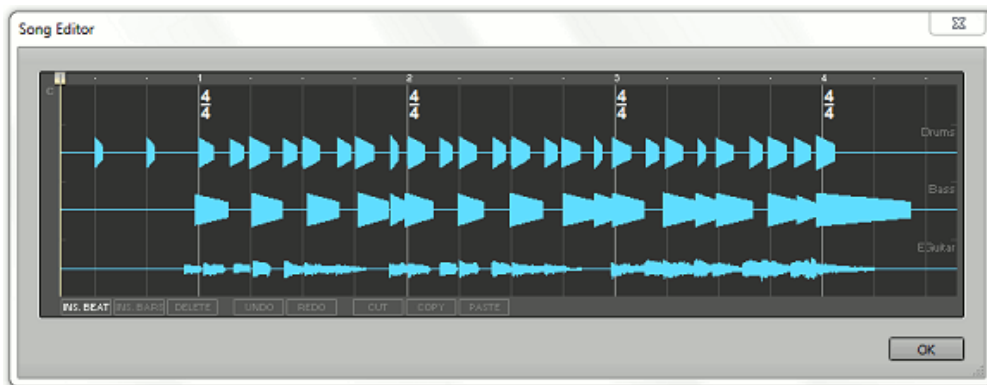
The **Bar numbers start at** box determines the number of the first bar. The default value is 0, so music starts at bar number 1 if the first bar is used for count-in. You can choose 1 if there's no count-in, or -1 if there's a two bar count-in. The lower limit is -9, which equals a ten bar count-in.

## 10.12 Song Editor

The Song Editor can be used to insert or remove parts of a song. It always works in 'Ripple mode', regardless of the Ripple button at the top of the main window. The song editor works in 'bar mode' if there are any MIDI tracks, regardless of the Bars button at the top of the main window.

The song editor affects "everything":

- Audio / MIDI files opened in the tracks
- Tempo and Time Signature
- Key Signature (as seen in Score editors)
- Chords and Lyrics
- Markers
- Automated Fader effects
- Automation data (Pro Plus edition)



*Song Editor window*

## 10.13 Multi MIDI Editor

The Multi MIDI Editor lets you work with multiple tracks in a single editor. It can be used to work on arrangements for string or woodwind sections etc.

The Multi MIDI Editor shows and affects all MIDI tracks that have their editor opened. If you use suitable colors for your instrument groups you can open a group in the Multi MIDI Editor quickly by rightclicking a track's Edit button and choosing **Open same color MIDI tracks in Multi MIDI Editor**.

### Pianoroll

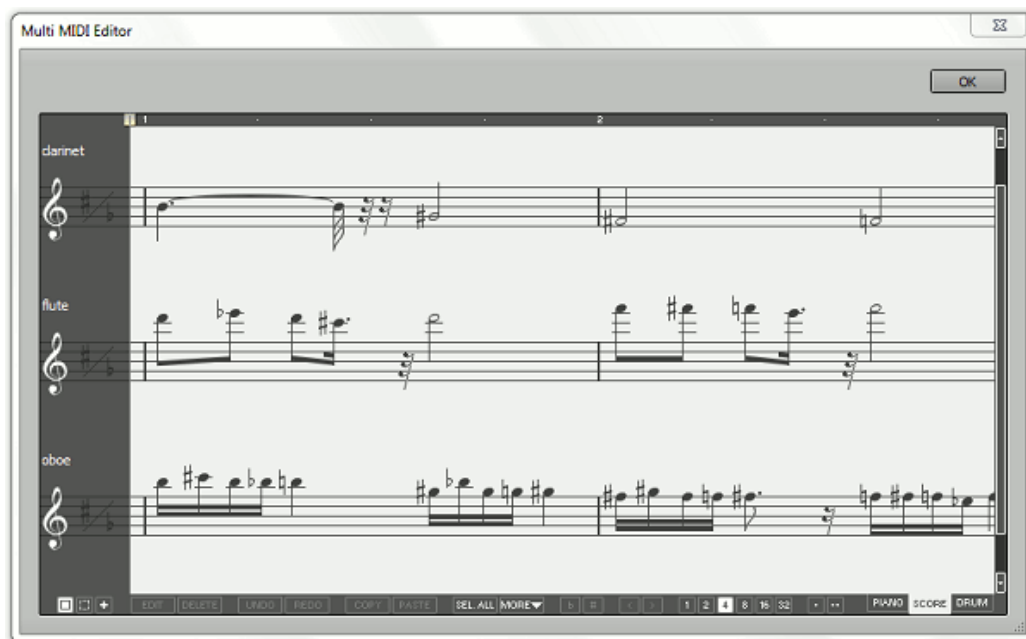
The colored buttons at the top represent the tracks that are visible in the editor. The active one is larger and its text is bold. Any new notes you add will be in the active track. Selected notes can be moved to the active track using the **Move** button. In case of overlapping notes the active track will appear in front of the others.



*Multi MIDI Editor window, showing 3 tracks in pianoroll view*

### Score

Each track gets its own staff (or a system of both bass and treble staves). Selected notes can be moved to another staff using drag-and-drop.



Multi MIDI Editor window, showing 3 tracks in score view

## Drum

The colored buttons at the top only serve to show the names of the tracks. The drum instruments appear in the same order, and the notes appear in the corresponding colors. The Drum Instrument Selector, which appears on clicking the NEW INST button lists the instruments available in all the track's MIDI instruments. The track numbers, as they appear on the colored buttons, appear in the selector as well.

Edits in a single instrument are not tweakable, unlike a track's drum editor.

## 10.14 Multitrack Editing

Using the Multitrack Editor, which can be shown using the Editing Options menu, multiple tracks can be edited simultaneously. The Multitrack Editor affects all tracks that have their editor opened.

Hint: Use the Song Editor if you want to edit all tracks including tempo, automation and markers etc.



Multitrack Editor window, showing 3 tracks

The Multitrack Editor works just like a track editor. It features all common track editor buttons except Export. The Multitrack Editor's Edit Control's features depend on the types of the tracks being edited. The control can be an Audio Edit Control, a MIDI Edit Control or one that contains just a Volume fader and Fade, Reverse and Transpose options.

## 10.15 Chords and Lyrics

Chords and Lyrics can be entered in the Chord Editor and Lyric Editor respectively, which are available from

the Editing Options menu. These Chords and Lyrics can be displayed in almost any editor, which makes it much easier to see "where you are". They can be made visible using small buttons labeled C and L which appear on the left hand side of the editors. The Chords appear at the top of the editor, the Lyrics appear at the bottom.

Entering Chords is pretty easy, since you probably have them on paper or in your head anyway. Entering Lyrics is a bit more work because it's not so easy to decide where the bars and beats are. It's recommended to type the lyrics first, and then add the bar separators (and optionally the beat separators).

Bars are separated by '|' characters. Inside a bar, beats are separated by '-' characters.

Here are examples of chords and lyrics:

```
||      empty bar for count in
Intro:
| C | Am | F |Gsus4-Gsus4- G - G |
| C | Am | Bb | G7 |
```

*Chords example*

```
||
| The sky | is blue | and - I | love -- you |
| It's true | it's true | it's true | it's true|
```

*Lyrics example*

Note that any text which is not in a bar is ignored, and thus can be used to add comments. Spaces can be used anywhere you like. However, spaces aren't allowed in chord names (ie. you must type 'Gsus4' instead of 'G sus 4').

Since MultitrackStudio stores the tempo in MIDI files, there must be at least one MIDI track in a Song in order to be able to align the chords and lyrics with the tracks. See [Extracting tempo from Track](#) if your song is audio only.

## Transpose Chords

The **Transpose** button can be used to transpose the selected chords. You can use this if you decide to play the guitar part using a capo. Transposed chords always use sharps, never flats (D# instead of Eb etc.). If a bass note is present at the end of the chord, separated by a slash (eg. C/B) , then this bass note will be transposed as well.

## Create MIDI Tracks from Chords

Using the **Create Track** button you can create MIDI files from the chords. These files will be loaded in a track automatically. Guitar, Piano, Bass and Strings tracks can be created. These tracks can be used to make sure the chords are OK, or to create backing tracks for practicing a guitar solo etc.

The following chords will be recognized: C, Cm, C6, Cm6, C7, Cm7, Cmaj7, Cmmaj7, Cadd9, Cmadd9, C9, Cm9, C11, Cm11, C13, Cm13, Csus2, Csus4 (or Csus), Cdim, Caug, Cdim7, Cm7b5. Any key can be used (Bbm, D7, C#maj7 etc.).

## Copy Lyrics to Clipboard

The **Copy** button copies the lyrics to the Clipboard. All bar and beat separators are removed. You can paste the lyrics in a text editor and print them.

# 11 Devices

A 'driverset' is used to make your audio and MIDI devices available for use by MultitrackStudio. This driverset can be selected in the Studio menu's Devices window. Clicking the **Properties** button will pop up the driverset's Properties window, which is where you can select the actual devices to be used.

The **Audio Input Control** and **Audio Output Control** (available from the Recording and the Studio menu respectively) can be used to set the properties (input selection, levels etc.) of the audio devices. The controls depend on the driverset and devices used.

The MIDI Out Device Options window (available from the Devices window) controls the behavior of the MIDI Out Ports.

MultitrackStudio Professional supports up to two audio channels, one MIDI In device and up to two MIDI Out devices.

MultitrackStudio Pro Plus supports up to 96 audio channels (using the AsioSnd driverset), up to four MIDI In devices and up to four MIDI Out devices.

## Choosing a driverset

On **Windows** there are three driversets available:

AsioSnd is the preferred driverset. It can only be used if the sound device comes with an ASIO driver. Latency can be very low.

VistaSound can be used if there's no ASIO driver for your sound device. As its name implies it works on Windows Vista or newer only. Latency can be low. The audio devices are used in exclusive mode, which means that other programs can't use the audio devices while MultitrackStudio is running. This includes the Microsoft GS Wavetable Synth, if you plan on using this to play MIDI tracks (which isn't recommended since latency is huge) you should use the WinSound driverset instead.

WinSound should work with any sound device. Latency is high, and there's no Soft Monitoring.

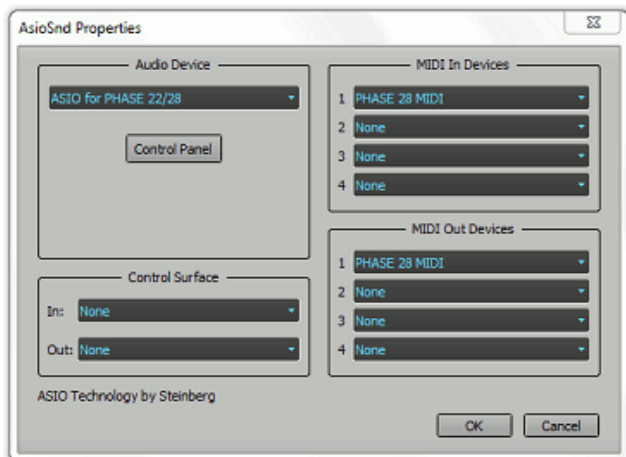
On **Mac** there's just one driverset: CoreSound.

## 11.1 AsioSnd

*Note: this driverset is available for Windows only.*

This driverset makes ASIO audio and Windows MIDI devices available for use by MultitrackStudio.

