MultitrackStudio

Bremmers Audio Design

Manual

Version 11.3, November 2025

https://www.multitrackstudio.com

Contents

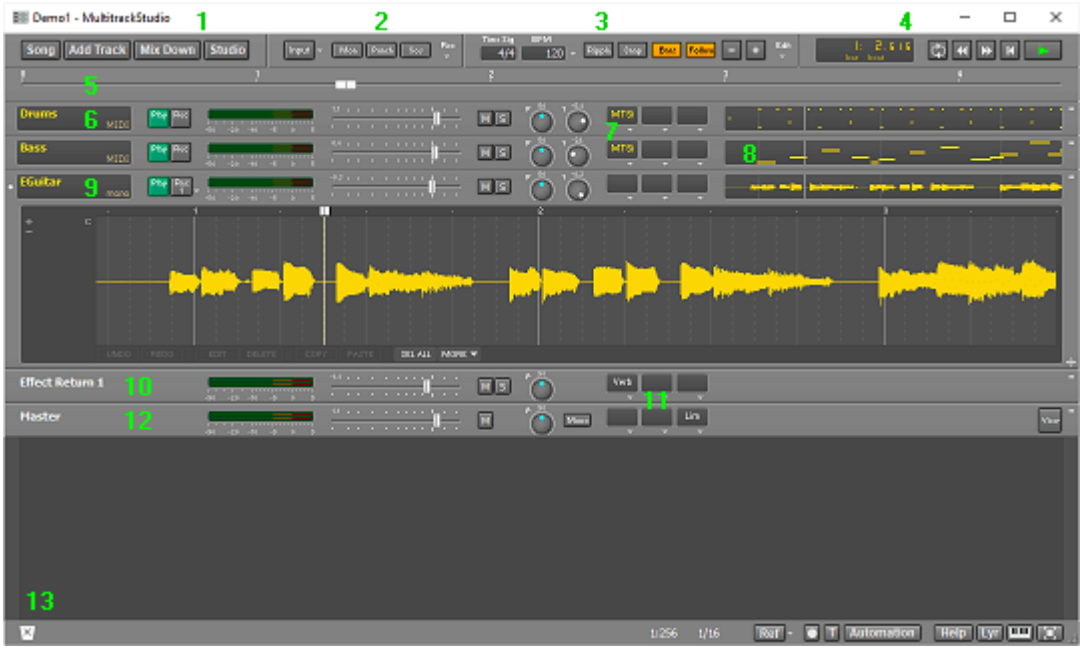
1 Introduction

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 laid out horizontally (unlike the more common vertical layout), allowing them to incorporate an editor as well. The editing tools are focused on correcting mistakes. MIDI tracks have been designed to look like audio tracks as much as possible.
MultitrackStudio includes a wide range of high-quality effects and a built-in General MIDI-compatible instrument set (MultitrackStudio Instruments), enabling software-only mixing and mastering. All track, mixer, and effect settings can be saved within a song file and recalled at any time.
With a songlist, you can play a sequence of songs-, ideal for previewing a CD project without first mixing the individual songs down to stereo files.

Tip: MultitrackStudio features a context-sensitive help system. Press F1 (Windows) / Shift-Command-? (Mac) to view help for the item under the mouse pointer.

The main window



MultitrackStudio main window

1. Menu buttons
2. Recording options
3. Editing options
4. Transport controls
5. Overview bar
6. MIDI track
7. MIDI Instrument slot
8. Editor Preview pane
9. Audio track with its editor open
10. Effect Return section
11. Effect slots
12. Master section
13. Garbage Bin

Tracks (6,9) contain audio or MIDI files. Tracks can be switched to playback or record mode using their Play and Rec buttons. Clicking the Start/Stop button on the transport bar (4) will start recording/playback for all tracks simultaneously.
You can load effects into effect slots (11) by clicking the slot's down arrow. Likewise, MIDI instruments can be loaded into MIDI Instrument slots (7) the same way. To remove tracks, effects, or instruments, simply drag and drop them onto the Garbage Bin (13).
Clicking a track's Editor Preview pane (8) opens its editor.

You can save the complete setup as a song using the Song menu (1). To create a stereo mix of the entire song, use the "Mix down to audio file" option in the Mix Down menu.

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: Create a New Song

Create a new (empty) Song using the Song → New menu option. A new (empty) folder will be 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 Add Track menu's Click Track option to do this.

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, a Recording Level Fader will appear at the top of the window (provided your sound device supports this). Alternatively, you can click the Input button to access the recording level controls.

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.

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.

Step 5: Record More Tracks

Add more tracks (using the Add Track menu) and record them (repeat steps 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 volume levels and add any effects. If your song sounds good, 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 CD-R.

Note (Pro edition only): Make sure it is a 16-bit stereo file if you want to burn it to a CD-R. 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 CD-R

Now you can burn the file created in step 6 to a CD-R 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 required to reproduce the mix you created. 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
- 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 (i.e., these audio/MIDI files are needed in order to play back the song). All filenames stored in the song file use a relative path whenever possible. This allows projects to be moved easily 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.

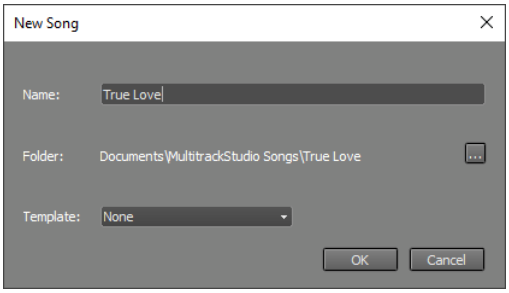
The currently opened song is shown in the main window's title bar.

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 with the same name automatically unless you browse for a folder yourself.

  The **Template**box *(Pro edition only)* lets you apply a template. The Template box also allows you to create new templates: the **Save current as 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 song** template that creates a new song identical to the current one. This can be convenient for live multitrack recording.



New Song window (Pro edition)

- **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 that is stored in the song file. You can use this to document the project.
- **Import Song**: Import a zipped song (i.e., a song exported using the Export Song option).

The Song menu offers several export options:

Note: the most important export function has its own button in the main window: Mix Down.

Export MIDI Tracks

This tool merges any combination of the MIDI tracks into a single MIDI file. You can use it to move your MIDI tracks to third-party notation software, etc. The current versions of the tracks are used (i.e., the MIDI files are not read from disk), so you can temporarily edit MIDI channels or quantize tracks if necessary.

The resulting file is a format 1 MIDI file by default. You can use the **Format 0** option if you need a format 0 file (certain hardware can import only format 0, for example).

If a MIDI channel is used by multiple tracks, a message will appear. You can choose "Export as-is" or "Merge Tracks". The first option is best if the file is to be imported into a notation program, etc. The latter option can be used if the file is meant to be played back by a (General MIDI) media player. Note that you'll have to make sure there's just one track playing notes on a particular MIDI channel at any time.

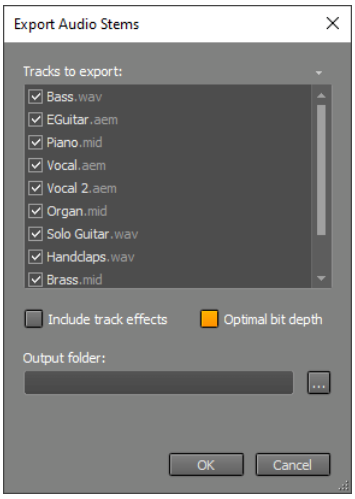
Lyrics, chords, and markers appear in the list if available, and they're checked by default. Lyrics can optionally be stored using **UTF-8** encoding, which is typically used for Asian languages.

Note: Chords are stored in Yamaha XF style. The file isn't a full-blown XF file.

Exporting to .midi2 (MIDI Clip File) is possible as well. Either use the Browse button or add ".midi2" to the name yourself. The "Format 0" and "Lyrics as UTF8" buttons do not apply to .midi2 files. Markers can't be stored in .midi2 files at this time.

Export Audio Stems

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



"Export Audio Stems" window

This tool can export audio tracks, MIDI tracks using a software instrument, and groups. An audio file will be created for each track or group. You can use this if you're going to have your tracks mixed by someone who doesn't use MultitrackStudio.
If **Include track effects** is on, any audio effects in the track effect slots will be included. Exported groups include track and group effects regardless of this option.
Optimal bit depth (on by default) makes each file use the lowest bit depth that won't cause any loss of quality for that track. A 16-bit file will be used for a 16-bit track if "Include track effects" is off, for example. 32-bit float files will be used otherwise.

Note: groups are rendered using the tracks routed to the group being rendered. Solo buttons may affect the result. Fancy sidechaining (using other tracks) may not work as expected.

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.

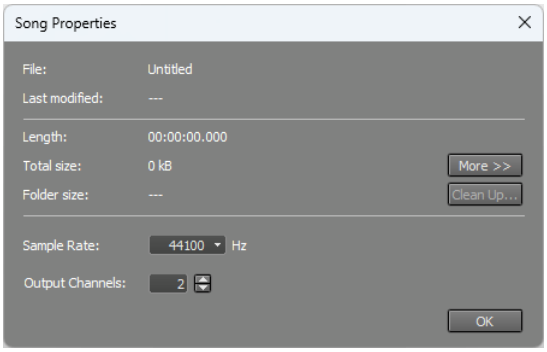
Export Song

"Export Song" saves the song in a .zip file. This makes it easy to move the song to another computer or to iPad. The zip file only contains files required to play back the song, i.e., files not needed will be excluded as determined by the Clean up Song Folder tool.

See Transferring Songs for more info.

2.2 Song Properties

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



Song Properties window

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 default for new songs.

Output Channels (Pro edition only) determines the number of audio output channels. This is always an even number. The minimum value is two (stereo), and the maximum value is

140. If the value is greater than 2, all Tracks, Group, and Effect Return sections will have an Output Selector. Note that the Output Channels value can exceed the number of channels the audio device actually has. Any mixer sections using these non-existent channels will not be audible.

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 that are not required to play back a song file. You can delete these files 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 also appear in the list. If you delete audio files used by a version, that version will no longer play back correctly.

2.3 Song Versions

Versions of a song can be created and reverted to later. These versions include the song file, as well as the MIDI and .aem files opened in the tracks.
Typical uses for versions include:

- Create a version before making major changes to the song, so you can revert to the previous version if the changes don't work out.
- Try different mixes and store each as a version. You can not only change mixer settings, but also edit audio and MIDI tracks.
- Create a version of any mixes you send to someone, just in case they later decide the older version was better.

Create Version

The Song menu's **Create Version** option opens the Create Version dialog, which lets you enter a name for the new version. If there are unsaved modifications in the song, you can choose whether or not to include them in the version. This can be helpful 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 doesn't turn out well after all.

Revert to Version

The Song menu's **Revert to Version** option lists all available versions. Tooltips show information about each version, such as the date it was created. You can revert to a version by clicking on it. If there's no version that matches the current state of the song, a new version representing the current state will be created automatically. These automatically created versions are named "Autosave Version 1", etc.

Autosave

Some versions are created automatically:

- **Autosave (safety backup)**: A version is created every 15 minutes. If the computer crashes, you can reopen the song and revert to this version to minimize lost work. The version is created when transport stops.
- **Autosave (discarded version)**: A version is created if you choose to discard changes when closing the song. If you change your mind, you can reopen the song and revert to this version.

Note 1: Autosave versions aren't created until the song has been saved at least once.

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

Note 3: The versioning system assumes there is only one song per folder (i.e., it assumes every version found in the folder belongs to the current song). This is the case with MultitrackStudio 5 or newer. For older songs, you may want to check this before reverting to a version.

Note 4: Some third-party demo plugins display a "demo limitation" message when plugin settings are saved. These messages will appear whenever a version is created.

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

2.4 Transferring Songs

Both MultitrackStudio (Windows/Mac) and MultitrackStudio for iPad can export songs as .zip files and import them.
While MultitrackStudio is largely the same on all platforms, there are some things to consider:

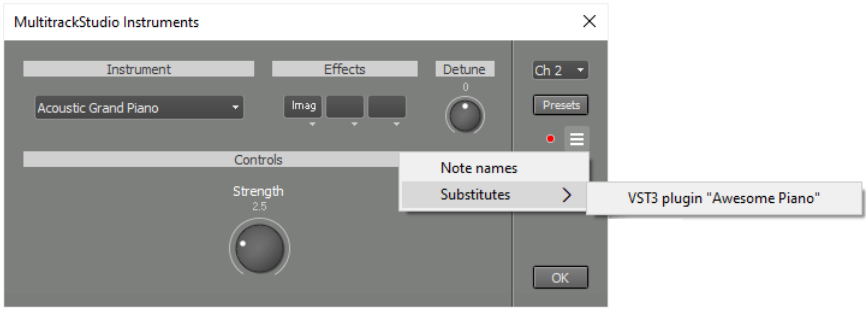
- 3rd-party plugins may not be available (see MIDI Instrument or MIDI Effect substitutes).
- The SoundFont Player is available on Mac and iPad only.
- MultitrackStudio for iPad lacks some features (see Exporting to MultitrackStudio for iPad).

MIDI Instrument or MIDI Effect substitutes

Exported songs may use plugins that aren't available on another device. There can be several reasons for this:

- The plugin isn't available for that platform. Windows doesn't support AU plugins, iPad doesn't support CLAP or VST plugins.
- The plugin isn't installed, and you can't or don't want to install it.
- The plugins aren't compatible across platforms. This can happen with AU plugins for Mac and iPad, for example. Plugin developers can choose to make their Mac and iPad versions compatible, but this isn't always the case.

If a plugin is missing, a Missing Audio Effect / Missing Instrument / Missing MIDI Effect placeholder appears instead. This placeholder preserves the plugin settings, so you can save the song without losing them. The plugin will reappear if you move the song back to the device it came from.



MultitrackStudio Instruments used as a substitute for the Awesome Piano VST3 plugin

Missing instruments are a major issue because you can't hear the track at all. MultitrackStudio lets you use a substitute on the current device while keeping the settings from the other device too:

1. Click the slot's down arrow to open the selector menu, and select an instrument.
2. The instrument's Options menu now has a "Substitutes" section. The original (missing) instrument appears there.
3. When you move the song back to the original device, you'll initially see the instrument you picked on the second device. You can use the Options menus of the affected instruments to load the substitute.
4. The actual instrument and the substitute have now changed places. So if you move the song to the second device again, you can pick the substitute you chose earlier.