ASIO drivers allow for low latencies and avoid track synchronization issues. In addition AsioSnd allows multichannel recording (Pro Plus edition only). If a sound device comes with an ASIO driver then it's usually best to use the AsioSnd driverset.



*AsioSnd Properties window (Pro Plus edition. Professional has only one MIDI In and two MIDI Out devices)*

In the **Audio Device** section you can select the audio device that will be used.

On clicking the **Control Panel** button the driver's control panel will appear. This panel usually lets you set the buffer size. Buffers can be up to 4096 samples (this corresponds to 93 ms at 44.1/88.2 kHz and 85 ms at 48/96 kHz). A buffer size of 256 (at 44.1 kHz) can be considered a good compromise between reliability and low latency.

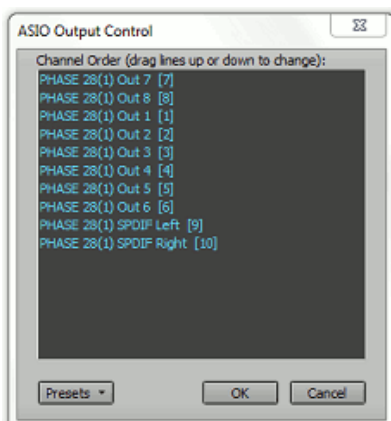
If the buffers are too small glitches will occur. This may not be a problem when playing back audio or recording MIDI, as the driver will usually stay in sync so any glitches will not appear in the final master. It's strongly recommended to use large enough buffers when recording audio, as glitches in the recorded track do appear in the master.

In the **MIDI In Devices** section you can select the device that is used for MIDI recording.

In the **MIDI Out Devices** section you can select the device that is used for MIDI playback. The 'Default' option uses the default Windows MIDI output device.

If you have a hardware control surface you can select the MIDI devices it is connected to in the **Control Surface** section.

### Audio Input/Output Control



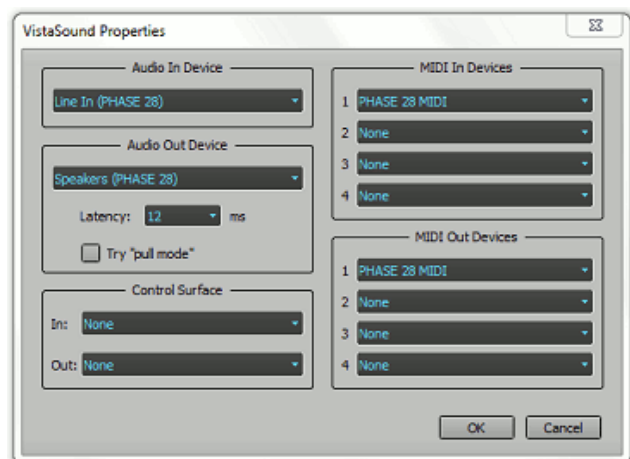
*Audio Output Control using AsioSnd*

The Audio Input Control and Audio Output Control (available from the Recording Options section and the Studio menu respectively) determine which in/outputs will be used. The listed in/outputs will be used from top to bottom. They can be reordered by dragging and dropping them. The **Automatically assign channels to tracks** button (Audio Input Control only) can be switched off to let you assign channels to tracks manually.

## 11.2 VistaSound

*Note: this driverset is available for Windows only.*

Windows Vista features new low-latency drivers called "Core Audio" or WASAPI. Sometimes the term WaveRT is used as well, although this actually refers to a technology used by drivers internally. Windows Vista also features MMCSS (Multimedia Class Scheduler Service), which helps prevent audio glitches under high CPU load. The VistaSound driverset makes WASAPI audio and MIDI devices available for use by MultitrackStudio. It supports multichannel recording and playback, provided the sound device driver supports this (Pro Plus edition only).



*VistaSound Properties window (Pro Plus edition, Professional has only one MIDI In and two MIDI Out devices)*

In the **Audio In Device** section you can select the audio device that will be used for recording. In the **Audio Out Device** section you can select the audio device that will be used for playback. It's a good idea to use Audio In and Out devices that are on the same sound device. If they're not their samplerates probably aren't equal. This can be quite a problem, as recorded tracks will slowly go out-of-sync during playback.

Audio devices are opened in exclusive mode in order to ensure low latency and good synchronization. This means other programs can't use these audio devices while MultitrackStudio runs. If, for example, you want to record the audio output of another program you'll have to temporarily select 'None' in the Audio Out Device section so the other program can playback.

The **Latency** box determines the time it takes before you hear the sound when playing MIDI soft instruments live or when using Soft Monitoring ('live effects'). You'll hear glitches if this settings is too low. The VistaSound driverset has been designed to not let these glitches end up in the actual recording: If, for example, you record the Guitar Amp effect live using a low latency and you hear glitches while recording, the glitches won't be in the track and it will sound fine when you play it back.

The **Try "pull mode"** button turns on "pull mode" (AKA "event mode"), which works better when CPU usage is high. You'd want to have this enabled, but unfortunately some drivers fail to implement this correctly. It also doesn't work on Windows Vista without SP1. Pull mode won't be used if VistaSound can detect it doesn't work, even if it's enabled.

Your sound device may not support latencies as low as the one you've selected. The actual latency appears in the Studio menu's Devices window.

In the **MIDI In Devices** section you can select the device that is used for MIDI recording.

In the **MIDI Out Devices** section you can select the device that is used for MIDI playback. The 'Default' option uses the default Windows MIDI output device.

If you have a hardware control surface you can select the MIDI devices it is connected to in the **Control Surface** section.

## Audio Input/Output Control



Audio Input Control using VistaSound

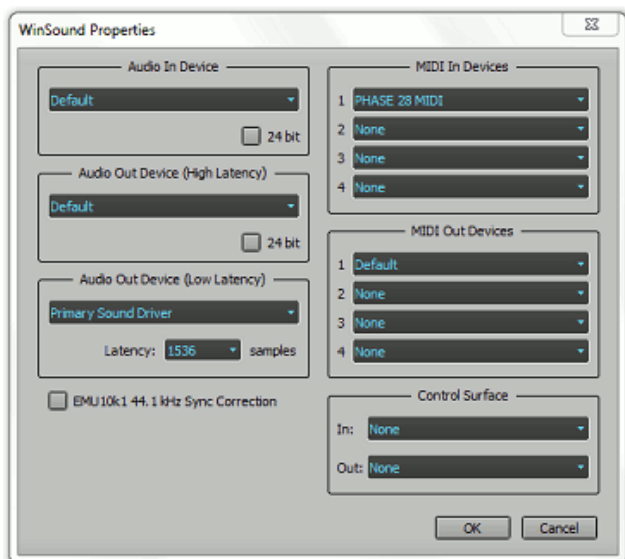
The Audio Input Control and Audio Output Control (available from the Recording Options section and the Studio menu respectively) determine which in/outputs will be used. The listed in/outputs will be used from top to bottom. They can be reordered by dragging and dropping them. The **Automatically assign channels to tracks** button (Audio Input Control only) can be switched off to let you assign channels to tracks manually.

The **Control Panel** button pops up the audio page of the Windows Control Panel, where you can adjust recording levels etc. if the sound device supports this.

## 11.3 WinSound

*Note: this driverset is available for Windows only.*

This driverset makes Windows Audio and MIDI devices available for use by MultitrackStudio.



WinSound Properties window (Pro Plus edition, Professional has only one MIDI In and two MIDI Out devices)

In the **Audio In Device** section you can select the device that is used for audio recording.

In the Audio Out sections you can select the devices that will be used for audio playback.

In the **Audio Out Devices (High Latency)** section you can select the device that will be used when there is no recording MIDI soft instrument. The devices listed are MME devices (which are very reliable, even when CPU usage is high).

In the **Audio Out Devices (Low Latency)** section you can select the device that will be used when there are one or more recording soft instruments. The devices listed are DirectSound devices (which can have a lower latency).

In general you will use MME and DirectSound devices that use the same sound device. WinSound will automatically open/close the appropriate device.

The **24 bit** buttons can be used to enable 24 bit recording/playback. It's recommended to enable this only if the sound device actually supports it, if it doesn't the sound device's driver may perform bad or even crash

your computer in some cases.

In the **MIDI In Devices** section you can select the device that is used for MIDI recording.

In the **MIDI Out Devices** section you can select the device that is used for MIDI playback. The 'Default' option uses the default Windows MIDI output device.

If you have a hardware control surface you can select the MIDI devices it is connected to in the **Control Surface** section.

It's a good idea to use Audio In and Out devices that are on the same sound device. If they're not their samplersates probably aren't equal. This can be quite a problem, as recorded tracks will slowly go out-of-sync during playback.

If necessary you can use the Sample Rate Converter to correct the sample rate of every recorded track. To determine the required samplerate you should record a playing track. Use the track's editor to determine the timing difference between those two tracks (at the end of the track). The new samplerate is equal to original samplerate multiplied by the playing time of the original track and divided by that of the recorded track.

### **SoundBlaster Live! issues**

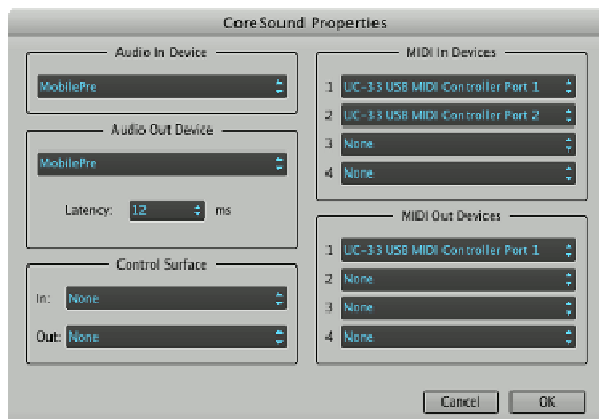
Creative Labs SoundBlaster Live! sound devices (and its cheaper brothers like 128, 512, 1024, Ensoniq AudioPCI) use a slightly higher samplerate for recording than for playback at a samplerate of 44.1 kHz. MultitrackStudio features a unique compensation for this effect. This compensation can be turned on by checking the **EMU10k1 44.1 kHz Sync Correction** box.

When using a samplerate of 48 kHz this problem does not occur, and the 'EMU10k1 44.1 kHz Sync Correction' setting has no effect.

## **11.4 CoreSound**

*Note: this driverset is available for Mac only.*

The CoreSound driverset makes Core Audio audio and MIDI devices available for use by MultitrackStudio.



*CoreSound Properties window (Pro Plus edition, Professional has only one MIDI In and two MIDI Out devices)*

In the **Audio In Device** section you can select the audio device that will be used for recording.

In the **Audio Out Device** section you can select the audio device that will be used for playback.

It's recommended to use Audio In and Out devices which are part of the same sound device. If they're not their samplersates probably aren't equal. This can be quite a problem, as recorded tracks will slowly go out-of-sync during playback. To solve this problem you can create an 'aggregate device' using the Audio MIDI Setup application, and use this device in MultitrackStudio. OS X will then take care of syncing the two devices.

The **Latency** box determines the time it takes before you hear the sound when playing MIDI software instruments live or when using Soft Monitoring ('live effects'). You'll hear glitches if this setting is too low.

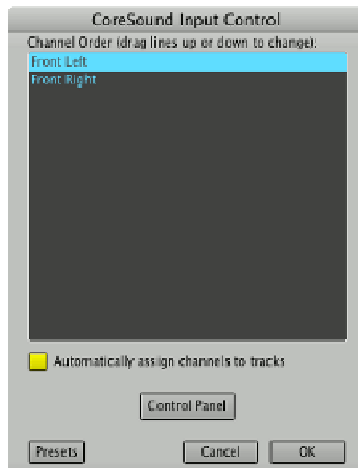
Your sound device may not support latencies as low as the one you've selected. The actual latency appears in the Studio menu's Devices window.

In the **MIDI In Devices** section you can select the device that is used for MIDI recording.

In the **MIDI Out Devices** section you can select the device that is used for MIDI playback.

If you have a hardware control surface you can select the MIDI devices it is connected to in the **Control Surface** section.

## Audio Input/Output Control



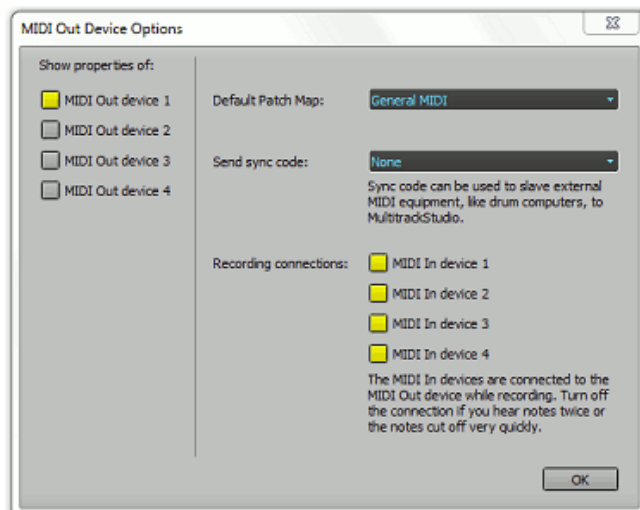
Audio Input Control using CoreSound

The Audio Input Control and Audio Output Control (available from the Recording Options section and the Studio menu respectively) determine which in/outputs will be used. The listed in/outputs will be used from top to bottom. They can be reordered by dragging and dropping them. The **Automatically assign channels to tracks** button (Audio Input Control only) can be switched off to let you assign channels to tracks manually.

The **Control Panel** button pops up the Sound page of the System Preferences, where you can adjust recording levels etc. if the sound device supports this.

## 11.5 MIDI Out Device Options

The MIDI Out Device Options window (available from the Studio menu's Devices window) determines the behavior of the MIDI Out devices, and consequently the External MIDI Instruments.



MIDI Out Device Options window (this example is from the Pro Plus edition)

**Default Patch Map:** Here you can select a patch map that matches the synthesizer connected to the MIDI Device. This patch map contains the names of patches and drum note names that are used by the External MIDI Instrument and the drum editor respectively.

The **Send sync code** section specifies the type of sync messages sent over the MIDI Out Device. This can be used to synchronize hardware or software sequencers with MultitrackStudio.

The **Recording connections** section defines the way MIDI In and Out devices will be connected when recording MIDI. By default, events received by the MIDI In device will be sent to the MIDI Out device that's being used by the recording track. This is fine if you're using an external 19 inch synthesizer module or an onboard soundcard synthesizer. However, it can cause problems if you're using a MIDI keyboard with built-in

sounds that is connected to both the computer MIDI In and Out device (all notes may be triggered twice). This can easily be solved by unchecking the corresponding button.

## 11.6 Compensating for driver issues

*Note: this feature is available for Windows only*

*Note: this needs to be done in extremely rare situations only. Make sure you're using the latest drivers for your sound device first.*

### Aligning audio devices

Under normal circumstances all audio and MIDI devices will be aligned by MultitrackStudio, so that newly recorded tracks are perfectly aligned with existing ones. However, some sound device drivers fail to report the exact playback or recording position, and as a result MultitrackStudio can't align the devices accurately. Offsets to the reported positions can be specified in text files to compensate for such driver defects.

### Aligning the audio input and output devices step-by-step

This section describes how to compensate the audio input device so that new tracks are aligned with existing ones.

#### Step 1

Start MultitrackStudio and load the 'C:\Program Files\MtStudio\Impulse.gjm' in a track. This file contains a single impulse at approx. 50 milliseconds. Set up another track that will record the first track.

#### Step 2

Connect the audio input device to the audio output device using an audio cable. If your sound device can do this routing internally you can use that feature instead of the cable.

#### Step 3

Click the Studio menu's Devices option and click the Settings button. The driverset's Settings window will appear. Now close this window using the OK button, thus forcing the program to create sections in a file that you will be editing in the next step. Note that 'default' devices (Default, MIDI Mapper or Primary Sound Driver) can't be compensated, so any devices you want to compensate must be selected explicitly.

#### Step 4

Record the first track to the second track for about one second. Open the track editors and locate the impulses. Move the mouse over the impulses and read the positions in the bottom right corner of the window. The difference between the two positions is error that needs compensation.

#### Step 5

The AsioSnd, VistaSound and WinSound driversets store their settings in the 'AsioSnd Settings.txt', 'VistaSound Settings.txt' and 'WinSound Settings.txt' files respectively. These files are located in the 'C:\Documents and Settings\Username\Application Data\MtStudio' (XP) or 'C:\Users\Username\AppData\Roaming\MtStudio' (Vista) folder, and can be edited using Windows Notepad to compensate for the driver's error. The settings files consist of sections, indicated by [brackets], which can contain values.

Here's a small example of a settings file:

```
[Settings]
```

```
[Brand X Wave Device]  
audioin_offset_millisecs=15
```

The [Settings] section shouldn't be modified. The [Brand X Wave Device] section, where 'Brand X Wave Device' is the name of the audio input device as specified in the driverset's Settings window. The error value found in step 4 has been filled in here (15 milliseconds in this case).

#### Step 6

Close MultitrackStudio and start it again (this is necessary to force the program to read the settings file again). Now you can repeat steps 1..4 and verify the results.

## Advanced options

It is also possible to specify offsets in samples instead of milliseconds, this can be useful if you want the compensation to work for multiple samplerates. The offset can also be specified in ASIO buffers (AsioSnd only). MIDI devices can also be compensated.

This is the full list of possible compensation options:

**Audio input devices** support these values:

audioin\_offset\_millisecs=  
audioin\_offset\_samples=  
audioin\_offset\_buffers= (AsioSnd only)

**WinSound high latency audio output devices** and **AsioSnd Audio output devices** support these values:

audioout\_offset\_millisecs=  
audioout\_offset\_samples=  
audioout\_offset\_buffers= (AsioSnd only)

**WinSound high latency audio output devices** support these values:

audiooutlowlat\_offset\_millisecs=  
audiooutlowlat\_offset\_samples=

**MIDI input devices** support these values:

midiiin\_offset\_millisecs=  
midiiin\_offset\_samples=

**MIDI output devices** support these values:

midioout\_offset\_millisecs=  
midioout\_offset\_samples=

The \_samples values must be integer values, the \_millisecs and \_buffers values can be fractional.

## ASIO Delay

A small delay can be introduced to the AsioSnd driver's ASIO buffer processing. This can sometimes be used to work around certain sound device/mainboard/driver incompatibilities if these symptoms occur:

1. Recording a MIDI track using a soft instrument sounds fine while recording.
2. But it sounds gargled or extremely glitchy when played back.

To add an ASIO delay open the 'C:\Documents and Settings\*Username*\Application Data\MtStudio\AsioSnd Settings.txt' (XP) or 'C:\Users\*Username*\AppData\Roaming\MtStudio\AsioSnd Settings.txt' (Vista) file in NotePad and add a 'AsioDelay=' line in the [Settings] section like this:

```
[Settings]
AsioDelay=20000
```

The value has to be determined experimentally (the higher the value the longer the delay. MultitrackStudio should be restarted after editing the file.

## ASIO MMCSS

Windows Vista features MMCSS (Multimedia Class Scheduler Service), which can help prevent glitches under high CPU load. While it's an ASIO driver's job to enable this many don't. You can add a 'MMCSS=1' line to the 'AsioSnd Settings.txt' file (see previous section) file to make MultitrackStudio turn on MMCSS. This line should appear in the [Settings] section:

```
[Settings]
MMCSS=1
```

MultitrackStudio should be restarted after editing the file.

Note that not every ASIO driver will necessarily be happy with this. If it performs worse you should remove the line again.

## 12 Control Surfaces

A hardware control surface is device which typically has faders, knobs and buttons. It can be used to control MultitrackStudio's transport, mixer and effects.

Control surfaces connect to a MIDI port on the computer. The MIDI In device to be used for the control surface can be selected in the Studio menu's Devices window. The MIDI Out device should be specified as well if the control surface has LEDs or motorized faders.

The MIDI In device used by the control surface can be selected as a regular MIDI In device (for recording a MIDI keyboard) as well. In this case the control surface functions will have the highest priority, ie. only MIDI messages which aren't mapped to a control surface action will be recorded by MIDI tracks. This mechanism makes it possible to map some keys of a MIDI keyboard to control surface actions. You can, for instance, use a key to invoke the "Alternate Take" action.

The Studio menu's Control Surface option pops up the Control Surface Settings window. Here you can assign control surface knobs to specific functions using the **Learn** function. Ready to use presets for the TranzPort and AlphaTrack (Frontier Design Group), the BCF2000 (Behringer) and the UC33 (Evolution) are provided.

The Control Surface Bar, which can be made visible using the Studio menu's Preferences window, shows the names of the Mixer Sections that are mapped to the control surface channels.

### 12.1 Control Surface Settings

The Control Surface Settings window defines the functionality of the control surface being used. The **Preset** button can be used to load predefined presets, or to create new presets. The **Info** button shows information on the current settings if available.

The **Clear** button clears the highlighted Action. The **Empty** preset can be loaded to clear all actions. If the **Learn** button is green any incoming midi messages will be mapped to the highlighted Action. Custom mappings can be created easily this way.

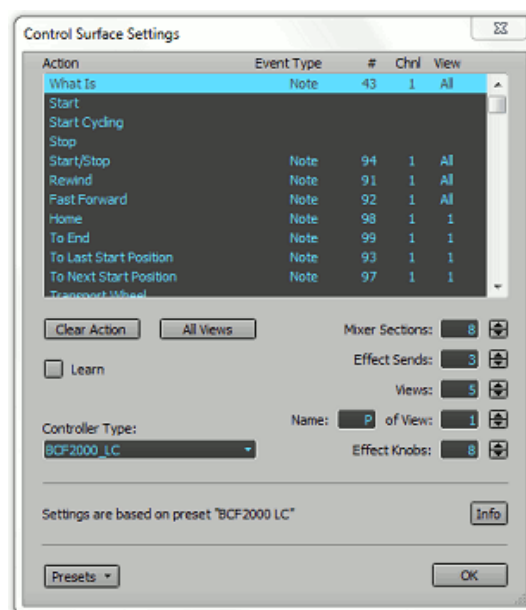
Control Surfaces which are not plain MIDI are translated to plain MIDI. Several **Controller Types** can be selected:

- MIDI Controller: plain MIDI messages
- TranzPort
- AlphaTrack
- Mackie Control
- HUI

The **Mixer Sections** settings will typically equal the number of channels the control surface provides. The highest possible value is eight. The **Effect Sends** settings determines the number of Effect Send knobs that can be controlled using the control surface.