Substitutes are available for instruments and MIDI effects (not for audio effects). They don't work with External MIDI Instruments, Virtual MIDI apps (iPad), or IAA apps (iPad).

Exporting to MultitrackStudio for iPad

Zipped MultitrackStudio songs can be imported into MultitrackStudio for iPad, provided you take care of a few things:

- MIDI tracks containing multiple streams (instruments) are not supported. Click the track's file name box and choose "Split streams" first.
- Song sample rate can't be higher than 48 kHz.
- There can't be more than 16 tracks (64 if the Pro Extension is present).

MultitrackStudio for iPad doesn't support the following features (but the song will still be usable):

- Total number of effect slots and Effect Return sections is limited, depending on iPad size. In addition, using Groups or multichannel audio output takes one of the available slots/Effect Return sections.
- No CLAP / VST plugins, and no macOS AU plugins.
- No Multi Instrument, Sampler, or Wheel Organ instruments.
- No Doubler, Exciter, Mid/Side Effect, Multi Effect, Parallel Effect, or Stereo Effect audio effects.
- No MIDI Multi Effect.
- Sidechain effects don't have a slot that processes the sidechain input signal.

Note: some features require the Pro Extension to be present.

The zip file can be moved to iPad using iTunes File Sharing, Dropbox, etc.

Using Mac / iPad Universal Clipboard

If you've set up your Mac and iPad to use the Universal Clipboard (*), you can copy/paste data between MultitrackStudio on the Mac and MultitrackStudio for iPad.

- **Songs**: The Mac "Export Song" / "Import Song" options will copy/paste if you press the Option key while clicking. The corresponding iPad dialogs have Copy or Paste options.
- **Audio/MIDI**: You can use the track editor's COPY and PASTE buttons. Alternatively, you can paste in the Import Audio/MIDI File dialog to create a new track.
- **Audio/MIDI files** can be copied in Finder and pasted into a track in MultitrackStudio for iPad. Alternatively, paste them in the Import Audio/MIDI File dialog to create a new track for the file.
- **SoundFont files** can be copied in Finder and pasted into MultitrackStudio for iPad's SoundFont Player.
- **Patchmap files** can be copied in Finder and pasted into MultitrackStudio for iPad's External MIDI Instrument.
- **Presets** can be copy-pasted between iPad and Mac just like songs, using the Import/Export buttons in the Preferences window.

(*) In short: enable WiFi, Bluetooth, and Handoff. Both devices must use the same iCloud account.

2.5 Songlists

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

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 Bar 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 appears at the top of the window. A button with the song's file name is shown for each song in the songlist, the colored 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 to 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 that is stored in the songlist file. You can use this to document the project.
- **Properties**: Shows 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. There's a position counter, as well as rewind, fast forward, to beginning, and start/stop buttons.

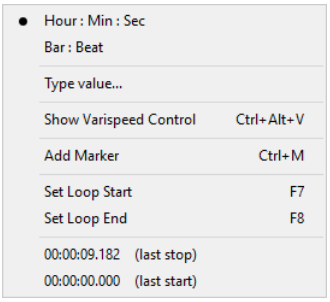
The transport controls

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 no tracks are in either playback or record mode, the transport will not start.

Tip: you can use the space bar instead of the start/stop button.

Position Counter

The position counter shows the current transport position. It can display either **hours:minutes:seconds** or **bar:beat**. Clicking the position counter opens a menu that allows you to choose between these two modes. The bar:beat option is available only if at least one track contains a MIDI file, since tempo information is stored in MIDI files.



Position Counter menu

After selecting the menu's **Type Value** option, you can type a new position. Hours:minutes:seconds values (separated by colons) are interpreted right to left, so you don't need to enter hours or minutes if the time is less than 60 seconds. However, if you want to enter minutes, you must also enter seconds. Zero values can be omitted (you can enter 12: instead of 12:00).
Bar:beat values are interpreted left to right, so you can easily enter just a bar number (e.g., 12 instead of 12:1).
Seconds and beat values can be decimal numbers (e.g., 1.462). Press Enter to confirm the new value, or Esc to cancel.

The position counter's maximum value is 10 hours at a 44.1 kHz sample rate (4 hours and 30 minutes at 96 kHz).

Loop mode

If the **Loop** button is engaged, the transport will loop the looping region (assuming you've set a valid region). You can click the position counter and use the **Set Loop Start** / **Set Loop End** options to define the looping region. These options are also available by right clicking the overview bar. The Loop button appears dimmed if it is engaged but no valid looping region is set.

The Overview Bar shows the looping region.

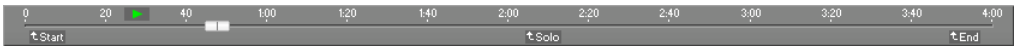
Overview Bar showing looping region

You can select a looping region and start the transport in one step by drawing the region on the Overview Bar while pressing the Alt key (Windows) / Option key (Mac). In this case, the Loop button will be engaged automatically, and will disengage when the transport stops.

3.2 Overview Bar and Markers

Overview Bar

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. Doubleclicking anywhere starts the transport from that position, clicking the thumb stops it. The Overview Bar also shows the markers.



Overview Bar with three markers, green triangle is most recent start 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. Double clicking it starts the transport at that position.

The part that's currently visible in editors is indicated by a thin line. It's only visible while the editors are scrolling horizontally.

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 position counter menu features an **Add Marker** option, which adds a marker at the current transport position. If there's already a marker at that position, a **Delete Marker** option is presented instead.

Alternatively, markers can be added by right-clicking the Overview Bar. Most editors allow adding markers by right clicking the time grid area at the top.
An easy way to add markers "on the fly" is to press Ctrl+M (Windows) / Option-M (Mac) at the appropriate times while the song is playing. This takes the grid snap setting into account, so accurately adding markers on the fly is easy when using a grid spacing 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, move to the current transport position, or type a new position. Renaming can also be done by double clicking the marker. Markers can be dragged to a new position.

3.3 VariSpeed

Note: This feature is available in the Pro edition only.

VariSpeed functions like a tape recorder's speed control. A key application is recording instruments that aren't in tune with existing tracks. Speed Only mode can also be used to slow the music down to make transcription or practice easier. The VariSpeed controls are hidden by default, they can be revealed by clicking the position counter and choosing **Show VariSpeed Control**.

VariSpeed control

The box offers a choice of several VariSpeed modes:

- **Off**: No VariSpeed
- **Tape style - 1 semitone (T1)**: Changes pitch by up to 1 semitone, speed changes accordingly.
- **Tape style - 2 semitones (T2)**: Changes pitch by up to 2 semitones, speed changes accordingly.
- **Tape style - half speed (TH)**: Runs at half speed (+/ 1 semitone). Audio tracks and software instruments sound one octave lower at half speed, external MIDI instruments do not.
- **Speed Only (SO)**: Changes speed (50% 150%) without changing pitch. Recording is not possible in Speed Only mode, VariSpeed will be turned off automatically if you attempt to record.

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

The tape-style modes work just 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 that's out of tune with your song, you can use VariSpeed to adjust the song's pitch. After recording the track, you can switch off VariSpeed and the recorded track's pitch will match the song's original pitch.

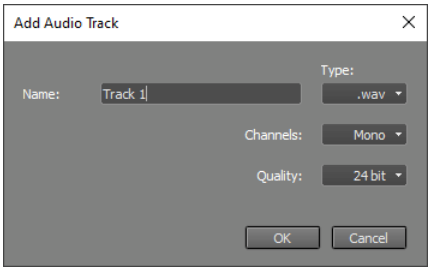
VariSpeed also works with MIDI tracks. Tracks using an external MIDI instrument are detuned using Pitch Bend messages.

Note that VariSpeed consumes CPU power, so it should be turned off when not in use.

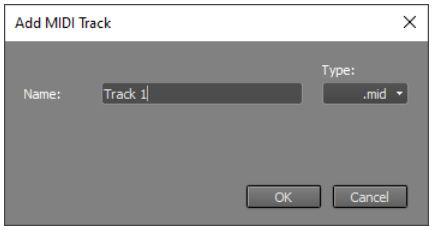
4 Recording

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 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 from a keyboard). See the Audio files and MIDI files sections 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 recording to start after a short delay (to give you time to walk to the mic, for instance), you can use the Delay Before Recording option.

Recording options

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

- **Input**: See audio recording.
- **Mon**: Soft Monitoring
- **Punch**: Punch In/Out
- **SoS**: Sound on Sound recording

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

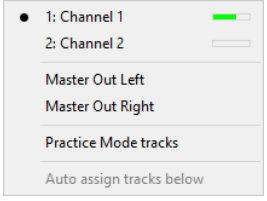
Recording options, with Recording Level fader

4.2 Audio Recording

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

Input assignment

A small downward-pointing triangle appears on the right-hand side of an audio track's Rec button. Clicking this triangle opens the input channel selector. The input channel is displayed on the Rec button itself. The input channel selector features small level meters.



Input channel selector

Recording Levels

The track's Level Meter starts working when you click the track's **Rec** button (it turns red). You can now set the recording level. How this is done depends on your sound device:

- A Recording Level Fader appears next to the Input button if the sound device supports it. This fader sets the level for all input channels.
- The **Input** button itself may provide access to per-channel level settings if the device supports this. (*)
- If the sound device comes with its own control panel, you can use that.
- If you have a mic preamp or a hardware mixer, it's more convenient to use that to set the recording level (set the sound device's input level control to neutral position).

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.

(*): The Input button shows the Windows audio recording settings (Windows) / System Preferences audio settings (Mac). If your audio device comes with a control panel application, you can click the down arrow menu's "Browse for device control panel..." option to open it. You can then 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 when clicking the Input button itself.

Under the hood
The level meters read 0.1% above the actual recording level while recording, to allow the first red segment to light up 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 edition only.

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

1. The Add Audio Track window has a "#" box that lets you specify the number of tracks to create, so you can add multiple tracks at once. The box appears automatically if the audio device has at least 4 input channels. You can press Ctrl+N to make it appear manually (this also works in the Add MIDI Track window).
2. The Song menu's New window has a Template box. The "Identical to current song" 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.

Tip: you can toggle all Rec buttons at once by clicking one while holding down the Ctrl key (Windows) / Command key (Mac).

Record Master Out

Note: it's typically easier to use the Mix Down menu's "Mix down to audio file" option instead.

An audio track will record the output of the Master section if the **Master Out** option is selected in the input channel selector. This feature can be used to mix the song down to stereo (see mastering).

This feature 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 off all other tracks, and bypass any effects in the Master section). After that, the five original tracks can be turned off (using their Play buttons), and the new track can be used instead.

Similarly, this option can be used to "freeze" a track that uses effects requiring a lot of processing power. The new (audio) track will include the effects in its audio file, thereby freeing up the processing power used by them.

Recording Practice Mode tracks

The input channel selector features a **Practice Mode tracks** option. Using this option, you can record a track that is in manual practice mode to an audio track. This is useful if you want to play an instrument plugin and record the performance as audio rather than MIDI, for example.

You can set it up like this:

- Double-click a track's Play button to switch it to "manual practice mode".
- If it's an audio track: engage the Mon button to switch on Soft Monitoring.
- Add an audio track, set its input to "Practice Mode tracks" and engage its Rec button.
- Now you can hear it's working, and you can start the transport.

The audio track that's recording isn't "soft monitored" (you'd hear the practice mode track twice if it were).

Note: this doesn't work with VariSpeed.

4.3 MIDI Recording

MIDI tracks record the MIDI In Device(s) and/or the Onscreen MIDI Keyboard.

MIDI-instrument windows have a Channel selector in the top-right corner. You usually don't have to match this with your MIDI keyboard's channel (see Autodetect Keyboard Channel).

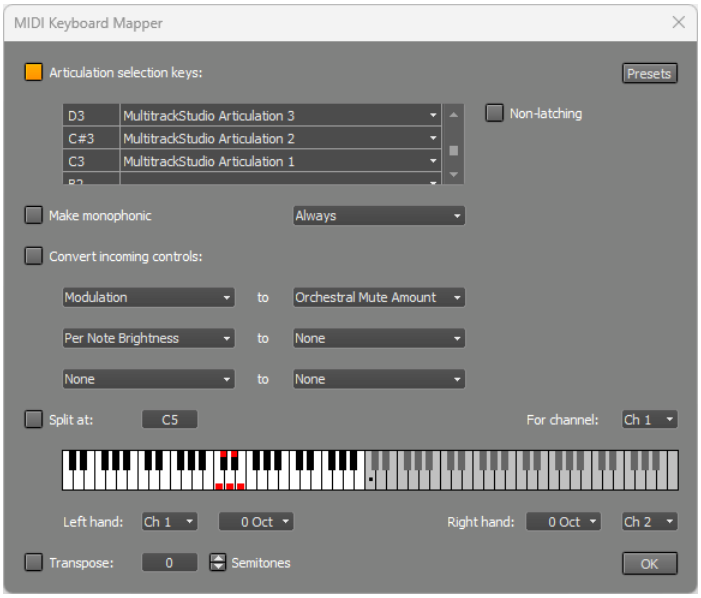
The Pro edition features a built-in MIDI merger that merges all data received from any of the MIDI In Devices (up to four can be used, see devices). Make sure your keyboards are using different channels in order to avoid problems.

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 record. Using multiple streams is not recommended.

MIDI Keyboard Mapper

The MIDI Keyboard Mapper, available from the Recording options menu, can do five things:



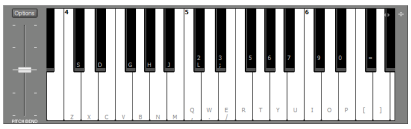
MIDI Keyboard Mapper window

- **Articulation selection keys**: see Articulations.
- **Make monophonic**: stops the sounding note when a new note starts. This makes playing realistic violin parts on a keyboard easier, for example. You can optionally use the sustain pedal or a key to switch this on/off.
- **Convert Controls**: converts up to 3 incoming controls to a different one. You can use this to map an MPE dimension to a MIDI 2.0 per-note control like Modulation, for example.
  This feature can also remove messages by converting a control to "None". You can use this to switch off an MPE dimension from a keyboard, for example. The 3 MPE dimensions appear as Per Note Pitch Bend, Per Note Brightness, and Per Note Aftertouch.
- **Split**: splits a MIDI keyboard into left and right hand parts. You can use this if you want to play two instruments using a single keyboard. 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.
- **Transpose**: transpose by a number of semitones. You can use this to play in a more convenient key.

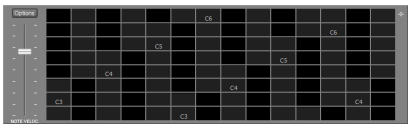
The available actions are processed in this order.

Onscreen MIDI Keyboard

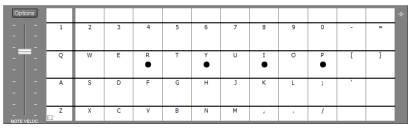
The onscreen keyboard can be used to play MIDI instruments. It works just like a MIDI In Device. It can be made visible using the button in the bottom-right corner of the main window. Not only does it offer a keyboard layout, but also drum, chords, matrix, fourths, and various string layouts.



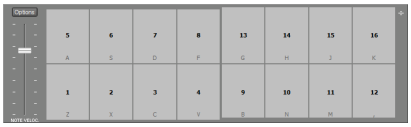
Keyboard



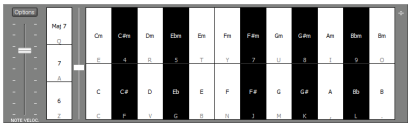
Fourths



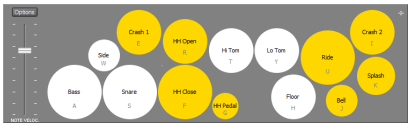
Bass



Matrix



Chords



Drum

You can use the computer keyboard to play the onscreen keyboard. The number of keys that can be played simultaneously depends solely on the keyboard hardware, three keys typically isn't a problem. The mouse works too, but it's not really suited for playing music.

Note: The Fourths layout can't be used with the keyboard. It can be used with a mouse or pen.

The slider on the left can be assigned to any MIDI controller (including note velocity and pitch bend) using the Options button. The slider can be turned into a button, which may be more convenient for the sustain controller, for example.

String instruments can be capoed using the Options button.

The Matrix layout can be used with the Matrix Sampler. The pad mapping conforms to the Matrix Sampler's matrix mapping. The 8 pads on the left correspond to the lower 8 cells of the Matrix Sampler, the 8 pads on the right correspond to the upper 8 cells.

The Chords layout allows playing chords with a single finger. It offers 12 keys for major chords and 12 keys for minor chords. You can use the 6/7/Maj7 buttons on the left to add a note to the chord. The vertical slider sets "the position of the keyboard player's hand on the keyboard".

The drum layout uses GM instrument mapping.

There's an option to create/recall presets.

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

Note for users of macOS 10.13 and older: the keyboard shortcuts won't appear until you've pressed the corresponding key on the computer keyboard while MultitrackStudio is running. You typically need to press 1..9, A..Z, and a couple of keys on the right hand side.

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 that can be used simultaneously depends solely on the touchscreen and its driver.

The Options button provides access to various options:

- Glide: the Fourths and string instruments support smoothly gliding from one note to another.
- String Bend: the string instruments support string bending.
- Finger Vibrato: guitar/cello-style vibrato movements.
- Aftertouch: polyphonic aftertouch messages are sent if you move a finger upward.
- Velocity: the higher your finger touches the screen, the higher the velocity.
- Use per-note pitch bend: Glide, String Bend and Finger Vibrato generate MIDI pitch bend events. This option makes them use MIDI 2.0 per-note pitch bend messages. Without this, only monophonic parts can be played while Glide or String Bend is enabled, and Finger Vibrato works only while a single note is playing.

The drum layout allows for performing hi hat pedal movements: 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.

The slider on the left can be moved while playing the keyboard.

The keyboard shortcuts are not visible in touchscreen mode.

Note for Windows 11 users: go to Settings and switch off "Three- and four-finger touch gestures" under "Bluetooth & Devices". These gestures interfere with keyboard playing.

Tip: a multi-touch screen may respond slowly to a single finger, but any added fingers are detected faster. In this case, keep one finger on the screen and use other fingers to play notes.

Autodetect Keyboard Channel

If the Recording options menu's Autodetect Keyboard Channel 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 which MIDI channel is being used.

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

You can turn off Autodetect Keyboard Channel if data is coming in on multiple MIDI channels and you want to record just one of them.

4.4 Multiple Takes

It often takes 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 is opened.
- Partial Takes: the recording is saved to a new file. When the transport is stopped, the part is pasted into 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 were played OK at least once. Then use the track's file options menu to load the takes one by one and determine which is best (you can right click to open a take in a new track). 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 include the section 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 Takes

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(s). This is what happens:

1. The last recorded track's File Options Menu's Alternate Take option is executed.
2. The transport rewinds to the point where the last recording started.

If you hold down the Ctrl key (Windows) / Command key (Mac) while clicking the Alternate Take menu option, 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 set to Record mode.
3. A file is created with the same name as the last recorded file, but with a number added. If the name already ended with a number, that number is incremented.
4. The transport's position rewinds to the point where the last recording started.

You can hold down the Shift key while clicking Alternate Take to prevent the transport from rewinding.

Invoking Alternate Take automatically clears the Punch button.

4.6 Partial Takes

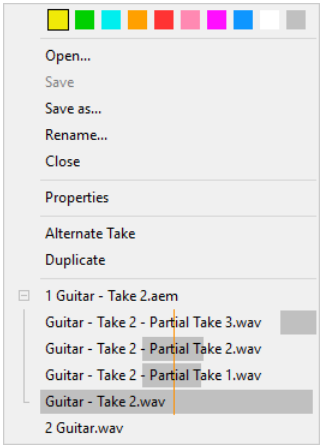
If you record to a track that already contains data, the new part becomes a partial take.

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 already using one.

Partial takes appear in the track's File Options menu if the take they were recorded in is expanded (see picture). Clicking one will open it in a new track.

The part of the song covered a by partial take appears gray in the menu. The vertical orange 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 about the starting point. 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 take. The part you want to record is selected beforehand. While recording, you'll hear the existing track before and after this selected part.

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

When the transport is started, MultitrackStudio will make sure the transport position is at least one bar before the start of the punch region. The transport position will be moved if necessary. If the editor grid is not in bars, the transport position will be moved to at least 2 seconds before the start of the punch region.

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.

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.
- 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.

Note: 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.

Onder de motorkap
The existing track, before and after the punch-in region, is audible during punch in/out recording. Invisible copies of software instruments and/or effects are used for this, so it won't work with demo versions of plugins that are limited to a single instance or can't save their settings.

4.8 Sound on Sound recording

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

Sound on Sound recording can be turned on or 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. You can resize the selected part, undo the recording, or use the editor's Edit button to change the recording's volume, etc. Only the newly recorded part is affected by these actions, the original part remains untouched.

4.9 Loop Recording

Using loop recording you can record multiple takes automatically. It also works with punch-in recording.

Loop Recording step-by-step

- Make sure the track's Rec button is red.
- Start the transport in Loop mode.
- When you think you've recorded a good performance, stop the transport.
- Now the takes are available from the track's File Options Menu (click the file name box). You can open a take in a new track by pressing the Shift key while clicking a take. 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 prevents the part from moving left or right.

Loop Punch-In Recording step-by-step

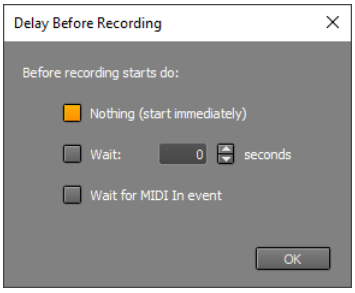
- Open the editor of the track you want to record.
- Select the part you want to record in the editor. Note that looped punch-in recordings won't be available as tweakable edits, so you should make sure the start and end points are in silent or otherwise suitable parts.
- Move the transport position to the point where you want playback to start. 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 in Loop mode (make sure the part you're going to record is within the looping region).
- 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

The Delay Before Recording window offers several options that can be useful when you're recording by yourself. It allows you to walk to your guitar, microphone, etc., before recording begins. There are two ways to do this:

1. **Wait**: The transport waits for a specified number of seconds to pass.
2. **Wait for MIDI In message**: The transport waits for a MIDI note or controller message on a MIDI In Device. This works for audio recording as well. If you have a MIDI sustain pedal, you can use it to start the transport. Any channel on the MIDI In Device can be used.

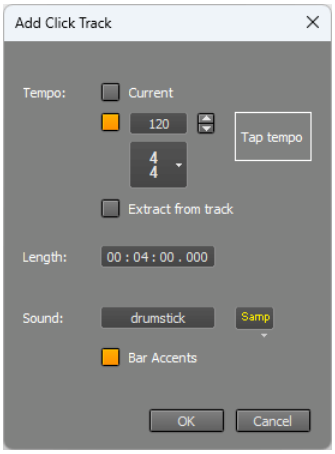
Note: these settings are used only if there is at least one track in record mode.



Delay Before Recording window

4.11 Click Track

The Add Track menu's Click Track option can be used to add a click track (metronome).



Add Click Track window

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. You can click a new tempo in the **Tap tempo** box, tap the tempo using the space bar.
- **Extract from track**: You can record a guide track and extract the tempo from it. See Extracting tempo from a track.

Length is the length of the click track in hours : minutes : seconds format. This setting isn't available for the "Extract from track" tempo option.

The **Sound** section specifies the drum instrument (MIDI note) and **MIDI Instrument** to use. After changing a Sound property, a **Store as default** button appears in the bottom-left corner. You can click this button to remember the current settings.

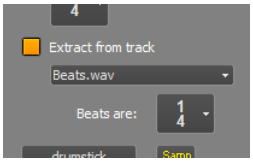
Bar Accents increases the velocity of the first beat in every bar. Other subtle accents may be added as well, depending on the time signature.

Tip: You can make the click track mute during playback automatically using the Mute click track during playback option in the Preferences window.

Note: The click track will be updated automatically when editing the time signature. If you don't want that for some reason, you can rename the click track (so it's no longer called Clicks.mid).

Extracting tempo from a track

Click tracks started being used in recording studios somewhere in the early eighties. Having a well-defined, constant tempo makes editing tracks easier. You can easily copy parts from one verse to another because the tempo is the same, for example.



Extract tempo from track

Music wasn't always played with such strict timing, however. There are no click tracks in classical music. Most guitar-based pop songs were recorded without a click track, which often results in (subtle) tempo changes when the chorus starts, for example.

If your song would benefit from a "live", organically evolving musical tempo, you can use the "Extract from track" option like this:

1. Record a guide track. It can be either MIDI (tap the beat on the MIDI keyboard) or audio (clap your hands or tap on your desk). You'd typically play quarter notes. You can tap the beat while playing guitar, for example. Or you can tap along with an existing track. The track must contain beats only (i.e., you can't extract tempo from an album track or a guitar solo track).
2. Optionally edit the track to correct any mistakes or to remove any beats that don't represent the tempo.
3. Add a click track using the "Extract from track" option. The track containing the beats can be selected from a list. Also, you can specify what the beats represent (quarter notes, 8th notes, etc.).
4. Use the Tempo /Time Signature Editor to edit the time signature. Typically, the length of the first measure (#0) will have been adjusted so the second measure (#1) coincides with the start of the song. This might require the use of a non-standard time signature in the first measure, like 27/4.

The changes can be undone in the Tempo and Time Signature editors.

You don't have to actually use the click track if you just want to see bar lines in editors, of course. The song tempo is stored in MIDI tracks, so you can even remove the click track if there are other MIDI tracks present.

Usage examples:

- One-man band recording: You can tap the tempo with a foot while playing the song on guitar. Record the foot tapping, and extract the tempo from this track.

- Full band recording: You can record the bass drum only. If necessary, you can now edit the recorded track so it contains "on-the-beat" hits only. Then extract the tempo.
- Add tempo/time sig info to a classical recording so you can use the score editors: You can play the tempo on a MIDI keyboard while listening to the recording. Then extract the tempo and use the Tempo Editor to get the time signatures right.

Tip: You don't have to use a click track or bars in MultitrackStudio. If you want to work entirely by ear, you can make the editors and the transport counter show seconds instead of bars, so it works just like a tape recorder. By default, the editors and the counter switch to bars automatically when a MIDI track is added. You can switch off the Bars button at the top to switch the editors to seconds. You can click the counter and choose "Hour : Min : Sec" The default behavior can be changed in Studio → Preferences ("Switch grid to bars automatically" and "Switch counter to bars automatically").

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 audio devices have monitoring features, though. In this case, you can consider using an analog mixer.

Soft Monitoring

You can switch on Soft Monitoring using the **Mon** button at the top of the main window. If this option is used, recording audio tracks will apply any effects to the incoming audio signal, and then send it to the Audio Out Device so you can hear the sound including the effects.

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 setting increases the risk of glitches in the recordings. All these problems can be avoided by using direct monitoring.

Note: this option does not work with the Early Windows audio driver type.

4.13 Practice Mode

These days, many instruments are software-based. This applies not only to software MIDI instruments like the Sampler or instrument plugins, but also to guitar amp simulators such as the Guitar Amp effect. Practice Mode lets you use these instruments without actually recording them, so you can practice your part or use a keyboard to figure out chords, etc.

Manual Practice Mode

You can switch a track to Practice Mode by double clicking its Play button. The button will display "Practice" while the track is in Practice Mode. The track will remain in Practice Mode until you click either its Play or Rec button.

Note that Soft Monitoring must be enabled for audio tracks to be audible.

Automatic Practice Mode

A track will switch to Practice Mode automatically if certain conditions are met. A MIDI track will enter Practice Mode if the MIDI instrument's window is visible when the transport starts, and neither the track's Play nor Rec button is enabled. Similarly, an audio track will enter Practice Mode if one of its effect windows is visible when the transport starts, and neither the track's Play nor Rec button is enabled.