There can be multiple **Views**. This is typically used to control multiple Actions using a single rotary knob (View 1 = Pan, View 2 = Effect Send 1 etc.). The **All Views** button makes the highlighted Action appear in all views. You'll probably want volume faders, transport buttons etc. to be in all views.

The **Effect Knobs** settings determines the number of rotary knobs available for controlling effect knobs. An effect can only be controlled when its user interface is visible on the screen. The knobs used to control effects can also be used to control mixer sections (pan knobs etc.), MultitrackStudio takes care of this automatically (there's no need to use views for this).



Control Surface Settings window

## Actions

The following actions can be controlled by the control surface. Actions marked (cc) should be controlled by a continuous controller (rotating knob or fader), all other actions are supposed to be controlled by a button.

- What Is: Keep this button down while using another button or knob. A description of the associated Action will be shown in the bottom left corner of the screen.

The following actions control the Transport:

- Start
- Start Cycling
- Stop
- Start/Stop: equivalent to hitting the space bar.
- Rewind
- Fast Forward
- Home
- To End
- To Last Start Position
- To Next Start Position
- Transport Wheel (cc)
- To Previous Marker
- To Next Marker
- Add Marker
- Delete Marker
- VariSpeed (cc) (*Pro Plus edition only*)
- Cycle: toggle cycle on/off. If it's on Start will do Start Cycling instead.
- Counter: turn on/off control surface's counter display.
- Counter Format: toggle bars/seconds.
- Zoom In
- Zoom Out
- Zoom In/Out (cc)
- To Next Song: to next song of songlist.

These actions control a couple of recording related things:

- New Audio Track: select a template from list of audio track templates
- New MIDI Track: select a template from list of MIDI track templates
- Alternate Take: click the Recording option's Alternate Take item.
- Punch: click the Punch button.

These actions control mixer sections:

- Section Play: toggle a track's Play button.
- Section Rec: toggle a track's Rec button.
- Section PlayRec: toggle between playback and record mode.
- Section Fader (cc)
- Section Mute
- Section Solo
- Section Pan (cc)
- Section Effect Send (cc)
- Section Slot: open an Effect Slot (show the effect's user interface).
- Section Select Slot (cc): pop up effect selector window
- Section Output Selector (cc)
- Section Editor: open/close a track's editor.
- Section Set Punch In: make start of the editor's selected part equal to the Transport position.
- Section Set Punch Out: make end of the editor's selected part equal to the Transport position.
- Section Set Punch In/Out: select the editor's selected part while the Transport is running. This should be done before recording.
- Section Goto Punch In: make Transport position equal to the start of the editor's selected part.
- Section Goto Punch Out: make Transport position equal to the end of the editor's selected part.
- Section Undo Punch: click track editor's Undo button
- Section Redo Punch: click track editor's Redo button
- Section Clone: add track with new file and similar settings.
- Section Map: pop up window to map a mixer section to control surface channel.

- Master Fader: controls the Master section's volume fader.
- Clear Solo: turn off any active Solo buttons.
- Level Meters: turn on/off the control surface's level meters
- Faders Silent: suspend/resume motor fader control. Can be used to keep the (automated) faders from making noise while recording in the same room.
- Slot Select Button: press this button before pressing the Section Slot button. Now a Section Select Slot action will be sent instead of a Section Slot action.
- Mouse Control (cc): controls the knob the mouse points to.
- Send Snapshot: send all values to the control surface (probably never needed).

These actions control views and banks:

- View Button
- View Down
- View Up
- View Up/Down (cc)
- Bank Down: move (typically) 8 sections down
- Bank Up: move (typically) 8 sections up
- To First Bank
- To Last Bank
- Section Down
- Section Up

The following actions are used to control Effects and Instruments. These actions can share knobs with non-effect actions (eg. Effect Knob and Section Pan can be on the same knob, Effect Row Up and View Up can be on the same button etc.).

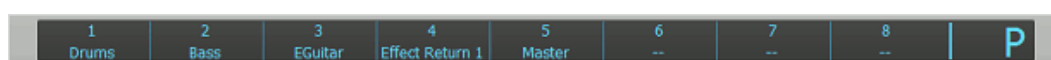
- Effect Knob: control an effect's knob.
- Effect Mouse Control (cc): controls the effect knob the mouse points to.
- Effect Row Down
- Effect Row Up
- Effect Row Up/Down (cc)
- Effect To First Row
- Effect To Last Row
- Effect Control Down
- Effect Control Up
- Effect Close: close the effect window.
- Effect Bypass

The following actions are used to select effects, sampler patches etc. These actions can share knobs with actions which are not in this group (eg. Selector Accept can be on the same button as Effect Close).

- Selector Down
- Selector Up
- Selector Up/Down (cc)
- Category Selector Down
- Category Selector Up
- Category Selector Up/Down (cc)
- Selector Accept: also used to invoke message dialog 'OK' or 'Yes' buttons.
- Selector Cancel: also used to invoke message dialog 'Cancel' or 'No' buttons.

## 12.2 Control Surface Bar

Cheaper control surfaces typically don't feature a display, therefore it's difficult to see what a knob's function is. MultitrackStudio features a Control Surface Bar at the bottom of the screen. It can be made visible using the Studio menu's Preferences window.



*Control Surface Bar*

The Control Surface Bar has eight sections that show the names of the mixer sections that are controlled by the corresponding control surface channels. The vertical line on the right can be dragged to align the bar with the control surface. If an effect window is currently visible the names of the effect knobs will be shown, provided the control surface is set up to control effects.

The name of the current View is shown on the righthand side. This typically indicates the function of the control surface's rotary knobs (pan, effect send 1 etc.).

### **Mapping Mixer Sections**

Songs can have more mixer sections than the available number of control surface channels. Most control surfaces have Bank Up/Down and/or Section Up/Down buttons so any number of mixer sections can be accessed. These buttons can be used with MultitrackStudio.

In MultitrackStudio, mixer sections can be mapped to control surface channels in any order. There are several ways to do this:

- Drag a mixer section to the Control Surface Bar
- Drag items within the Control Surface Bar
- Click the Control Surface Bar and use the selector window that pops up.
- Set up control surface knobs to pop up a selector window using the Section Map action.

Your custom mapping will be lost when you press the control surface's Bank Up/Down or Section Up/Down buttons.

# 13 Audio and MIDI Files

## 13.1 Audio Files

The following audio file formats are supported:

- **.WAV files:** 16 bit mono or stereo (Pro Plus edition also supports 24 bit, 32 bit and 32 bit floating point files).
- **.GJM files:** 16 bit mono using lossless compression (Pro Plus edition also supports 24 bit).
- **.GJS files:** 16 bit stereo using lossless compression (Pro Plus edition also supports 24 bit).
- **.AIF files:** 16 bit mono or stereo (Pro Plus edition also supports 24 bit, 32 bit and 32 bit floating point files).
- **.MP3 files:** 16 bit mono or stereo files using lossy compression.
- **.SAM files:** 16 bit mono headerless raw data files.
- **.AEM files:** contain references to audio files to play. .AEM files are application-generated (see Understanding Audio Editing).
- **.LST files:** pre MultitrackStudio 5 equivalent of .aem files. These files can still be read.

The Mac version can also open existing .aac, .ac3, .aifc, .caf, .mp4, .m4a, .snd, .au and .sd2 files. Modifying these files is not possible.

### WAV files

WAV files can be used with almost any program that supports audio. You need a WAV file to create an audio CD.

### GJM/GJS files

GJM/GJS files use a compression algorithm that works best if the audio signal doesn't contain loud treble parts. This works well for multitrack recording since tracks typically have many silent or soft parts so the file size can easily be reduced to about 70% of its original size.

*Note that sound quality isn't impaired in any way by the compressing action: if you save a .WAV file in .GJM format and then save that file in .WAV format again you get exactly the same file.*

### AIF files

AIF files are similar to WAV files. They're widely supported on Mac computers, but rare on Windows.

### MP3 files

MP3 files use a lossy compression algorithm that degrades sound quality. The resulting file size is 3..9% of the original size. This makes MP3 the format of choice if you want to publish your songs on the internet, or if you want to send them via email.

Every time a new MP3 file is created the audio quality can be chosen (Medium, High or Very High). High and Very High quality files use the full samplerate (44.1 or 48 kHz), Medium quality files will use half the samplerate (22.05 or 24 kHz).

An MP3 encoder is required in order to create MP3 files. You can search the web for such a file.

**Windows:** The 32-bit version expects a 'lame\_enc.dll' file in the C:\Program Files\MtStudio folder (C:\Program Files (x86)\MtStudio on 64 bit Windows). The 64-bit version expects a 'lame\_enc64.dll' file in the C:\Program Files\MtStudio folder. If there's no dll file any ACM codecs which are on your system will be used. The ACM codec that comes with Windows usually supports creating medium quality files only.

**Mac:** A 'libmp3lame.dylib' file is expected in the user's Library/Application Support/MultitrackStudio folder.

*Note that MP3 is NOT the format of choice for multitrack recording: not only does sound quality suffer, the MP3 encoding/decoding process consumes a lot of processing power as well.*

## 13.2 MIDI Files

The following MIDI file formats are supported:

- **.MID files:** standard MIDI files.
- **.MPT files:** MIDI Pattern Track files (see MIDI Pattern Editing).

.MID file can be saved as .MPT files and vice versa.

A MIDI file can contain more than one stream ('track' in MIDI terms, but renamed to avoid confusion). MultitrackStudio supports using multiple streams, although we don't recommend it. MultitrackStudio does not support patch changes in a stream. If a program change or bank change is encountered in a file that is being opened a new stream will be created. Furthermore MultitrackStudio streams can only send messages to one MIDI channel (it uses the channel the program change is sent to). So if a stream in your file sends messages to more than one MIDI channel (which is bad practice anyway) the file won't load as intended.

# 14 Keyboard Shortcuts

## 14.1 Keyboard Shortcuts (Windows)

### Transport

These shortcuts work in the main window, effect/instrument windows and editor windows:

- **Home**: Go to start of song.
- **End**: Go to end of song.
- **Space Bar**: Toggle transport start/stop.
- **Shift+Space Bar**: Start at last start position (if transport stopped), Stop and move to start position (if transport running).
- **Left/Right Arrow**: Rewind/Fast Forward.  
Several modifier keys can be used combined with the left/right arrow keys:
  - **M**: To previous/next Marker.
  - **B**: To previous/next bar.
  - **E**: To previous/next beat.
  - **S**: One second backward/forward.
  - **I**: One minute backward/forward.
  - **Q**: One quarter hour backward/forward.
  - **H**: One hour backward/forward.
  - **R**: To last recording start/end.
  - **Alt**: Walk through history of recent start positions (and the last stop position if transport is stopped). These positions are also available from the Markers menu. You can press Alt+Left Arrow to manually 'loop' part of the song. This can be useful when setting up effects.
  - **Ctrl**: Move one pixel in the editors. The actual amount of time depends on the zoom level.
- **Page Up/Down**: Move one editor page. The actual amount of time depends on the zoom level and the window width.
- **F6**: Cycle selected part of focused track.
- **-**: Zoom Out.
- **+**: Zoom In.

These work in the main window only:

- **Ctrl+M**: Add Marker.
- **Ctrl+Alt+V**: Show/Hide VariSpeed control (*Pro Plus edition only*).