Automatic Practice Mode also works while the transport is stopped, regardless of the track's Play/Rec buttons. Alternatively, you can enable a track's Rec button. This will allow Practice Mode even if no effect or instrument window is visible.

5 Playback and Mixing

5.1 Playback and Mixing

In order 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 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, instrument plugin, etc.) is used the track's output is treated as if it's an audio track.

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

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 is replaced by an audio or MIDI file.
Tracks can be added using the Add Track menu's Audio Track, MIDI Track, or Import Audio/MIDI File options. The latter can also import multiple files at once. Tracks can be removed by dragging the Name box (on the left) to the Garbage Bin (in the bottom-left corner of the main window). The track order can be changed using drag-and-drop as well.

All tracks have the following basic features:

Track (No file opened)

- **Name** box: Displays the name of the opened file.
  The bottom-right corner indicates the file type:
  - "mono": Mono audio file.
  - "stereo": Stereo audio file.
  - "MIDI": MIDI file. If the file has multiple streams, the number of streams is shown ("4 MIDI" etc.).
  - "not opened": The file couldn't be opened, likely because it doesn't exist or it's an unsupported type. In this case, the Play and Rec buttons are disabled.

  Tip: You can change the width of the Name box in the Preferences window.
- **File Options Menu** (appears when clicking the Name box)
  The file options menu contains the following items:
  - **Color**: Chooses a color for the Name box and editor. Ten colors are available.
  - **Open**: Opens an existing Audio/MIDI file. This option does not copy the file to the song folder, unlike the Add Track menu's Import Audio/MIDI File option.
    Windows: If the file doesn't exist, it will be created. The file type is based on the file extension ("piano.mid" creates a MIDI file, "piano.gjm" opens or creates a .GJM audio file). If no file extension is entered, a .WAV audio file is opened or created.
  - **Save**: Saves the MIDI or .aem file to disk. Use this to save performed edits. Available for MIDI and edited audio tracks only. Disabled if the file hasn't been modified.
    Note: Tracks are saved automatically when the Song menu's Save option is used, so explicit saving is usually unnecessary.
  - **Save As**: Copies the file to a new file and opens it.
  - **Rename**: Renames the file. *Note: The file is closed and reopened, which clears the editor's undo history.*
  - **Close**: Unloads the file.
  - **Properties**: Shows the file's properties. For .mp3 files, you can edit the tags in this window.
  - **Add Stream**: Adds a stream to the MIDI file. (MIDI track only)

    - **Split Streams**: Splits the MIDI file into separate single-stream files, each opened in a new track. (MIDI files with multiple streams only)
    - **Alternate Take**: Creates and opens a new file, and puts the track in record mode so you can quickly record an alternate take. These files appear at the bottom of the menu. Hold the Ctrl key (Windows) / Command key (Mac) while clicking to open the new file in a new track.
    - **Copy live performance to clipboard**: After playing a software instrument live without recording, you can copy the performance to the clipboard and paste it into a track. (MIDI software instrument tracks only)
    - **Duplicate**: Creates a new track with a copy of this track's contents.
    - **File History**: Lists all opened files for this track. You can reopen previous files using this menu. Handy for auditioning alternate takes.
      Right-click (Windows) / Ctrl-click (Mac) for options. Use "Remove from list" to allow "Clean up Son Folder" to mark the file as unused.
- **Play** and **Rec** buttons: Enable playback or recording for the track. Start the transport to begin playback or recording.
- **Level Meter**: Displays the sound level. See Level Meters.
- **Volume** fader: Sets the track's playback volume.
- **Mute** button: Mutes the track.
- **Solo** button: Solos the track. The signal still passes through any Group and/or Effect Return sections. Use the Effect Return's Mute button if needed.
  Solo multiple tracks by holding the Ctrl key (Windows) / Command key (Mac) and clicking additional Solo buttons.
  Double-clicking a Solo button activates "half solo": other tracks are attenuated by 12 dB instead of being fully muted. The Solo button will display "H" in this mode.
- **Pan** knob: Sets the pan position (0% = left, 50% = center, 100% = right). It has a blue dot.
- **Editor Preview pane**: Displays a compact editor view. Click it to open the full editor.
  The data can be scrolled left/right. The transport position changes when using a trackpad (or horizontal scroll wheel). It doesn't change if dragged with the mouse.
  Note: An EDIT button may be present to show/hide the editor, depending on your Preferences.

Hold the A key and click any Play, Rec, Mute button or Editor Preview pane to toggle the same element for all tracks. Hold the C key to affect all tracks with the same color.

Audio Tracks

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

Audio track

- **Effect Send** knobs: Control the level of the (mono) signal sent to the corresponding Effect Return section. Sends are post-fader and post-effects, meaning they are affected by the Volume fader, Mute button, and any effects.
- **Effect Slots**: Can contain effects like EQ or Compressor. Effects are applied before volume and pan, so compressor settings remain consistent regardless of Volume fader changes.
- **Output Selector**: Determines where the track's output is routed. Choose between the Master section or a Group section. The Pro edition can route tracks to Audio Out Device channels (e.g., 3/4, 5/6...) if the song uses multiple stereo outputs (see Song Properties). Use the Pan knob to send the signal to a single channel.
  The Output Selector is hidden if there are no routing options besides Master.

MIDI Tracks

MIDI track (Instrument: External MIDI Instrument)

MIDI tracks (tracks with a MIDI file) include an Instrument slot. If the slot contains a software instrument (e.g., MultitrackStudio Instruments), MIDI data is converted to audio and routed through the mixer. If it contains an External MIDI Instrument, the output is sent to an external hardware synth. See the MIDI Instruments page for more details.

MIDI tracks using software instruments have the same extra controls as audio tracks (except the first Effect Slot is replaced by the Instrument Slot).

MIDI track (Instrument: Sampler)

5.3 Groups

Audio tracks (and MIDI tracks using a software instrument) can optionally send their output to a Group section. This allows for controlling multiple tracks with a single volume fader, or for running multiple tracks through a single Compressor. The Group section's output is routed to the Master section (it can also be routed to audio device output channels with the Pro edition).

Group sections can be added using the Add Track menu. A group can be removed by dragging the text on the left (Group 1 etc.) to the Garbage Bin. The order in which the groups appear can be changed using drag-and-drop.

Group sections have the following features:

Group section

- **Level Meter**: Shows the actual output level (that is, the level after applying effects and volume/pan). See Level Meters.
- **Volume** fader: Sets the group's volume.
- **Mute** button: Mutes the group.
- **Solo** button: Solos the group.
- **Pan** knob: Sets the pan position for the group. It has a blue dot.
- **Effect Send** knobs: Control 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**: 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 to be adjusted when moving the Volume fader.
- **Output Selector** *(Pro edition only)*: Determines the routing of the group's output. Only appears if the song uses multiple stereo outputs (see Song Properties). 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.

A Label can be placed on a group section to show its purpose (i.e., "Backing Vocals").

Note: Care should be taken in situations where tracks routed through the group use the same Effect Sends: effects in the group section can cause phase shifts that may lead to unexpected coloration.

5.4 Effect Returns

Each audio track (and MIDI track using a software instrument) and each Group will have a corresponding Effect Send knob. 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. An Effect Return section can be removed by dragging the text on the left (Effect Return 1, etc.) to the Garbage Bin. The order in which the Effect Returns appear can be changed using drag-and-drop.

Effect Return sections have the following features:

Effect Return section with Reverb effect

- **Level Meter**: Shows the actual output level (i.e., the level after applying effects and volume/pan). See Level Meters.

- **Volume** fader: Sets the volume for the Effect Return.
- **Mute** button: Mutes the Effect Return.
- **Solo** button: Solos the Effect Return.
- **Pan** knob: Sets the pan position for the Effect Return.
- **Effect Slots**: Can contain effects such as Reverb or Echo.
- **Output Selector** *(Pro edition only)*: Determines the routing of the Effect Return's output. Only appears if the song uses multiple stereo outputs (see Song Properties). 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 effects unit (e.g., a reverb unit).

A Label can be placed on an Effect Return to show its purpose (e.g., "Reverb").

5.5 Master

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

The Master section has the following features:

Master section with Master Limiter effect in last slot

- **Level Meter**: Shows the actual output level (that is, the level after applying effects and volume/pan). This means distortion occurs when the meter hits the red section. See Level Meters.
- **Volume** fader: Sets the master volume.
- **Mute** button: Mutes all output.
- **Pan** knob: Sets the master pan position.
- **Mono** button: Forces mono output (both stereo channels carry the same signal). This can be used to check mono compatibility.
- **Effect Slots**: Can contain effects such as an EQ, Compressor or Master Limiter. Effects processing takes place after volume/pan processing, which allows the Master Limiter to clip at the correct level.
- **View** button: Shows or hides an oscilloscope view of the output signal.

5.6 Labels

Labels are typically used on Group or Effect Return sections to indicate what they do. An Effect Return section could have a "Reverb" label, for example.

Effect Return with "Reverb" label

The Add Track menu's Label item can be dragged and dropped onto a mixer section. 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 main window.

The label color can be changed using the right click menu. It's convenient to match Group label colors to the tracks that are routed to the Group.

Tip: If labels are used on a track, it is recommended to place the label below the level meter.

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 clicking the small button in the top-right corner of the section. While collapsed, only the section's name is visible, all controls are hidden.

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

- **Expand/collapse all sections**
- **Expand related sections only** expands all sections contributing to the sound of the current one, and collapses all other sections. Appears on tracks and groups.

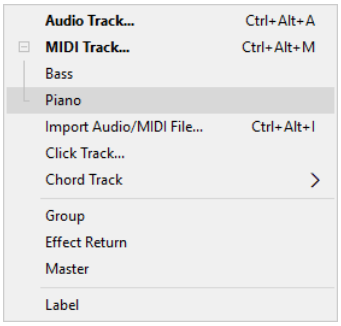
- **Expand/collapse same color tracks only** expands all tracks having the same color as the current one, and collapses all other tracks. Appears on tracks.

You can collapse/expand all same-color tracks by pressing the Alt key while clicking the button.

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 (i.e., 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.



Add Track menu (MIDI track templates expanded)

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.

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 are 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 Multiband Compressor can be used.

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

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

6.2 Preparing External MIDI Tracks

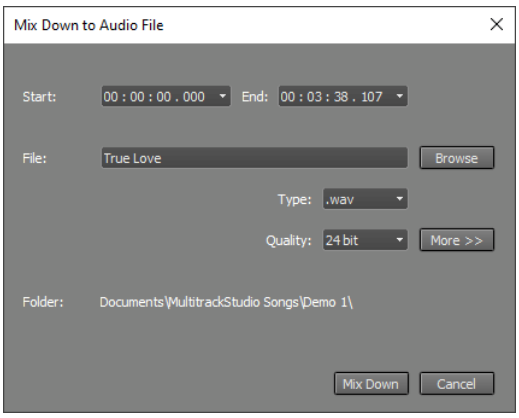
Before you can mix down the song, any MIDI tracks using an External MIDI Instrument have to be recorded to one or more audio tracks. To do this you should:

- Connect your synthesizer's output to your Audio In Device.
- 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 entire 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, you can 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 will be mixed down. The down arrows next to the boxes can be used to load marker positions.
The **Browse** button opens a standard file save dialog. The File box displays the file name. You can also change the name without using the Browse button.
The **Type** box lets you choose the file type (.wav, .mp3, etc.).
The **Quality** box is available if the selected file type offers multiple audio quality options.



Mix Down to file window

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

The **More** button reveals some advanced settings. The **Channels** box can be used if you want to mix down to a mono file. The **Sample rate** box allows you to set the audio file's sample rate independently from the song's sample rate (e.g., to mix down a 96 kHz song to a 44.1 kHz file). The **Noise Shaping** button can be used to avoid applying noise shaping 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" window appears. If it is not engaged, the file will be saved in the folder containing the current song 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 into a new song. You can browse for an audio file if no mixed down file is available (i.e., if "Mix down to audio file" has not been used since opening the current song).

Note: The track's volume fader is set to +3 dB automatically to compensate for the 3 dB attenuation caused by the pan knob.

6.4 Realtime Mixdown

Some sample-based instrument plugins can suffer from audio dropouts during offline mixdown. This typically happens when the samples do not fit into the computer's memory. In such cases, 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).
- Click the small arrow next to the track's Rec button and select "Master Out". This will make the track record the output of the master section instead of your soundcard's inputs.
- Switch the new track to record mode using the Rec button. Make sure all tracks that should be included in the master are in playback mode.
- Start the transport, and stop it when the song has reached the end.

You can now select the desired part of the recorded track in the track editor and export it using the Export option.

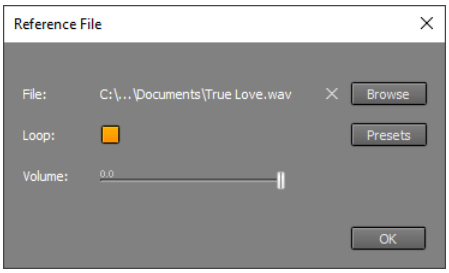
6.5 Reference Files

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

Comparing your master with similar commercial recordings can be very helpful. If it sounds similar, you can expect your master to sound good on a wide range of playback systems. If it sounds very different, you've probably made a mix that sounds good only on your audio system.

The Reference File feature makes comparing easy. Once set up, you can click the **Ref** button (at the bottom of the main window) to toggle between the Master output and the reference file.
The Ref button's down arrow provides access to the Reference File settings:

Ref button



Reference File settings window

The **Browse** button can be used to load an audio file. If **Loop** is engaged, the file will loop. The **Volume** slider can be used to match the reference track's level to the master level.

It often makes sense to play only the chorus of a song. You can load the audio file into a track, select the chorus, and export the selected part. This new file can be used as the reference file. Make sure the Loop button is engaged.

The Reference File plays back in mono if the Master section's Mono button is engaged, allowing you to compare mono versions as well.

You can also use this feature if you're trying to create a better mix of a song. First, mix the old version down to an audio file and use that file as the reference. Now you can easily compare your new mix with the old one.

Note: the audio files aren't copied to the song folder to avoid having multiple copies of relatively large files. Presets don't contain the audio file itself either.

Note: the Reference File is audible only if at least one track is playing back audio. Both audio tracks and MIDI tracks using a software instrument count.

7 Audio Effects

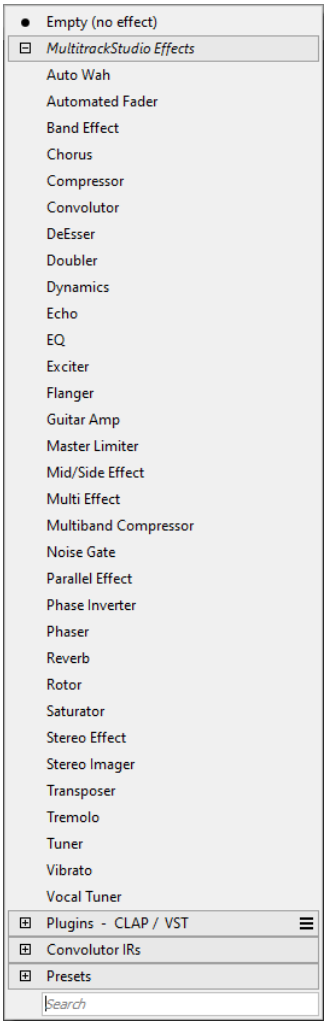
MultitrackStudio features a large number of built-in high-quality audio effects. In addition, AU / CLAP / VST plugins can be used.

The following audio effects are available:

- **Auto Wah**
- **Automated Fader**
- **Band Effect**
- **Chorus**
- **Compressor**
- **Convolutor**
- **Deesser**
- **Doubler**
- **Dynamics**
- **Echo**
- **EQ**
- **Exciter**
- **Flanger**
- **Guitar Amp**
- **Master Limiter**
- **Mid/Side Effect** *(Pro)*
- **Multi Effect**
- **Multiband Compressor** *(Pro)*
- **Noise Gate**
- **Parallel Effect**
- **Phase Inverter**
- **Phaser**
- **Reverb**
- **Rotor**
- **Saturator**
- **Stereo Effect**
- **Stereo Imager**
- **Transposer**
- **Tremolo**
- **Tuner**
- **Vibrato**
- **Vocal Tuner**
- **AU Plugins**
- **CLAP Plugins**
- **VST Plugins**

Effects are used in Effect Slots. Effects can be selected by clicking the slot's down arrow (or by right-clicking the slot). The Effect Selector contains all MultitrackStudio effects, AU / CLAP / VST plugins, Convolutor impulse responses, and effect presets.

Effect Slot



Effect Selector (Pro)

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

Tip: you can click the bottom-left corner of an effect slot to toggle the effect's Bypass button. A "B" appears if you hover the mouse over this area.

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

The Plugins option's ☰ button provides access to the Plugin Manager.

Search

A search term can be typed to filter the Effect Selector. AU, CLAP, and VST list items have invisible tags so you can use "au", "clap", or "vst" search terms to hide other types of plugins.
While 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 term, so you can easily try the next effect that matches it.

Presets

Presets can be loaded or created using the **Presets** button, which appears on the effect's user interface. Most effects come with built-in presets.

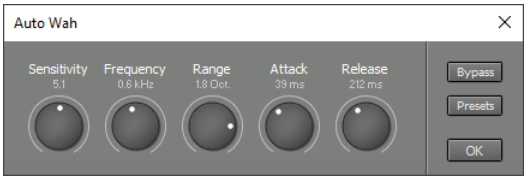
Controlling the Transport

You can still use the keyboard or mouse to control the transport while an effect's user interface is visible.

Third-party plugins may steal keyboard focus, so the MultitrackStudio keyboard shortcuts may no longer work. You can click the right hand part of the plugin window (the "MultitrackStudio part") to restore keyboard focus.
MultitrackStudio attempts to let the Space, Left Arrow, Right Arrow, Home, End, Page Up, and Page Down keys control the transport even if the plugin steals keyboard focus. You can hold the Ctrl key to force a key to be sent

to the plugin only, so it doesn't affect the transport. If this feature causes problems with a plugin, you can go to the Plugin Manager and check the Keybrd box.

7.1 Auto Wah



Auto Wah window

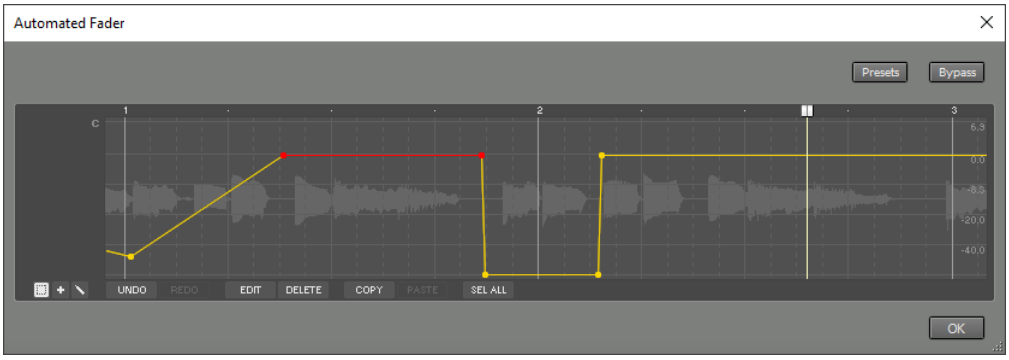
The Auto Wah is a resonant low-pass filter. Its cutoff frequency increases when the signal level goes up, and decreases when the level drops.

The **Frequency** knob sets the lower limit for the filter frequency. **Range** sets the difference between the highest and lowest filter frequencies. **Sensitivity** determines how much the filter frequency changes in response to the input level. The **Attack** and **Release** knobs control how quickly the filter frequency responds to level changes.

7.2 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.

The current position is indicated in the effect slot itself.



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** mode: Clicking a dot selects it, pressing the mouse in "empty space" and moving it selects dots. Selected dots can be moved.
- **Add** mode: Clicking in "empty space" adds a dot, clicking a dot selects it. Moving the selected dot(s) is also possible. 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. one centimeter), 4 dots will appear.
- **Draw** mode: Draw free-hand.

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

UNDO and **REDO** let you undo and redo edits.
EDIT: If a single dot is selected, this button pops up a window where you can type a new value for the selected dot (e.g., "-20" to move the dot to -20 dB).
If multiple dots are selected, the button pops up a window where you can apply several functions like "Amplify" (change the vertical distance between the dots) or create sine/triangle/square wave shapes.
DELETE removes the selected dot(s).
SEL ALL selects all dots.
COPY and **PASTE** let you exchange data between Automated Faders, Controller editors, and Automation editors.

Audio can be converted to dots. You can drag audio from an audio track editor to an Automated Fader, or you can use copy-and-paste. By default, the amplitude envelope will be used, you can click the EDIT button and switch to pitch instead. The EDIT button provides access to several options like envelope attack/release times. This works similarly to tweakable edits in audio/MIDI editors.

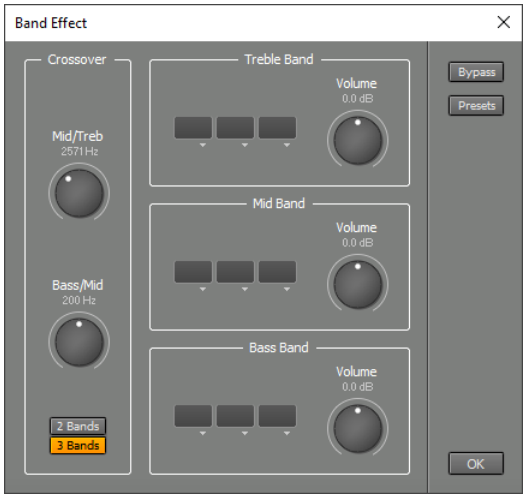
If an Automated Fader is used in a track, the track's audio/MIDI data is displayed in the background. Scrubbing will be available as well, but it does not include any effects (the Automated Fader isn't included either).

Note: Editing tracks in Ripple mode does not update Automated Faders. The Song Editor does.

7.3 Band Effect

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

The bands are split using first-order filters.



Band Effect window

Vocal Removal

The Vocal Removal preset is a vocal remover built using a Band Effect. The Mid Band includes a Stereo Effect with a Phase Inverter 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 retain as much bass and treble as possible while still reducing the vocals sufficiently. Vocal Removal only works well if the audio signal is stereo, the vocals are panned to the center, and there is not an excessive amount of stereo reverb on the vocals.

7.4 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** knobs 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%.

If the **Stereo** button is active, a stereo chorus effect will be applied to mono signals. This is typically the effect you're looking for. The **Reverse** button makes the stereo effect "spin" in the opposite direction.

7.5 Compressor

The Compressor attenuates loud parts while leaving soft parts untouched. In addition, it can make sounds "fatter" or help them fit better in the mix, even without significant compression taking place.

Compressor window

Threshold controls the level above which compression takes place.

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

Gain sets the amount of gain applied after compression. Since the Compressor attenuates loud parts, the overall level drops. The Gain control compensates for this level drop. If the **Auto** button is enabled, 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 how typical modern compressors work.
- **Vintage** is less transparent but has more character. This is a "feedback" compressor, which is how older (tube or opto) compressors work.
- **Vintage Warm** is like Vintage, but modified to produce more even harmonics.

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 **Reduce** meter indicates the amount of gain reduction. This value appears in the effect slot itself too.

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 is opened. You can reset it manually by pressing the F5 key (Windows) / Command-R (Mac).

The **Sidechain** section is available with the Clean program only.

Typical applications of the Sidechain section's effect slot are:

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

7.6 Convolutor

The Convolutor 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.

Convolutor window

In simple terms, the Convolutor 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 is indeed 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 creates the hall's response to the guitar!

Note that if you whistle in a hall, the hall's response contains only the tones you whistled. This is a necessary condition for creating the exact response: the thing you want to model must 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 edition comes with the "Vintage Reverbs", a collection of 4 plate reverbs, 2 spring reverbs, and 2 digital reverbs. See the "Convolutor impulse responses" setting in the Preferences window.

Length Limit controls the part of the 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 response file is stereo). Doing this halves the CPU usage. Clicking the Mono button has no effect until the Transport is restarted.

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

Volume controls the output level.
The **Mix** button adds the dry input signal to the output of the effect.

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

The **Random** button applies subtle modulation which makes reverbs sound smoother. You can switch this off if you're using non-reverb IRs like guitar speakers or mics.

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 it gets to 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 Impulse.gjm from the Contents/Resources folder to a more convenient location.

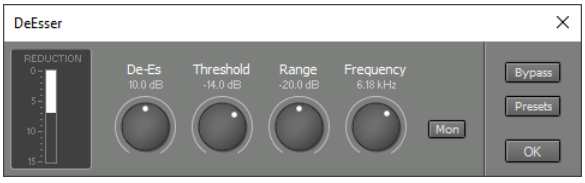
Recording an impulse response file goes like this:

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 part 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 the 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 about 1 second from the start.

7.7 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.

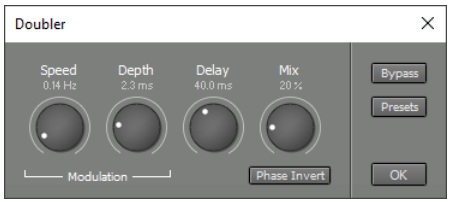
Threshold controls the level above which the DeEsser becomes active.

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 de-essed.

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 "S" sounds will be attenuated). By engaging the **Mon** button you can hear the filtered signal the DeEsser uses. You can use this option to judge whether the Frequency knob is set correctly (ideally, you only hear "S" sounds and nothing else).

The **Reduction** meter shows the amount of "S" sound reduction. This value appears in the slot itself too.

7.8 Doubler



Doubler window

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 effect can also model sixties-style phasing/flanging effects, since these were created with tape recorders in a similar setup.

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

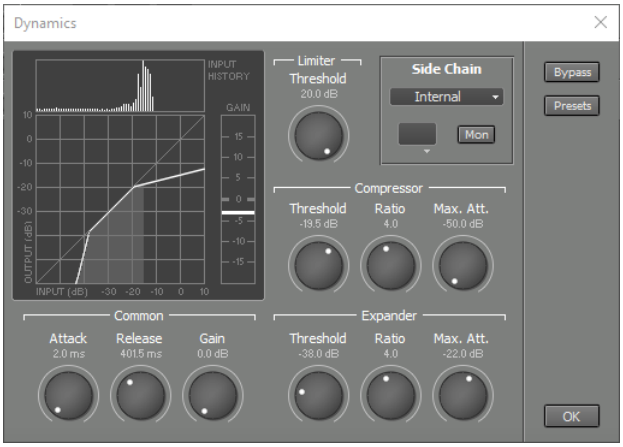
The **Delay** knob sets the average delay time. Low delay values result in a "fatter" voice rather than two separate voices. High delay values result in two distinct voices. The **Speed** and **Depth** knobs control the modulation.

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.

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

If you want to pan the two voices to different positions in the stereo image, you can use a Stereo Effect. You can then use the Stereo Effect's Pan controls. The Stereo Effect has a Stereo Doubler preset.

7.9 Dynamics



Dynamics window

The Dynamics effect combines a Limiter, a Compressor, and an Expander in one effect. The Expander section can be used to attenuate background noise, for example.

Attack controls how quickly the Compressor and Limiter respond to loud signals, while **Release** controls how long it takes to stop attenuating after a loud signal ends. Low Release times can cause distortion at low frequencies.

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

The **Transfer Curve** on the left shows the effect of the current settings of all Limiter / Compressor / Expander knobs, and the Gain knob. The horizontal axis represents the input, the vertical axis represents the output.

The vertical **Gain meter** shows the current amount of gain applied by the effect. This value appears in the slot itself as well.

The **Level History** (top left) shows how much time the input signal spends at each level (the higher the bar, the more time). The Level History will be reset when either the transport is started or the Dynamics window is opened. You can reset it manually by pressing the F5 key (Windows) / Command-R (Mac).