### Main Window

- **Up/Down Arrow**: Scroll mixer sections up/down. Add Ctrl key to scroll one page
- **Tab / Shift+Tab**: Focus next/previous section. Add Ctrl key to focus last / first section.
  
- **Ctrl+S**: Save song.
- **Ctrl+N**: Show Comments window.
  
- **Ctrl+I**: Show Audio Input Control.
- **Ctrl+J**: Toggle Soft Monitoring.
- **Ctrl+P**: Toggle Punch In/Out recording.
- **Ctrl+Q**: Toggle Sound On Sound recording.
- **Ctrl+L**: Show Add Click Track window.
- **Ctrl+T**: Add empty track.
- **Ctrl+Alt+A**: Add Audio Track.
- **Ctrl+Alt+M**: Add MIDI Track.
- **Ctrl+Alt+I**: Import audio/MIDI file.
- **Ctrl+Alt+G**: Add .gjm track.
- **Ctrl+Alt+J**: Add .gjs track.
- **Ctrl+Alt+W**: Add .wav track (same as Ctrl+Alt+A).
- **Ctrl+Alt+3**: Add .mp3 track.
- **Ctrl+Alt+P**: Add .mpt track.
- **Alt+T**: Alternate Take, add Shift to avoid rewinding.
- **Ctrl+Alt+T**: Alternate Take (in new tracks), add Shift to avoid rewinding.
- **Ctrl+R**: Show Delay Before Recording window.
- **Ctrl+K**: Show Keyboard Splitter window.

- **Insert**: Toggle Ripple button.
- **Ctrl+G**: Toggle Snap button.
- **Ctrl+B**: Toggle Bars button.
- **Ctrl+Alt+B**: Switch time grid to bars.
- **Ctrl+Alt+S**: Switch time grid to seconds.
- **Ctrl+E**: Show Tempo / Time Signature Editor.
- **Ctrl+Alt+E**: Show Song Editor.
- **Ctrl+Alt+U**: Show Multi MIDI Editor.
- **Ctrl+U**: Show Multitrack Editor.
- **Ctrl+H**: Show Chords Editor.
- **Ctrl+Alt+H**: Show Lyrics Editor.
  
- **Ctrl+O**: Show Audio Output Control.
- **Ctrl+F**: Show Control Surface window.
- **Ctrl+D**: Show Devices window.
- **Ctrl+Alt+C**: Show/hide CPU usage indicator.
- **Ctrl+Alt+D**: Show/hide disk space indicator.
- **Ctrl+Alt+F**: Show/hide control surface bar.
- **F11**: Enter / leave full screen mode.
- **Ctrl+W**: Show/hide wizard.
- **F1**: Show help on the item the mouse points to.

## Editors

Most editors can be operated using the standard Windows keyboard shortcuts. A track editor can only be controlled using keyboard shortcuts if the track has focus. The Time Signature and Tempo editors do not support keyboard shortcuts.

The following shortcuts are supported:

- **Alt+Enter**: Edit
- **Ctrl+Z**: Undo
- **Ctrl+Y**: Redo (Ctrl+Shift+Z also works)
- **Ctrl+X**: Cut
- **Ctrl+C**: Copy
- **Ctrl+V**: Paste
- **Delete**: Delete
- **Ctrl+A**: Select All
- **Ctrl+Shift+I**: Make punch-in point equal to transport position
- **Ctrl+Shift+O**: Make punch-out point equal to transport position
- **Shift+Left/Right Arrow**: Shift editors left/right while keeping transport position
- **Alt**: Temporarily switch between Select Notes/Dots and Add mode

The Multi MIDI Editor also features:

- **Up/Down Arrow**: scroll up/down. Add Ctrl key to scroll all the way up/down.
- **Tab / Shift+Tab**: make next/previous track active.
- **Alt+M**: Move selected notes to active track.

## Add Audio Track window

- **Ctrl+M**: Mono
- **Ctrl+S**: Stereo
- **Ctrl+N**: Show # of tracks box (*Pro Plus edition only*).

## Effect/Instrument windows

- **F3** or **Ctrl+F**: Show effect/instrument selector
- **F5**: Reset Level History (Compressor, Dynamics, Noisegate), Reset spectrum averaging (EQ), Reload VST plugin (VST/VSTi plugin).

## External MIDI Instrument window

- **Up/Down Arrow**: Change Program
- **Shift+Up/Down Arrow**: Change Bank

## Alt shortcuts

Most windows, including the main window, feature shortcuts using the Alt key. If you press the Alt key the shortcut characters will appear underlined. The shortcuts will hide again when the Alt key is released. The shortcut key should be pressed before the Alt key is released.

In the main window, only the mixer section which has focus can be controlled using Alt shortcuts. A dot appears on the left hand side of the mixer section indicating it is focused. Tab and Shift+Tab can be used to move focus. Clicking a section (including any of its controls) will focus that section as well. The Preference and EQ windows have a similar focus mechanism.



Focus indicator (left) and Pan knob after pressing Alt+P (right).

Volume faders and rotary knobs can be edited using Alt shortcuts as well. An edit field appears in which a new value can be typed. Pressing Enter accepts the new value, Esc discards it. Instead of typing a value you can use the up/down arrow keys to move the control. Note that you'll have to press Esc to accept this value, since Enter accepts the edit field's value.

*Note: the left Alt key should be used on some international keyboards.*

## Mouse modifier keys

Mouse modifier keys change the effect of a mouse click if you keep the key down while clicking.

### Standard modifier keys

- **Ctrl** (while selecting): Select item without deselecting existing items (MIDI editor notes, track Solo buttons)
- **Ctrl** (while dragging): Copy item instead of move it (editors and effect slots)

### Transport Start button

- **Shift**: Start at last start position
- **C**: Start Cycling

### Effect Slots

- **B**: Toggle effect's Bypass button

### Track buttons

The Play, Rec, Mute and Edit buttons of all tracks will be toggled if you keep the Ctrl key down while clicking a track's button.

### Audio/MIDI editors

- **Alt** (on edges selected part): Stretch selected part
- **Alt** (in selected part): Warp selected part

### Pianoroll, Score and Drum editor notes

- **V**: Volume of note
- **D**: Duration of note
- **S**: Sharpen note (one semitone up)
- **F**: Flatten note (one semitone down)
- **Q**: Quantize note (move it to the current grid)
- **R**: Remove (delete) note
- **T**: Transpose note one octave up or down
- **X**: eXpand to chord (eg. click a C and select major: an E and a G will be added)
- **1**: make it a whole note
- **2**: make it a half note
- **4**: make it a quarter note
- **8**: make it an 8th note

- **6**: make it a 16th note
- **3**: make it a 32th note

The V, D, T and X mouse modifiers pop up a small selector, which will disappear when you release the mouse button. You can select an item by moving the mouse while the mouse button is still down. The Drum Editor doesn't support mouse modifiers which don't make sense for percussion instruments (like Duration, Sharpen, Expand to chord etc.).

## Mouse wheel

The mouse wheel can be used in various places:

- Move faders and rotary knobs.
- Scroll lists.
- Scroll MIDI editors vertically.
- While pointer is over small left/right hand side panel: scroll mixer sections vertically.

Combined with Ctrl key:

- Zoom editors horizontally.
- While mouse is over left hand side of editor: zoom editor vertically.

## 14.2 Keyboard Shortcuts (Mac)

### Transport

These shortcuts work in the main window, effect/instrument windows and editor windows:

- **Home** or **Option-Left Arrow**: Go to start of song.
- **End**: Go to end of song.
- **Space Bar**: Toggle transport start/stop.
- **Shift-Space Bar**: Start at last start position (if transport stopped), Stop and move to start position (if transport running).
- **Left/Right Arrow**: Rewind/Fast Forward.

Several modifier keys can be used combined with the left/right arrow keys:

- **M**: To previous/next Marker.
- **B**: To previous/next bar.
- **E**: To previous/next beat.
- **S**: One second backward/forward.
- **I**: One minute backward/forward.
- **Q**: One quarter hour backward/forward.
- **H**: One hour backward/forward.
- **R**: To last recording start/end.
- **Command**: Walk through history of recent start positions (and the last stop position if transport is stopped). These positions are also available from the Markers menu. You can press Command-Left Arrow to manually 'loop' part of the song. This can be useful when setting up effects.
- **Ctrl**: Move one pixel in the editors. The actual amount of time depends on the zoom level.
- **Page Up/Down**: Move one editor page. The actual amount of time depends on the zoom level and the window width.
- **F6**: Cycle selected part of focused track.
- **-**: Zoom Out.
- **+**: Zoom In.

These work in the main window only:

- **Option-M**: Add Marker.
- **Option-Command-V**: Show/Hide VariSpeed control (*Pro Plus edition only*).

### Main Window

- **Command-S**: Save song.
- **Command-I**: Show Audio Input Control.

- **Command-J:** Toggle Soft Monitoring.
  - **Command-P:** Toggle Punch In/Out recording.
  - **Option-Command-P:** Toggle Sound On Sound recording.
  - **Command-L:** Show Add Click Track window.
  - **Command-T:** Add empty track.
  - **Option-Command-A:** Add Audio Track.
  - **Option-Command-M:** Add MIDI Track.
  - **Option-Command-I:** Import audio/MIDI file.
  - **Option-T:** Alternate Take, add Shift to avoid rewinding.
  - **Option-Command-T:** Alternate Take (in new tracks), add Shift to avoid rewinding.
  - **Command-Y:** Show Delay Before Recording window.
  - **Command-K:** Show Keyboard Splitter window.
- 
- **Command-R:** Toggle Ripple button.
  - **Command-G:** Toggle Snap button.
  - **Command-B:** Toggle Bars button.
  - **Command-E:** Show Tempo / Time Signature Editor.
  - **Option-Command-E:** Show Song Editor.
  - **Option-Command-U:** Show Multi MIDI Editor.
  - **Command-U:** Show Multitrack Editor.
  - **Option-Command-C:** Show Chords Editor.
  - **Option-Command-L:** Show Lyrics Editor.
- 
- **Command-O:** Show Audio Output Control.
  - **Command-D:** Show Devices window.
  - **Ctrl-Command-F:** Enter / exit full screen mode.
  - **Command-,:** Show Preferences window.
  - **Shift-Command-?:** Open Help menu, including a item that shows help on the control under the mouse pointer in the active window.
- 
- **Command-M:** Minimize window.
  - **Up/Down Arrow:** Scroll mixer sections up/down. Add Command key to scroll one page.
  - **Ctrl-A:** Open Add Track menu.
  - **Ctrl-B:** Edit BPM box.
  - **Ctrl-E:** Open Edit menu.
  - **Ctrl-I:** Edit Time Sig box.
  - **Ctrl-K:** Open transport start button menu.
  - **Ctrl-L:** Open Songlist menu (if songlist bar is visible).
  - **Ctrl-N:** Open transport position menu.
  - **Ctrl-Q:** Open Tempo menu.
  - **Ctrl-R:** Open Recording menu.
  - **Ctrl-S:** Open Song menu.
  - **Ctrl-U:** Open Studio menu.
  - **Ctrl-W:** Edit transport position box.
  - **Ctrl-X:** Open Mix Down menu.
  - **Ctrl-Z:** Open editor zoom factor selector.