7.10 Echo

Echo window

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

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 as note values.
Lo-cut sets the frequency below which attenuation occurs (this typically happens in tape echo units).

Hi-cut sets the frequency above which attenuation occurs (this also happens both in nature and in tape echo units).
TapeSim controls the amount of flutter and distortion.
Mix controls the level of the echoes mixed with the dry (input) signal (0% is dry only, 100% is echo only).

7.11 EQ

The EQ effect consists of 6 tone control sections.

The overall transfer curve is displayed at the top. The colored dots correspond to the 6 sections. You can move them to control the section's Gain and Frequency knobs. A small version of the curve appears in the effect slot itself.

Each section has its own Bypass button ("B").

EQ window, with spectrum and "Standard" reference spectrum (blue curve)

Lo Cut

The Lo Cut section is a low cut filter. The cutoff rate can be 6, 12, or 18 dB/octave. The cutoff frequency can range from 20 Hz to 2 kHz.

Bass

The Bass section can be a shelving or bell-type equalizer. Attenuation/boost ranges from -12 dB to +12 dB. Frequency can range from 20 Hz to 1 kHz. If the Vintage button is active, the equalizer follows the classic Baxandall curves: cutting low frequencies will be accompanied by a slight boost in the lower mid 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 range from 50 Hz to 2 kHz. The bandwidth ranges from 0.05 to 2 octaves. Gain ranges from -12 dB to +12 dB.

Hi Mid

The Hi Mid section is a parametric equalizer. The center frequency can range from 500 Hz to 12 kHz. The bandwidth ranges from 0.05 to 2 octaves. Gain ranges from -12 dB to +12 dB.

Treble

The Treble section can be a shelving or bell-type equalizer. Attenuation/boost ranges from -12 dB to +12 dB. Frequency can range from 1 kHz to 20 kHz. If the Vintage button is active, the equalizer follows the classic Baxandall curves: cutting high frequencies will be accompanied by a slight boost in the upper mid 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 high cut filter. The cutoff rate can be 6, 12, or 18 dB/octave. The cutoff frequency can range from 500 Hz to 20 kHz.

Spectrum Display

The frequency spectrum of the audio signal can be shown in the graph. This can be very helpful when setting up the EQ.

There is a Spectrum box below the graph. More options appear after you select a signal for display:

- EQ input
- EQ output
- Master section output (if the EQ is used in the mixer's Master section) *(Pro edition only)*
- Band Effect in/output (if the EQ is used in a Band Effect) *(Pro edition only)*

The spectrum can be shown using:

- No Bands: high resolution, but of little psychoacoustic value.
- 1/3 Octave Bands: similar to Critical Bands at higher frequencies, but with higher resolution in the lower range.
- Critical Bands: this reflects how the human ear perceives sound.

The real-time behavior can be one of the following:

- Real Time: this option looks nice but isn't very helpful for setting up the EQ.
- Average: a moving average is displayed.
- Total Average: the full average is displayed.

Averages will be reset automatically when either the transport is started or the EQ window opens. You can also reset the averaging manually by pressing the F5 key (Windows) / Command-R (Mac).

The full-scale value can be set between -30 and 0 dB. Use the mouse to move the graph up or down. The scale can be set to either 10 or 20 dB per division using the button in the bottom-right corner or by pinching on your trackpad.

Reference Spectrum

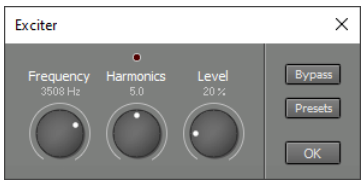
A reference spectrum can be displayed. This can help when setting up the EQ for mastering purposes. You can compare the song's spectrum to other songs you've created or to commercial recordings.

The built-in Standard reference spectrum is typical of many well-mastered recordings.

You can click the Reference box and choose "Import..." to extract the spectrum from an audio file. Alternatively, you can drop a file onto the Reference box. The new spectrum will be added to the list, and it can be renamed or deleted just like presets (right click).

7.12 Exciter

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



Exciter window

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

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 indicator above the knob will light. This should 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 running.

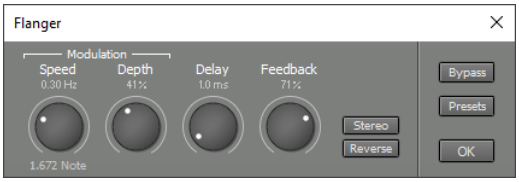
2. Set the Frequency and Level knobs to their maximum values, and set the Harmonic knob to its middle position.
3. Turn down the Frequency knob until you hear only the highest frequencies of the signal.
4. Adjust the Harmonic knob. If it is set too low, the level of the generated harmonics will be too low (you'll just hear a high-pass filtered version of the original signal). If it is set too high, the indicator above the knob 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.

7.13 Flanger

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

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

The higher the **Feedback** setting, the more pronounced the effect.



Flanger window

If the **Stereo** button is engaged, the delay times of both stereo channels will be modulated with out-of-phase signals. With low delay settings, this creates a sound similar to a rotating speaker. The **Reverse** button makes the stereo effect "spin" in the opposite direction.

7.14 Guitar Amp

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. In addition, up to three stompbox effects can be used.

Input section

Guitar Amp window

The **Level** knob controls the level of the guitar signal presented to the amp. The level indicator located next to the knob can be used to make the amp see the same input level a hardware amp would:

- **HB** equals a humbucker in the amp's Hi input.
- **SC** equals a single coil in the Hi input, or a humbucker in the Lo input.
- **Lo** equals a single coil in the Lo input.

The indicator assumes you're playing the guitar fairly hard (like some powerful rhythm chords). Don't worry if the level is much lower while playing more subtle parts, a real amp would see a lower level too.

The level indicator is just a way to make it easier to set up the amp to work like the hardware version. You can ignore it if you like. For example, you can use a higher setting to get more distortion.

Amp section

Three amp types are available:

- 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 two channels. The **Brilliant** channel includes **Volume**, **Treble**, **Bass**, and **Cut**. The Cut knob attenuates high frequencies right before the power tubes.
  The **Normal** channel includes **Volume**, **Bass**, and **Cut** knobs. The Bass knob blends the true normal channel (Bass all the way up) with the brilliant channel of older versions of this amp (Bass all the way down).

- The **Stack** model features **Volume**, **Treble**, **Mid**, and **Bass** knobs. In addition, there's a **Channel Mix** knob, which emulates using the amp's normal and lead channels simultaneously via a jumper cable.

Speaker/Mic section

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

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

You can use the box below the Mic Center/Edge slider to load your own speaker impulse response file. The Mic Center/Edge slider is not available in this case.

Note: the impulse responses are shared with the Convolutor effect.

Stompbox effect sections

Three stompbox effects can be inserted between the guitar and the amp. Each effect features two knobs.

- **Auto Wah**
- **Booster** is a treble booster. It makes overdriving the amp easier. Many classic rock sounds were created using a device like this.
- **Compressor**
- **Chorus** is a standard mono chorus effect.
- **Chorus Stereo** sounds nice, but it doubles the Guitar Amp's CPU usage because there are now effectively two amps. This may prevent you from playing the Guitar Amp live on a slower computer.
- **Delay** is a tape delay with a Feedback knob, so you get multiple repeats.
- **Echo** is a tape echo, with just a single repeat.
- **Flanger**
- **Mid EQ** emulates the parametric mid EQ some amps have. You can also use it to emulate a wah wah pedal in a fixed position.
- **Noise Gate** can be used to mute the noise in high-gain sounds.
- **Phaser**
- **Pickup EQ** can be used to change the characteristics of the guitar pickup. You can turn its Treble knob down to compensate for a shrill sound caused by a very short guitar cable, or to make a single coil pickup sound more like a humbucker. Turning Treble up can make a humbucker sound more like a single coil pickup.
- **Reverb** is a spring reverb.
- **Tremolo** modulates the guitar signal amplitude. Combo USA type amps often had a "Vibrato" channel which actually provided tremolo.

Playing guitar through 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 stompbox effect as a DI box.

To play the Guitar Amp live, you have to turn on the Mon (Soft Monitoring) button (located at the top of the main window). Also, you have to either make the Guitar Amp visible or engage the track's Rec button. You can also use Practice Mode.

Finding your tone

Basic amp sound presets are available.

The CLEAN presets provide good starting points for clean sounds. You can adjust the Volume knob to fine-tune the break-up point, so the sound is clean when you play softly and gets dirtier when you play harder. You'll probably need to adjust the Output level after changing Volume significantly.

The DRIVE presets provide good starting points for overdrive sounds. You can adjust the Volume knob to change the amount of overdrive.

Tip: Clean sounds you hear on records usually aren't as clean as you think, and distorted sounds usually aren't as distorted as you think. The guitar fits better in the mix this way.

The FUZZ presets emulate a fuzz box by overdriving the amp's input tube using a Booster stompbox effect. The FX presets use stompbox effects to create several commonly used guitar sounds.

In addition to the stompbox effects, you can use effects in the track's effect slots. You can place them in a Multi Effect if you need more slots.

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

7.15 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.

Drive controls the amount of amplification. This will typically be the only knob you have to use.

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).

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

Master Limiter window

The Master Limiter automatically optimizes the limiter's release time (i.e., the time it takes to turn up the level again after the signal peaks) 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 dBFS). This small margin serves to avoid distortion in sample rate converters, CD players, soundcards etc.

The **RMS Output** meter indicates the perceived loudness. A pop song's chorus typically reads approx. -17 dB, which is why this level is marked by a triangle. Classical music typically reads 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. In case you wonder why -17 dB equals the K system's -14 dB: MultitrackStudio uses math textbook RMS values, whereas the K system uses AES-17 RMS values, which are 3 dB higher.

The **Peak Input Level** 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 of 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 mouse or the Drive knob. The vertical bars that are covered by the curtain are limited. You'd typically want to limit just a few small bars. The Peak Input Level display will be reset when either the Transport is started or the Master Limiter window pops up.

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

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.

Limiter Slot

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

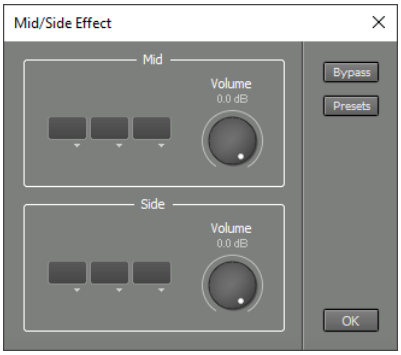
- Make sure the Master Limiter's window is on screen.
- Start the transport and play a chorus. Adjust the Drive knob so the RMS Output meter reads approx. -17 dB.

- Make sure the Peak Input Level display doesn't indicate too much limiting (i.e., 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.

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.

7.16 Mid/Side Effect

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



Mid/Side Effect window

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.

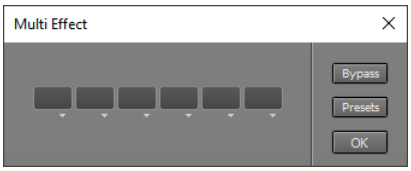
The Mid/Side Effect can be used to correct problems in a full mix. In a typical pop song, lead vocals and bass will be in the Mid part exclusively, while many backing instruments are in the Side part or in both parts. An EQ is the most commonly used effect. You can use it in the Mid section to EQ the lead vocals. You can 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 its 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.

7.17 Multi Effect

The Multi Effect is a container for other effects. Use it if you need more effect slots than are available. The Multi Effect can also be used to create effect presets consisting of multiple effects (for example, a "vocal channel" with EQ, Compressor, and Deesser).



Multi Effect window

When loading a Multi Effect, the effect currently in the slot is moved into the Multi Effect. If you hold down the Ctrl key (Windows) / Command key (Mac) while clicking the effect selector's Multi Effect item, all related effect slots will be moved into the Multi Effect (e.g. all of a track's effects, or all of a Stereo Effect's Left Channel effects).

7.18 Multiband Compressor

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

The Multiband Compressor splits the audio signal into three frequency bands and applies compression to each band. It is typically used in the Master section when a single-band compressor cannot provide the required amount of compression without introducing side effects, such as a loud kick drum noticeably muting high-frequency parts.

The **Bass/Mid** and **Mid/Treb** knobs set the crossover frequencies separating the bands.

Each of the three compressors has six knobs:
Threshold controls the level above which compression occurs. **Gain** sets the amount of gain applied after compression. Since the compressor attenuates loud parts, the overall level drops. The Gain control compensates for this drop.
Ratio and **Knee** control the shape of the compression curve.
Attack determines how quickly the compressor starts attenuating loud signals, while **Release** controls how long it takes to stop attenuating after the loud signal ends. Low Release times can cause distortion at low frequencies.

Low Ratio settings and relatively low Threshold settings are typically used for mastering purposes.

The display shows the average gain (including the Gain knobs) as three horizontal lines. This gives an impression of how the frequency spectrum is affected. If you want to apply compression without significantly altering the frequency spectrum, you can use the Gain knobs to make each band's average gain approximately 0 dB.

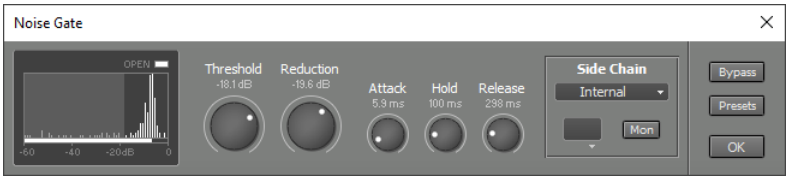
The bars at the top of the display represent the peak reduction (excluding the Gain knobs). The effect slot itself shows the peak reduction level of the band that is being reduced the most.

Multiband Compressor window

7.19 Noise Gate

The Noise Gate attenuates signals below a certain level. It can be used to remove noise, or headphone bleed recorded by a vocal mic, from a track.

Threshold determines the level below which the signal is attenuated. **Reduction** controls the amount of attenuation applied to signals below the threshold. Applying heavy attenuation can cause the Noise Gate to respond more slowly.



Noise Gate window

Attack controls the time it takes for the Noise Gate to open (i.e., let the signal through). **Release** controls the time it takes for the Noise Gate to close (i.e., attenuate the signal). The values represent the time needed for a 60 dB change. **Hold** sets a fixed amount of time to wait after the signal drops below the threshold. The release phase begins after the Hold time has elapsed.