The mixer section which has focus responds to keyboard shortcuts. A dot appears on the left hand side of the mixer section indicating it is focused. Tab and Shift-Tab can be used to move focus. Clicking a section (including any of its controls) will focus that section as well.



*Focus indicator (left) and Pan knob after pressing Ctrl-P (right).*

There are keyboard shortcuts for Volume faders and rotary knobs as well. An edit field appears in which a new value can be typed. Pressing Enter accepts the new value, Esc discards it. Instead of typing a value you can use the up/down arrow keys to move the control. Note that you'll have to press Esc to accept this value, since Enter accepts the edit field's value.

- **Tab/Shift-Tab:** Focus next/previous section. Add Ctrl key to focus last / first section.
- **Ctrl-C:** Toggle Rec button focused track.
- **Ctrl-D:** Open editor focused track.
- **Ctrl-F:** Open file menu focused track.
- **Ctrl-M:** Toggle Mute button focused section.
- **Ctrl-O:** Toggle Solo button focused section (Mono on Master section).

- **Ctrl-P**: Edit pan knob focused track.
- **Ctrl-Y**: Toggle Play button focused track.
- **Ctrl-V**: Edit volume slider focused track.
- **Ctrl-1**: Edit effect send 1 knob focused track (2= second effect send etc.).
- **Ctrl-F2**: Open first slot (effect/instrument) focused section.
- **Ctrl-F3**: Open second slot focused section.
- **Ctrl-F4**: Open third slot focused section.

*Note: OS X may override the Ctrl-function key shortcuts.*

## Editors

Most editors can be operated using the standard OS X keyboard shortcuts. A track editor can only be controlled using keyboard shortcuts if the track has focus. The Time Signature and Tempo editors do not support keyboard shortcuts.

The following shortcuts are supported:

- **Command-I**: Edit
- **Command-Z**: Undo
- **Option-Command-Z**: Redo
- **Command-X**: Cut
- **Command-C**: Copy
- **Command-V**: Paste
- **Delete**: Delete
- **Command-A**: Select All
- **Shift-Command-I**: Make punch-in point equal to transport position
- **Shift-Command-O**: Make punch-out point equal to transport position
- **Shift-Left/Right Arrow**: Shift editors left/right while keeping transport position
- **Option**: Temporarily switch between Select Notes/Dots and Add mode

The Multi MIDI Editor also features:

- **Up/Down Arrow**: scroll up/down. Add Command key to scroll all the way up/down.
- **Tab / Shift-Tab**: make next/previous track active.
- **Option-M**: Move selected notes to active track.

## Add Audio Track window

- **Command-M**: Mono
- **Command-S**: Stereo
- **Command-N**: Show # of tracks box (*Pro Plus edition only*).
- **Ctrl-T**: Open Type selector.
- **Ctrl-C**: Open Channels selector.
- **Ctrl-Q**: Open Quality selector.

## Effect/Instrument windows

- **Command-F**: Show effect/instrument selector
- **Command-R**: Reset Level History (Compressor, Dynamics, NoiseGate), Reset spectrum averaging (EQ), Reload plugin (VST/VSTi/AU/AUi plugin).
- **Ctrl-B**: Toggle effect Bypass button.
- **Ctrl-C**: Edit instrument Channel box.
- **Ctrl-M**: Toggle sidechain effect Monitor button.
- **Ctrl-P**: Open Presets menu.
- **Ctrl-P**: Open sidechain effect sidechain source menu.

## External MIDI Instrument window

- **Up/Down Arrow**: Change Program
- **Shift-Up/Down Arrow**: Change Bank

## Mouse modifier keys

Mouse modifier keys change the effect of a mouse click if you keep the key down while clicking.

## Standard modifier keys

- **Command** (while selecting): Select item without deselecting existing items (MIDI editor notes, track Solo buttons)
- **Option** (while dragging): Copy item instead of move it (editors and effect slots)

## Transport Start button

- **Shift**: Start at last start position
- **C**: Start Cycling

## Effect Slots

- **B**: Toggle effect's Bypass button

## Track buttons

The Play, Rec, Mute and Edit buttons of all tracks will be toggled if you keep the Command key down while clicking a track's button.

## Audio/MIDI editors

- **Command** (on edges selected part): Stretch selected part
- **Command** (in selected part): Warp selected part

## Pianoroll, Score and Drum editor notes

- **V**: Volume of note
- **D**: Duration of note
- **S**: Sharpen note (one semitone up)
- **F**: Flatten note (one semitone down)
- **Q**: Quantize note (move it to the current grid)
- **R**: Remove (delete) note
- **T**: Transpose note one octave up or down
- **X**: eXpand to chord (eg. click a C and select major: an E and a G will be added)
- **1**: make it a whole note
- **2**: make it a half note
- **4**: make it a quarter note
- **8**: make it an 8th note
- **6**: make it a 16th note
- **3**: make it a 32th note

The V, D, T and X mouse modifiers pop up a small selector, which will disappear when you release the mouse button. You can select an item by moving the mouse while the mouse button is still down.

The Drum Editor doesn't support mouse modifiers which don't make sense for percussion instruments (like Duration, Sharpen, Expand to chord etc.).

## Trackpad gestures

Trackpad gestures can be used in various places.

Two finger swipe:

- Move faders and rotary knobs.
- Scroll lists.
- Scroll editors horizontally.
- Scroll MIDI editors vertically.
- While pointer is over small left/right hand side panel: scroll mixer sections vertically.

Pinch:

- Zoom editors horizontally.
- While pointer is over left hand side of editor: zoom editor vertically.

## **Mouse wheel**

The mouse wheel can be used in various places:

- Move faders and rotary knobs.
- Scroll lists.
- Scroll MIDI editors vertically.
- While pointer is over small left/right hand side panel: scroll mixer sections vertically.

Combined with Command key:

- Zoom editors horizontally.
- While mouse is over left hand side of editor: zoom editor vertically.

# 15 Touchscreens

*Note: touchscreen support is available for Windows only*

## Introduction

MultitrackStudio features a touchscreen mode which makes the program easy to use with touchscreens. Touchscreen support has been designed to turn the computer in a recording and mixing device, while allowing some editing as well. You can interact with the knobs you see on the screen directly without having to find your mouse and move it to the right location first. In fact you're not even supposed to have a mouse or keyboard within reach.

The goal being a great experience also means that not every nifty feature is necessarily available in touchscreen mode. It's not possible to collapse mixer sections for example, because the buttons would get in the way and the collapsed sections would be too small. Labels aren't available either.

## Touch hardware and Windows versions

A convertible notebook (a notebook which lets you flip the lid, so the screen is outside when the lid is closed) would be a nice computer to use. Another interesting option would be a touchscreen mounted on a stand, connected to your computer. It's best to have the screen sloped towards you. The traditional monitor behind the keyboard on a desk setup isn't ideal because it's not very comfortable to keep your arms in that position for a long time.



Monitor on stand

The best touch experience is provided by Windows 7 combined with a multi-touch screen. Multi-touch means you can use multiple fingers simultaneously. The onscreen MIDI keyboard benefits from this. It also allows for two-finger zooming.

*Note: early multi-touch notebooks came with Vista. We've found that the onscreen MIDI keyboard is pretty much useless on these systems because of the way multi-touch is converted to single touch. Upgrading to Windows 7 would solve this.*

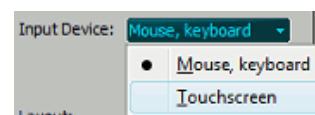
MultitrackStudio does a great job at making the most out of single-touch touchscreens and older Windows versions as well. The one thing that can make a great difference is the amount of force that's needed to make the touchscreen register you finger. Older monitors based on resistive technology can require a significant amount of pressure which makes it very hard to drag you finger over the screen. Controlling faders, knobs and editors etc. is hard using such a monitor. Such a monitor may still be usable if you mainly want to use it for recording.

## Windows DPI setting

Touch screens are hard to use if the things you want to control are too small. Traditionally Windows runs at 96 DPI (DPI = dots per inch). Modern notebook screens can have 150 DPI or more, which makes everything significantly smaller unless you adjust the Windows DPI value accordingly. A MultitrackStudio track measures 9.5 mm in height if the Windows DPI value matches the screen's. It is highly recommended to make sure tracks aren't any smaller than this. You can increase the DPI value even more if you still can't use the touchscreen comfortably.

## Switching to touchscreen mode

To switch to touchscreen mode go to the Studio menu's Preferences window and select Touchscreen in the Input Device box. A 'Test Touchscreen...' button appears which lets you do a quick test. MultitrackStudio learns from this test whether it can distinguish between mouse movements and touch movements. Using the mouse in touchscreen mode will be a bit awkward if it can't.



Input Device selector

In touchscreen mode some controls are bigger to make them easier to use. The transport buttons are an example of this. The controls that don't get bigger still respond to a larger area to make them easier to use with touch.

## Full screen mode

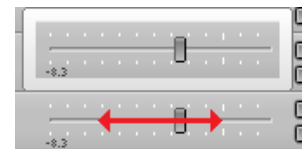
In touchscreen mode button is available in the bottom-right corner which toggles the Studio menu's Full Screen option. It's highly recommended to use the full screen mode. The knobs at the top, and the status bar at the bottom are much easier to operate this way, and you avoid the risk of touching the 'X' button or Windows task bar inadvertently.

## Controlling user interface elements

Some user interface elements work a bit different with touch than with the mouse:

### Mixer faders

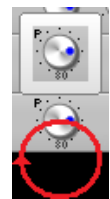
Put a finger on the fader and move it horizontally. A copy of the fader appears above the fader so you can see it even if your finger covers the fader itself. The fader thumb doesn't move as fast as your finger does, so you can control it accurately. Tapping the left half moves it down one step, tapping the right half moves it up one step.



Fader with copy

### Rotary knobs

Put a finger on the knob and make a rotating movement below the knob. A copy of the knob appears above the knob so you can see it even if your finger covers the knob itself. A few turns are required to turn the knob all the way, so you can control it accurately. Tapping the left half moves it down one step, tapping the right half moves it up one step.



Knob

### Buttons/boxes with down arrows (like the transport's Play button and position indicator)

You can't push the down arrow because it's too small. Instead you can put a finger on the button/box itself and move it down (approx. 2 centimeters). A white area becomes visible, this represents the menu which will appear when you take your finger off the screen.



Position indicator about to show dropdown menu

*Note: this doesn't apply to the track file name boxes.*

### Effect/Instrument slots

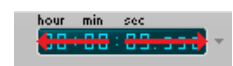
See "Buttons with down arrows". The whole slot area can be touched, ie. the little display also works, not just the button. If you want to move a slot and the white area is visible (meaning you're not dragging the slot but instead about to pop up the effect selector) you can move horizontally to get rid of that.



Tapping a slot

### Position indicator

You can move your finger horizontally over the transport position indicator to walk through the history of recent start positions (the Alt + Left/Right arrow key keyboard shortcut). About 2 centimeters will do. Moving to the right once takes you back to where the transport last started.



Stepping through start history

### Overview Bar

The markers appear at the bottom, but you can (and should) touch them as if they span the full height. Dragging markers in particular is difficult if you aim too low. The Transport Options menu can be used to add markers. You can use it to delete markers as well (click the marker before opening the menu). The easiest way to rename a marker is by double-tapping it.