The **Open** indicator lights up when the gate is open. This is also shown in the effect slot itself.

The **Trigger Signal History** on the left shows the relative amount of time the sidechain signal (after effects processing) stays at a certain level (the taller the bar, the more time spent at that level). The current input level is shown horizontally at the bottom. This Trigger Signal History makes it very easy to set the threshold. There is a colored "curtain" on the left side of the display that can be adjusted using the mouse or the Threshold knob. The signal bars that fall under the curtain are muted (i.e., the gate is closed). The Trigger Signal History resets automatically when the transport starts or when the Noise Gate window opens. You can reset it manually by pressing the F5 key (Windows) / Command-R (Mac).

In short, setting up the Noise Gate goes like this:

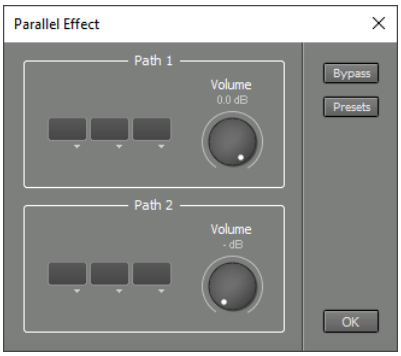
- Make sure the Noise Gate window is on screen.
- Press the Space bar to start the Transport, play the whole song, then press the Space bar again to stop.
- If there are two distinct groups of vertical bars, adjust the Threshold knob so that the "curtain" covers the left group. If there's just one group,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

7.20 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.

The Parallel Effect can be used to add effects to a part of a track. For example, echo can be added to 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.



Parallel Effect window

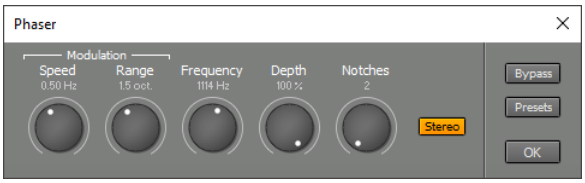
7.21 Phase Inverter

The Phase Inverter inverts the phase of the signal, just like a mixing desk's polarity switch. This effect can be used to correct out-of-phase stereo recordings. Another possible application is larger-than-life stereo positioning (using the Stereo Effect).

Phase Inverter window

7.22 Phaser

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



Phaser window

Frequency controls the tonal character of the effect.
Range determines how far the notches move. High values can lead to noticeable pitch shifts.
Speed controls how fast the notches move.
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.

7.23 Reverb

The Reverb effect offers four programs:

- **Room** is a small room, suitable for adding "ambience" to vocals.
- **Chamber** is an echo chamber.
- **Hall** is a concert hall.
- **Plate** is a plate reverb.

The Reverb effect is typically used in an Effect Return section, so multiple tracks can use a single instance

Reverb window

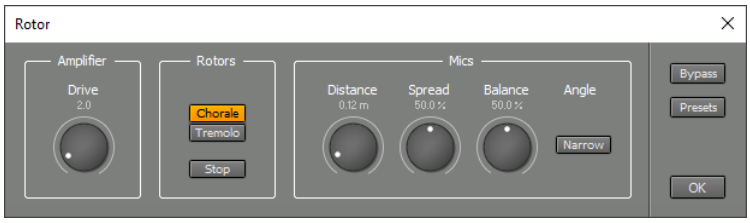
Rvrb time controls the reverb decay time.
Mix adjusts the balance between the dry (input) and wet (reverb) signals. 0% is dry only, 100% is wet only. 100% is typically used when the effect is placed in an Effect Return section.
Pre Delay sets the time before the first reflection is heard.
Width controls the stereo width of the reverb.

The Color section contains controls that shape the tonal character of the reverb.
Lo Mult is a multiplier for the low-frequency reverb time, while **Lo Freq** sets the cutoff frequency below which Lo Mult is applied.
Hi Cut sets the frequency above which the reverb time is gradually reduced.

If **Spin** is not zero, some of the reverb algorithm's parameters are modulated with a low-frequency signal. This adds randomness and smoothness to the reverb. Too much Spin can introduce noticeable pitch shifts (especially on piano). Percussion may benefit from a higher Spin setting.

7.24 Rotor

The Rotor effect simulates a rotating speaker. It consists of bass and treble speakers that rotate 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, which sets the level at which the tube amplifier operates. This can be used to add tube-style distortion.

The Rotors section controls the speakers' rotation speed. **Chorale** is slow, **Tremolo** is fast. The **Stop** button can be used to hold the rotors at a fixed position.
Your MIDI keyboard's Modulation Wheel can be used to switch speeds if the Rotor is used in an effect slot of a Wheel Organ or the MultitrackStudio Instruments. This is controller #1: 64 or higher is Tremolo, lower values correspond to Chorale.

The Mics section controls the microphone placement used to record the speakers. **Distance** controls how far the mics are from the cabinet. **Spread** adjusts stereo channel separation. **Balance** sets the relative levels of the treble and 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.

7.25 Saturator

The Saturator effect adds either tube or tape-style 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, while the transformer adds lower-order odd harmonics. The Tube program enhances harmonic content, somewhat like an exciter effect.

Saturator window ('Tube')

Drive controls the signal level fed into the virtual preamp's input. The VU meter shows the average level. At 0 dB, total harmonic distortion is approximately 2%.

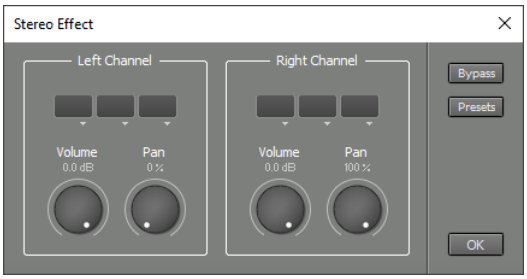
Tape

The Tape program models distortion, high-frequency compression, low-frequency bump, and wow & flutter. It can be used on individual tracks to make them sound warmer. The Tape program can also be used on a full mix (i.e., in the Master section) to help tracks blend better.

Saturator window ('Tape')

Drive controls the virtual recording level. The VU meter shows the average recording level. At 0 dB VU, total harmonic distortion is approximately 1%.
LF Bump controls the low-frequency bump. **Flutter** controls the amount of wow & flutter.

7.26 Stereo Effect



Stereo Effect window

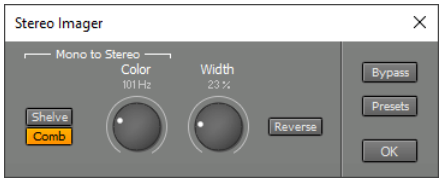
The Stereo Effect has separate groups of effect slots for the left and right channels. After effects processing, the two signals are mixed to stereo using their **Volume** and **Pan** controls.

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.

You can use a Stereo Effect to pan a mono track to one side and its reverb to the other side. This was a common trick in the seventies. You can do this with an Effect Return section, of course, but you may prefer doing it in the track itself: add a Stereo Effect and pick the Reverb Left or Reverb Right presets.

The Stereo Effect can also be used to narrow the stereo width, swap the channels (using the Pan knobs), or mute one of the channels.

7.27 Stereo Imager



Stereo Imager window

The Stereo Imager effect can change the width of the stereo image. It works with both stereo and mono input signals.

The **Width** knob controls the stereo image width. The **Reverse** button swaps the left and right channels.

Mono input signals are converted to stereo using a filter. Two filter types are available:

- **Shelve**: Low frequencies are directed to the left channel, and 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 spacing between the notches of the comb filter.

Both mono-to-stereo algorithms are mono-compatible: when the stereo outputs are summed, the resulting signal is identical to the original mono input.

Tip: Alternatively, you can pan the track to one side and its reverb to the opposite side. You can use an Effect Return section for the reverb, or you can use a Stereo Effect in the track. The Stereo Effect has presets for this.

7.28 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

Transposer window ('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 opposite direction (e.g., if pitch is shifted up 2 semitones, the formant should go down 2 semitones).

Polyphonic

The Polyphonic program is optimized for polyphonic audio. It is extremely CPU-efficient while still producing good results. Part of the efficiency comes from a limited headroom, which is where the **Level** knob comes in. If the light above it turns on, the audio signal is clipping 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.

Note: the Transposer only works if delay compensation is available. In short, this means it does not work "live" using Soft Monitoring.

Transposer window ('Polyphonic')

7.29 Tremolo

Tremolo modulates the signal level using a sine wave.

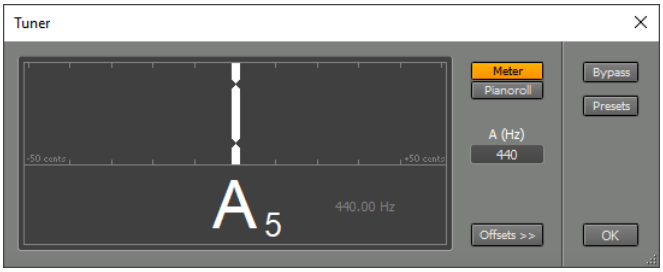
The modulation **Speed** and **Depth** can be adjusted.
The **Stereo** button can be used to create a stereo effect by modulating the right channel with a phase-shifted version of the sine wave.

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

7.30 Tuner

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



Tuner window (Meter mode)

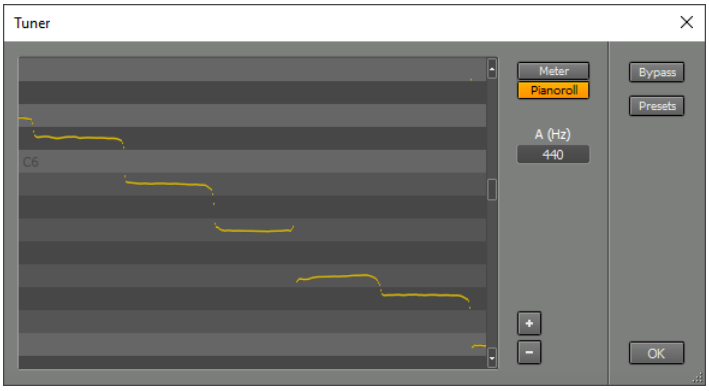
The **A** box determines the frequency of note A5.
The Tuner effect can be used to measure the frequency of an A5 played on, for example, a piano. This value can then be entered in the A box, allowing other instruments to be tuned to the same pitch.

Offsets can be specified for non-chromatic tunings.

Tip: The Tuner typically works best when used before any other effects (such as the Guitar Amp).

Pianoroll Mode

The Tuner includes a Pianoroll mode, which can be used for practicing vocals, violin, etc. A pitch track appears over a piano layout and scrolls automatically from right to left.



Tuner window (Pianoroll mode)

7.31 Vibrato

Vibrato modulates the pitch of the signal using 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 a phase-shifted version of the sine wave. The **Reverse** button makes the stereo effect "spin" in the opposite direction.

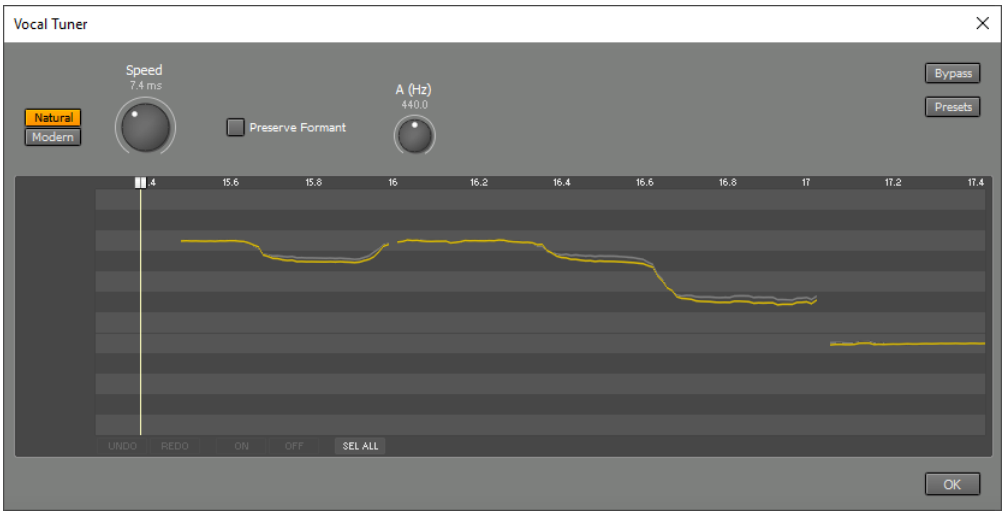
Vibrato window

7.32 Vocal Tuner

Tip: If a track needs just a few tweaks, you can use the track editor's pitch correction feature instead, so the good parts remain untouched.

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

Natural



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

The Natural program works as unobtrusively as possible.

The **Speed** knob sets how quickly the pitch is corrected. A slow setting preserves note onsets and vibrato.

Preserve Formant corrects the formant so the results sound more natural. This isn't necessary if the pitch is shifted only slightly.

Modern

The Modern program sounds a bit synthetic and robotic. This sound is quite popular in contemporary pop music.

The **Correction** knob sets how much out-of-tune notes are corrected. At 100%, the pitch is perfect, which usually sounds rather synthetic. Lower settings result in a more natural sound.

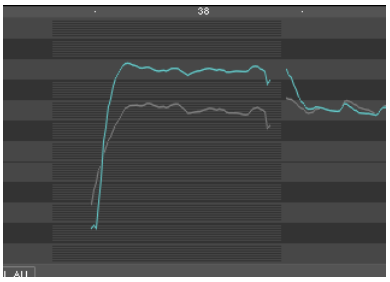
The **Ignore** section contains knobs that tell the tuner to ignore certain parts of the sound to avoid unwanted artifacts. **Ambient** ignores background noise during silent parts. **Sibilant** ignores unpitched sounds like "s". Note that the Vocal Tuner doesn't do anything if you turn an "ignore" knob up by too much.