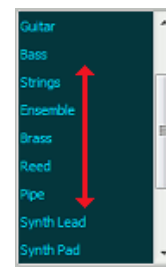


Tapping a marker

It's not possible to change the transport position while recording, in order to avoid doing that accidentally.

## Lists with a vertical scrollbar

You can put a finger on the contents of these lists and move it, without using the scrollbar. Windows 7 with a multi-touch screen features inertia scrolling: the list moves on for a while after you've lifted your finger.

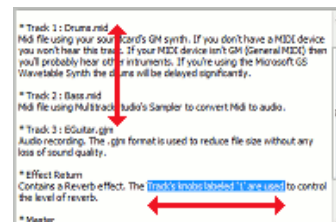


Scrolling a list

## Text in Comments window and Chords/Lyrics editors.

See "Lists with a vertical scrollbar". Text can be selected by moving your finger horizontally. Once it's clear you're selecting rather than panning you can move vertically as well. With a multi-touch screen you can use two-finger zoom in/out gestures to make the text larger/smaller.

These windows have a 'Keybrd' button which shows an onscreen keyboard. It uses your computer's keyboard layout.



Text box: scrolling and selecting

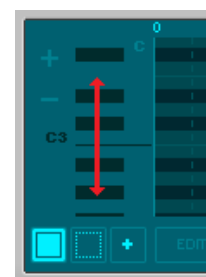
## Editors

- Selecting and adding notes etc. work as expected. A copy of part of the editor appears above the editor so you can see it even if your finger covers the editor itself.
- Editors which can scroll vertically can be scrolled using the left hand part (the vertical piano in the pianoroll, the drum instrument names in the drum editor etc.). On a Windows 7 multi-touch machine the pianoroll and audio editors can be zoomed vertically using two fingers on the left-hand part.
- Left/right "flicks" (fast movements) move the transport by one page. Flicks need to be enabled in Windows for this to work.
- The needle, nor any other part of the time bars above editors can be used with touch. There's a transparent area on the editor itself which can be used to move the needle.
- Editors can be moved horizontally by moving a finger over the status bar (that's the bar at the bottom of the window containing the Help button etc.). Any part of the status bar can be used, even the buttons. On a Windows 7 multi-touch machine two finger zoom gestures can be used to zoom horizontally. The status bar tracks can be performed on the Master section's View area as well.
- Add modes (MIDI editors, automation editors etc.) switch to select mode after adding a note/dot, so you must press it again in order to add another note/dot. This is done to avoid adding notes/dots inadvertently.

*Tip: tilting a finger (in "finger vibrato direction") to move a small distance may be more accurate than moving the whole finger.*



Drum editor while touched



Scrolling vertically



Use status bar to move editors horizontally

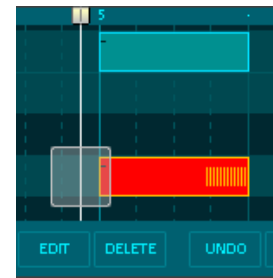
## Pianoroll

See "Editors". Moving/resizing notes works a little different:

- A selected note has a grip on the right-hand side. Here you can move the right-hand side of the note.
- A note which isn't selected can only be moved, its duration cannot be

changed.

- Hence a very short note which is selected can only be resized, not moved. Unselect the note first if you want to move it.



*Pianoroll showing resize grip on selected note and transparent needle thumb.*

## Up/down buttons

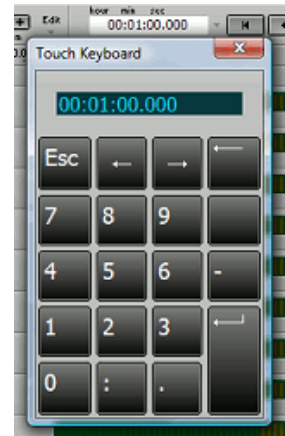
You can't push the up/down arrows because they're too small. Instead, put a finger on the button and move it approx. 2 centimeters up or down to increase/decrease the value. If you keep the finger on the screen the button will continue to increase/decrease automatically.



*Up/down button*

## Text boxes

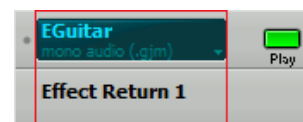
An onscreen keyboard appears if you tap a text box. Use the keyboard's Enter key to accept the new value, use Esc to cancel.



*Position Indicator with Touch Keyboard*

## Moving mixer sections

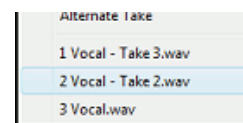
Only the file name box can be used to drag-and-drop tracks. The corresponding area on Effect Returns etc. can be used.



*Use this area to drag sections*

## Track file history

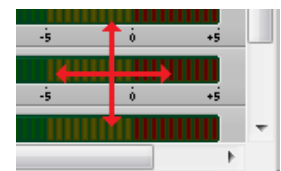
A message box pops up on tapping a file, and you can choose whether you want to open it in the current track or in a new one



*A track's file history*

## Main window

If the main window shows scrollbars you can put a finger on a mixer section. Moving it moves all mixer sections. It's best to target the level meter or a large empty area, since the faders, effect slots and rotary knobs may respond to movements in a certain direction.



*Scrolling the mixer sections*

## Menus

Menus can be closed by clicking outside it. This will not cause a click to be registered.

# 16 Preferences

The Preferences window contains some general settings:

## User Interface:

- **Color Theme:** Choose a color theme. The Classic themes (*Windows only*) make the program look like pre-version 5 MultitrackStudio.
- **Knob Style:** The round knobs can respond to either rotary or vertical mouse movements.
- **Show full path:** Show the full file path of the songs in the song menu (instead of just the name).
- **Show tooltips:** Turn on/off the tooltips that appear on moving the mouse over a control. Note that many tooltips provide helpful information which you won't be able to see if you turn them off.
- **Input Device (*Windows only*):** Choose Touchscreen if you're using a touchscreen, choose Mouse, Keyboard otherwise.
- **Size (*Mac only*):** If you have problems reading or operating the user interface you can make it larger. The setting has no effect until you've restarted MultitrackStudio.
- **Layout:** Here you can show or hide some parts of the main window.

## Editors:

- **Scrubber on track editors:** The track editor scrubbing feature can be turned on/off.
- **Play notes being edited:** MIDI notes that are being edited can be made audible.
- **Show all buttons (no "More"):** Hide the More button that appears on some editors and show buttons for all the options.

## MIDI Options:

- **Default Instrument:** Determines the MIDI instrument that appears in a new track. Options are "MultitrackStudio Instruments" and "External MIDI Instrument 1".
- **MIDI file format:** Determines the timing precision used for saving MIDI files. '480 ticks per quarter note' (default) is the most compatible option, but '30 frames per sec./200 ticks per frame' offers the highest resolution. The latter is not as widely supported, music notation software typically won't open this type of files.
- **"Wave" tab:** Adds a "Wave" tab to the Piano/Score/Drum tabs. The Wave editor shows the MIDI data as if it were an audio signal.
- **Default Editor:** Here you can choose the type of MIDI editor that appears by default.
- **Default Editor Mode:** Determines which of the three buttons in the bottom left corner of the MIDI editors is 'on' by default. It defaults to Select Part, which works similar to audio editors and is suitable if you do a lot of MIDI recording. You might want to switch to Select Notes or Add Notes if you enter notes using the mouse a lot.
- **Switch to bars automatically:** switch the time grid to bars if there's at least one MIDI track in the song.
- **Middle C:** Determines the name of MIDI note 60. Can be C3, C4 or C5 (C5 is the default value).
- **Sampler Memory:** Determines the maximum amount of memory to be used for Sampler instruments. The operating system will be forced to use the hard disk if too much memory is being used. This 'disk swapping' will decrease performance significantly, and should therefore be avoided. This setting is intended for lowering the Sampler's memory usage to make room for other audio programs (eg. sampler type VSTi plugins). This setting has no effect if there are no Samplers.

## Folders:

- **Root Folder for New Songs:** A new folder will be created in this folder for each new song. It defaults to "My Documents\MultitrackStudio Songs" (*Windows*) / "/Users/username/Music/MultitrackStudio Songs" (*Mac*).
- **VST plugins:**  
**Windows:** Specifies the VST Folder. All VST Plugins you want to use should be located in this folder or one of its subfolders. See also Customizing the VST folder.  
*Note: the 64-bit version will ask for permission to run "MtStudio.exe" as Administrator. That's to update the registry, so VST plugin installers can find the VST folder.*  
**Mac:** VST plugins are typically located in the user or system Library/Audio/Plug-ins/VST folder, so there's no need to specify a folder here. You can specify an additional folder if you have one.
- **Sampler patches:** Specifies the folder that contains sampler patches (see organizing your patches)
- **Convolver impulse responses:** Specifies the folder that contains impulse responses. This box is empty by default. You can create a folder for your IR files and select it here.

The **Bring back 'don't show again' messages** button will cause any turned off messages to be shown again.

# 17 Tools

The following tools are available from the Studio->Tools menu:

- **Sample Rate Converter**
- **Stereo Merger**

## **Sample Rate Converter**

Changes the samplerate of a file. Can be used (for instance) for CD(44.1 kHz)/DAT(48 kHz) conversion. Samplerate can be thought of as being the digital equivalent of the analog tape recorder's tape speed.

The **Noise Shaping** button determines whether or not to apply noise shaping to the dither signal.

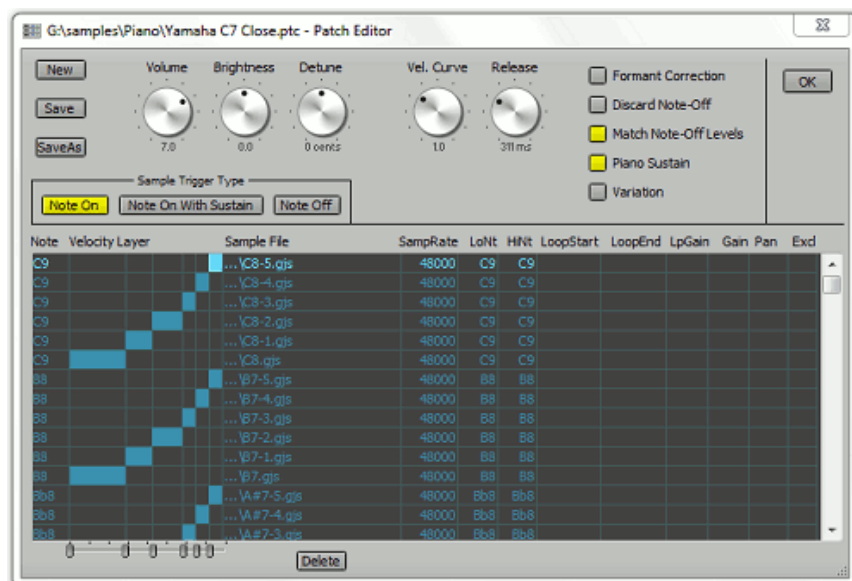
## **Stereo Merger**

The Stereo Merger takes two mono audio files and merges them into one stereo audio file. One file is used for the left channel, the other for the right channel.

# 18 Miscellaneous

## 18.1 Patch Editor

The Patch Editor allows you to modify existing patches or create new patches.



Patch Editor window

A patch consists of one or more samples. A sample is an audio file containing a single note of the instrument the patch is for (for instance a single piano key hit).

### Samples

Samples can be triggered by three trigger sources: "Note On", "Note On with Sustain" and "Note Off". Most patches use "Note On" samples only. "Note On with Sustain" samples are used instead if the Sustain pedal is down at when the note is played. "Note Off" samples are fired when a note ends. The **Match Note-Off Levels** button can be used to automatically match the level of the "Note Off" sample with the current level of the playing note. The sample's Gain property determines the highest allowed level in this situation. "Note On with Sustain" and "Note Off" samples will typically be used for large piano patches.

For every sample the following properties must be defined:

- **Note:** The note of the recorded sample (for instance 'C5')
- **Layer:** The velocity layer the sample is in. Velocity is zero on the left, and 127 on the right. The active region appears in color. A region can be activated by clicking the mouse on it. See also Layer Thresholds.
- **Sample File:** Audio file containing the sample. Can be either mono or stereo.
- **Samplerate:** The samplerate of the audio file (for instance '44100'). This parameter can also be used for fine-tuning (for instance: multiplying the samplerate with 1.0116 increases the perceived pitch by 20 cents).

The following properties are optional:

- **Lowest Note:** The lowest note this sample will be used for. Use this to override the Sampler's default note-assignment rules, or to set the lowest note the patch can produce.
- **Highest Note:** The highest note this sample will be used for. Use this to override the Sampler's default note-assignment rules, or to set the highest note the patch can produce.
- **LoopStart:** The position in samples at which the loop starts.
- **LoopEnd:** The position in samples at which the loop ends. Should always be higher than LoopStart.
- **LoopGain:** The relative volume level of each consecutive passage through the loop (for instance '0.900'). If loopgain is equal to the sample's level at LoopEnd divided by the level at LoopStart a natural decay results.
- **Gain:** Gain level, 1.000 is neutral

- **Pan**: Pan position, 50 is center
- **Excl**: Exclusive Group, can be 1 or higher. Only one note can be active at once per group, so currently playing notes will be stopped if a new one arrives. This can be used to mute a hi-hat when it's closed.

All parameters can be edited while the Transport is running.

### Layer Thresholds

The Layer Thresholds control contains 15 sliders. You can drag the sliders. If your patch contains less than 16 layers you can drag any unused sliders all the way left.

### Formant Correction

In general, instruments played hard produce more harmonics than they do when played soft (the 'formant' changes). The Sampler contains a special filter that mimics this behavior. This filter can be activated using the Formant Correction button.

### General Controls

The **Release** control sets the time it takes to reach 60dB attenuation when a Note-Off event is received. When **Discard NoteOff** is active Note-Off events are ignored. This is useful for drum patches.

The **Brightness** control controls the relative level of the sample's harmonics.

Using the **Detune** control the patch can be exactly tuned.

The **Piano Sustain** button makes the sustain pedal behave like it does on a piano, ie. the sustain pedal can still "catch" the sound of keys that have been released if the corresponding strings aren't fully damped yet.

The **Variation** button will slightly change the pitch, brightness and volume level of every note. This can be used to avoid machine-gun effects when notes are played repetitively. Some real-world instruments, like piano and organ, can't really produce these pitch and brightness changes, it's probably best not to use this feature on these kind of instruments.

The **New Patch** button loads an empty patch.

### Sustain Pedal noise

The highest note (G10) samples of the "Note On with Sustain" and "Note Off" type are used for a special purpose. They are triggered by sustain pedal down and up movements respectively. They can be used to play samples of the sound a piano pedal makes.

## 18.2 Level Meters

The Level Meters are based on DIN PPM meters, where 0db = 0dBFS. They also feature a "peak hold" mechanism. Signal peaks are being shown by a single segment for 2 seconds.

If the audio signal is stereo a meter will display both the left and the right channel, the upper signal being the left channel.

The right-hand segment will start flashing if clipping occurred (ie. if the level was greater than 0 dB). This only happens if this overload actually is a problem:

- Recording audio tracks
- Recording MIDI soft instrument tracks
- Master section
- Group and Effect Return sections which are routed to the sound device (*Pro Plus edition only*).

You can rightclick (Windows) / Ctrl-click (Mac) to reset it, so it stops flashing.

The Studio menu's Preferences window features a **Large Meters** options which makes the meters twice as big. Clicking a meter pops up a much larger version in a new window. This can be used if you need to watch the meter from a distance (to set up recording levels for example).

Track Level Meters will automatically be activated when the track's Rec button is engaged.

### **18.3 Dither**

MultitrackStudio's internal data format is 32 bit fixed point. Every time truncation to 16 or 24 bit is performed (for instance: when sending the mixer output to the sound device, or when saving files created by the Sample Rate Converter) adequate dithering is applied. Dithering turns distortion (caused by truncation) into random noise. This noise is less objectionable because of its random nature. The dither signal used is called HP-TPD (High Pass Triangular Probability Dither).

Noise Shaping can be used to move the dither noise to frequencies the ear can't hear very well, thereby improving the perceived sound quality even more. However, this type of dither should only be used when you are sure the file will never be processed again, as doing so will increase noise. MultitrackStudio uses third order noise shaping at 44.1/48 kHz, and second order noiseshaping at higher sample rates. Noise Shaping is applied only when truncating to 16 bit, not when truncating to 24 bit.

# 19 Requirements

MultitrackStudio has been designed to run very efficiently, so computer requirements are fairly modest. Some performance issues are discussed in the following sections. With newer computers the sound device usually is the only thing to worry about.

## Operating System

**Windows:** The 32-bit version of MultitrackStudio can be used on any computer that runs Windows 7/Vista/XP/2000 SP4, including the 64-bit versions of Windows 7/Vista/XP. The 64-bit version works with the 64-bit versions of Windows 7/Vista.

**Mac:** MultitrackStudio works with OS X 10.7 (Lion)/10.6 (Snow Leopard).

## Sound Device

At minimum, a 16 bit/44.1kHz/stereo sound device capable of full-duplex operation (ie., simultaneous playback and recording) is needed for audio recording/playback. Virtually any modern device will be capable of this.

On Windows XP/2000 Soft Monitoring requires an ASIO driver, and it's highly recommended for recording software MIDI instruments as well (latency will be much too high with the WinSound driverset).

## CPU Power

Real time audio processing requires a fast processor. A 500 MHz CPU will let you run a basic mix (a Reverb and say 10 other effects). The Convolver, the Sampler and the MultitrackStudio Instruments require a bit more CPU power. Although they can be used on a 500 MHz CPU, 750 MHz is no luxury if you plan on using them. The Pro Plus edition's Guitar Amp requires a lot of CPU power too, a 1 MHz CPU is recommended. If you use 88.2 or 96 kHz samplerates (Pro Plus edition) a 1 GHz or higher CPU is recommended. 2 GHz is recommended for 192 kHz operation. MultitrackStudio takes advantage of multiple core CPUs (up to eight CPUs can be used).

## Memory Usage

MultitrackStudio's memory requirements are very modest, unless you're using very large sampler patches. With Windows XP/2000 even 128 MB will do for modest projects.

Note that some sample based VSTi plugins can use lots of memory, if you use a lot of those then having 2 or 3 GB of memory is a good idea.

## Disk Speed

If your songs contain about ten audio tracks a fast hard disk (7200 RPM as opposed to the once standard 5400 RPM) is recommended.

## Audio Gear

You may need some special wires to connect microphones etc. to your sound device, especially if you have a cheaper sound device which typically use 3.5mm jack plugs, whereas microphones use XLR connectors or 6.3mm jack plugs.

Using an external high-quality mic preamp can significantly improve the sound quality of your recordings. They usually provide Phantom Power as well, so you can use condenser mics.

An analog compressor can reduce the risk of overloading the sound device's input. It also allows you to get more out of a 16 bit sound device's resolution.

Not all stereo sound devices allow you to set different recording levels for left and right channels. This can be quite a problem if you want to record two tracks at the same time (for instance a vocal track and an electric guitar track). You can solve this problem by using two mic preamps (that have a level control). Using a small analog mixer may be a cheaper alternative.

## 20 Troubleshooting

### **I can't load my master file in my CD writer program.**

Make sure the file is a stereo .wav file. If you're using the Pro Plus edition then also make sure it's a 16 bit file (CDs are always 16 bit).

### **All other tracks are on the track I recorded. What's wrong?**

Your sound device is recording it's own audio output. If your sound device comes with some kind of mixer window you can search for the problematic setting there.

**Windows XP/2000:** If you're using the WinSound driverset you can go click the Recording Options area's Input button, and make sure all inputs are turned off (except the one you're using). The offending one may be called "What U Hear" or "Master".

### **My vocals are on the left or right channel only.**

Record to mono audio files. Microphones are mono, so recording to a stereo file results in one channel being silent.

### **Track's Play or Rec Button turns gray when starting Transport.**

There is no audio/MIDI device available to play or record this file. If the mixer is disabled you can play only as many audio files (stereo files count as 2!) as there are output channels on your device.

### **Can't load MIDI files recorded with MultitrackStudio in another application.**

In the Preferences window switch the MIDI File Format to '480 ticks per quarter note', this format is more widely supported than the other one.

### **There are glitches/short bursts of static in my recordings. or MIDI device seems to 'pause' periodically. or Transport stops with 'Buffer over/underrun' message now and then.**

Close all other programs.

### **My audio tracks are out of sync. What can I do?**

- Make sure you're using the latest drivers for your sound device
- Try using a samplerate of 48 Khz rather than the default 44.1 kHz (see Song Properties).
- **Windows:** Try using a different driverset.
- **Windows:** The WinSound driverset features an 'Apply EMU10k1 44.1 kHz Audio Sync Correction' setting. Soundcards of the Soundblaster Live! type (including 128, 512, 1024 and Ensoniq AudioPCI) use slightly different samplerates for playback and recording when using a samplerate of 44.1 kHz. MultitrackStudio compensates for this effect if the 'Apply EMU10k1 44.1 kHz Audio Sync Correction' button is engaged in the Winsound Properties window. Make sure this button is engaged if you have one of the aforementioned soundcards, make sure it isn't if you don't.
- **Mac:** : If you're using different devices for audio recording and playback you can create an "aggregate device" using the Audio MIDI Setup application and use that device instead.

### **My songs play back too fast. What can I do?**

- If your sound device's control panel has a samplerate setting, make sure its value is identical to the one used in the MultitrackStudio Song menu's Properties window.
- **Windows:** In the Windows Control Panel, set Sound Scheme to "No Sounds".

### **I hear another instrument while recording using a soft instrument. or I don't hear a recording soft instrument.**

The track you are recording is using a MIDI channel that is not equal to the one your MIDI keyboard uses.

### **I want to restore the previous version of a file.**

Song, songlist, MIDI, patch and .aem files are backed up every time they are saved to disk. The old versions receive a file extension starting with '~': .hdr, .lml, .mid, .ptc and .aem become .~hdr, .~lml, .~mid, .~ptc and .~aem respectively. The old versions can be made ready for use by renaming them to a file with the correct extension.

### **I hear glitches when opening windows etc. in Windows Vista.**

- Try turning off the Aero Vista looks (switch to the Windows Classic display theme).
- If you're using the AsioSnd driverset: try turning on MMCSS (see Compensating for bad drivers).

### **The file open/save dialogs hang on Windows Vista**

This happens to a small number of users. Just terminate the program using the Task Manager and run

MultitrackStudio again. MultitrackStudio will now revert to using the old style dialogs automatically.