The note editor

The note editor shows both the input pitch (dimmed color) and the output pitch (bright color). The Vocal Tuner quantizes pitch to the nearest active note. Using the note editor, you can disable certain notes. If a note is turned off, pitch is quantized to the nearest enabled note. The Vocal Tuner does nothing if all notes are off. The note editor looks like a one-octave piano roll. You can select a part of a horizontal bar that represents a note using the mouse, and use the ON or OFF buttons to switch the selected part on or off. It's also possible to select multiple adjacent notes.

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

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



Vocal Tuner editor, all notes off except A

The Vocal Tuner can also be used to change the melody. In the picture above, all notes are off except A, so a G is changed to an A.

Note: When used in an audio track, the Vocal Tuner updates the note editor's pitch curves even when the transport isn't running. In this case the track's audio file is analyzed directly, so any effects that precede the Vocal Tuner are not applied. For example, if an Automated Fader effect is used to mute a note, the muted note will still appear in the Vocal Tuner.

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

7.33 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 Audio Effect placeholder will appear.

AU (Audio Unit) plugins are .component files located in the user or system Library/Audio/Plug-ins/Components folder. macOS comes with several AU plugins, and many third parties offer AU plugins as well. Virtually all AU plugins are AUv2. Some newer ones are AUv3. MultitrackStudio supports both versions.

AU plugins can be loaded into an effect slot using the slot's down arrow. The AU plugins appear in the list's Plugins section. The plugin will be shown in a window with Bypass and Presets buttons. Any presets that come with the plugin appear in the Presets menu.

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

Some plugins generate MIDI data. This MIDI output is merged with the data coming from MIDI input devices if the plugin is in a recording audio track and Soft Monitoring is enabled. MIDI output from plugins is only converted from MPE to MIDI 2.0 if the plugin either sends MPE configuration messages (RPN 6) or reports that it supports MPE (as per the MPE specs).

Note: If you install AU plugins while MultitrackStudio is running, you may need to restart MultitrackStudio for the new plugins to appear (the plugin list is collected only once).

7.34 CLAP Plugins

CLAP is a new plugin format. Noteworthy characteristics include extensibility, fast plugin scanning, and MIDI 2.0 protocol support. It strives to avoid misinterpretation of the specs, which should lead to fewer compatibility issues. CLAP is open source. It's released under the MIT license, so developers don't need a proprietary license agreement.

CLAP plugins can be loaded in an effect slot using the slot's down arrow. The CLAP plugins appear in the list's Plugins section.

Windows: CLAP plugins are files, the name ends with .clap. 64-bit plugins are located in the C:\Program Files\Common Files\CLAP\ folder.

32-bit plugins are located in C:\Program Files\Common Files\CLAP\ (if your Windows version is 32-bit), or C:\Program Files (x86)\Common Files\CLAP\ (64-bit Windows version). 64-bit MultitrackStudio can only use 64-bit plugins, 32-bit MultitrackStudio can only use 32-bit plugins.

Mac: CLAP plugins are bundles, the name ends with .clap. They're located in the user or system Library/Audio/Plug-ins/CLAP folder.

You can create the CLAP folder yourself if it's not present.

For plugin developers
The CLAP plugin API is available at https://cleveraudio.org
Almost all extensions are supported, except for the draft ones. The draft plugin-invalidation, plugin-state-converter, and gain-adjustment-metering extensions are supported.
The source code for the MIDI CI profiles extension (used for the MIDI 2.0 Orchestral Articulation profile) is available at https://www.multitrackstudio.com/clap-profiles.zip

Replacing other plugin formats with CLAP

CLAP plugins can offer conversion from one plugin format to another. MultitrackStudio uses this to convert from VST to CLAP. Both the plugin state and any automation are converted. Any MultitrackStudio presets will work with the CLAP plugin.

CLAP option in VST window

"CLAP" appears in the top-right corner of a VST window if a compatible CLAP plugin is available. To use the CLAP plugin, you can go to the Plugin Manager and uncheck the Effect, Instr, and MIDI Eff boxes for the VST plugin. From now on, the CLAP plugin will be loaded instead when you open a song. To see results, you can either re-open the song or press the F5 key (Windows) / Command-R (Mac) to reload a single plugin instance.

The CLAP plugin will be used automatically if the VST plugin is missing.

This feature can be disabled for a specific VST plugin in the Plugin Manager, by unchecking the Effect, Instr, and MIDI Eff boxes for the CLAP plugin.

7.35 VST Plugins

Many commercial and free plugins are available in the VST format. MultitrackStudio supports both VST3 and VST2 plugins.

VST plugins can be loaded into an effect slot using the slot's down arrow. The VST plugins appear in the list's Plugins section.

Note: A VST plugin that's installed while MultitrackStudio is running may not be recognized automatically (the plugins are collected only once per session). You can press the F5 key (Windows) / Command-R (Mac) while an effect selector is visible to force VST plugins to be rescanned.

If a VST plugin gets into 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.

Tip for Mac users: VST plugins that haven't yet been updated for Apple Silicon can still be used on an Apple Silicon Mac if you open MultitrackStudio using Rosetta: find MultitrackStudio in Finder, Ctrl-click it, choose Get Info, and check the Open in Rosetta option.

VST3 plugins

Windows: VST3 plugins are .vst3 files. 64-bit plugins are located in the C:\Program Files\Common Files\VST3\ folder.

32-bit plugins are located in the C:\Program Files\Common Files\VST3\ (if your Windows version is 32-bit), or the C:\Program Files (x86)\Common Files\VST3\ folder (64-bit Windows). 64-bit MultitrackStudio can only use 64-bit plugins, and 32-bit MultitrackStudio can only use 32-bit plugins.

Mac: VST3 plugins are .vst3 files. They're located in the user or system Library/Audio/Plug-ins/VST3 folder.

You can use MtStudioLinks.txt files to exclude files or folders (see the VST2 description). Including files or folders is not possible.

Presets

Any presets that come with the plugin appear in the Presets menu. The presets can be stored in the plugin itself, or they can be .vstpreset files in one of these folders:

Windows:

- C:\Users\USERNAME\Documents\VST3 Presets\COMPANYNAME\PLUGINNAME\
- C:\Users\USERNAME\AppData\Roaming\VST3 Presets\COMPANYNAME\PLUGINNAME\
- C:\ProgramData\VST3 Presets\COMPANYNAME\PLUGINNAME\

Mac:

- User or system Library/Audio/Presets/COMPANYNAME/PLUGINNAME/
- Network/Library/Audio/Presets/COMPANYNAME/PLUGINNAME/

VST2 plugins

Windows: VST2 plugins are .dll files. In the Plugin Manager, a folder can be selected where the VST plugins are located. MultitrackStudio looks for VST plugins in this folder and its subfolders.
Mac: VST2 plugins are .vst files. They're located in the user or system Library/Audio/Plug-ins/VST folder.

See Customizing the VST2 folder for more flexible options.

Plugins that 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 that come 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.

There are a couple of "powered" plugins on the market that come with their own dedicated hardware. These kinds of plugins are not supported.

Bridging

Note: Bridging is available for Windows only. The Mac version supports 64-bit plugins only.

Both 32-bit and 64-bit versions of MultitrackStudio support 32-bit and 64-bit VST2 plugins. 64-bit Windows is required to run 64-bit plugins. 64-bit MultitrackStudio runs 32-bit plugins "bridged", or "out-of-process" in technical terms. Similarly, 32-bit MultitrackStudio runs 64-bit plugins bridged. This happens automatically.

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

Note: Not all VST2 plugins work well when bridged. Some work fine with one instance but exhibit issues with multiple instances. Some copy protection mechanisms may fail. Some won't work if UAC (User Account Control) is enabled.

A bridged plugin that crashes shouldn't crash MultitrackStudio itself. You can choose to run a buggy plugin bridged for this reason. The Plugin Manager can be used to force new instances of a plugin to 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 VST2 folder

On Windows, the Plugin Manager allows for specifying one VST2 folder. On Mac, there are two default VST folders, and you can specify an additional one in the Plugin Manager. 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:\OtherFolder\
g:\OtherFolder\TheReverb.dll
-SamplesDir\
-BuggyPlugin.dll

Mac:

/Volumes/MyDrive/OtherFolder/
/Volumes/MyDrive/OtherFolder/TheReverb.vst
-SamplesDir/
-BuggyPlugin.vst

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

7.36 Automatic Delay Compensation

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

Automatic Delay Compensation is available in:

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

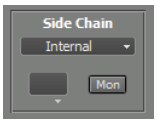
Delay Compensation is NOT available in:

- The Sidechain box of sidechaining effects (Dynamics etc.).
- The instruments in the Multi Instrument (the effects do have PDC).

7.37 External Sidechain Routing

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

All versions 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 edition also features "external sidechaining", where the sidechain input can be connected to sources outside the effect.



Sidechain section

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

- **Internal**: the effect's input.
- **Track**: the output of an audio or software-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 from Groups will not be sent to effects 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 the bass guitar every time the kick drum hits, or mute the background music whenever the announcer speaks). 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 source.

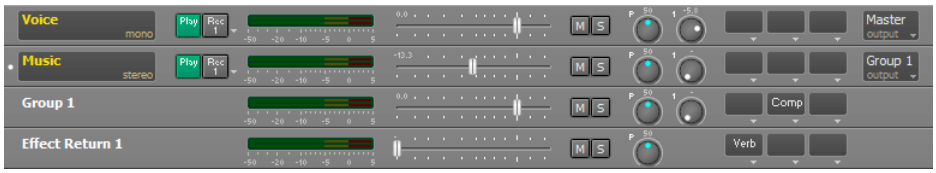
The only limitation that applies to track sidechaining is that sidechains can't "feed" themselves, e.g., Track 1 can't use Track 2 as sidechain source if Track 2 already uses Track 1. This typically isn't a problem in practice.

Group Bus sidechaining

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

Effect Send sidechaining

This was the only way to do "ducking" before 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 source

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 white 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 the sidechain source.
Effect Return 1's fader is all the way down to prevent the signal from being sent to the Master section.
In this example, the upper track will be audible (the Effect Send is 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 that Group.

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 source can be used to build your own dynamic noise filters (using a Noise Gate or Dynamics effect's expander in the treble band), etc.

Plugin sidechaining

AU, CLAP, and VST audio effect plugins that have more than 2 input channels will get a Sidechain box just like the ones in the Dynamics/Compressor/Noise Gate effects. Input channels 3 and 4 will receive the sidechain source signal.

Instrument plugins that have audio inputs get a Sidechain 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 Sidechain box. Then you can use the track's MIDI editor to enter notes that the plugin can use to determine the correct pitch.

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

Some (older) VST2 plugins use proprietary sidechain input plugins. This is a secondary plugin that picks up the sidechain source and routes it to the primary plugin. This setup will not work reliably on multi-CPU machines in MultitrackStudio unless you tell the program these plugins belong together. You can enable the SC Plug option in the Plugin Manager. New instances of the plugin will now get a Sidechain Plugin box. This box is identical to a

Sidechain box, except its output is ignored. You can load the secondary plugin in the effect slot in the Sidechain box, and choose the sidechain source. MultitrackStudio's sidechaining mechanism will then ensure everything works correctly under any conditions.

Multi-output Instrument sidechaining

Some AU / CLAP / VST instrument plugins have multiple outputs. The Sampler can have multiple outputs too. The outputs of these instruments are available as sidechain sources. Up to 30 outputs per instrument can be used as sidechain sources. This feature is especially useful with drum instruments. For example:

- Use the kick drum output as the sidechain source for a Compressor or Dynamics effect in the bass track.
- Route the instrument outputs to tracks, so you can mix the drum instruments in the main window instead of the instrument's Output Mixer.
  An instrument 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 Mon button. If you route all the drum instrument outputs to tracks this way, you can mute the instrument track using its Mute button. Note that you'll have to unmute this track if you want to play the instrument live or hear notes when clicked in the track's editor. This is because the sidechains only work while the track is playing back.

7.38 Audio to MIDI Plugins

Some plugins can convert audio to MIDI. This is typically used to play MIDI instruments using an electric guitar.

Record as MIDI

You can record these plugins to a MIDI track like this:

1. Add an audio track, and load the plugin in one of the effect slots.
2. Switch the track to Practice Mode. You can double click its Play button to do this.
3. Enable Soft Monitoring, so the plugin will be used.
4. Engage the Rec button of the MIDI track you'll be recording.

The MIDI track now responds to the audio input, and you can start the transport to actually record it as MIDI.

This MIDI output is merged with the data coming from MIDI input devices if the plugin is in a recording audio track and Soft Monitoring is enabled.

Record as Audio

You can also use these plugins on an audio track, and then turn them into audio again with a software MIDI Instrument:

1. Load the plugin into an effect slot of an audio track.
2. Open its user interface and click on the Output button.
3. The Output Mixer has a MIDI Out strip. Here you can load a MIDI Instrument. Make sure the corresponding Volume fader is moved up.

MIDI 2.0 / MPE

MIDI output from audio effect plugins is only converted from MPE to MIDI 2.0 if the plugin either sends MPE configuration messages (RPN 6), or reports that it supports MPE (as per the MPE specifications).

8 MIDI Instruments

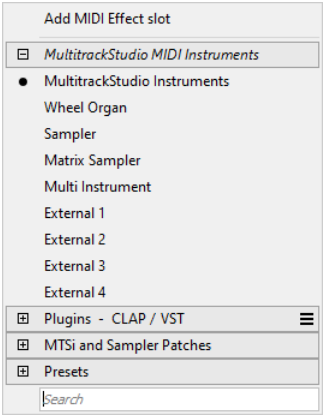
MIDI Instruments are used to convert MIDI messages to audio. These instruments are available:

1. MultitrackStudio Instruments, a GM compatible instrument collection.
2. Wheel Organ, emulates a tonewheel organ.
3. SoundFont Player, generates audio using .sf2 files. *(Mac only)*
4. Sampler, generates audio using samples.
5. Matrix Sampler, plays back samples.
6. Multi Instrument, can contain multiple instruments.
7. External MIDI Instruments, can be either an external hardware synth, a synth on your soundcard, or a software emulation of such a device.
8. AU Instrument Plugins, AU plugins that can convert MIDI to audio.
9. CLAP Instrument Plugins, CLAP plugins that can convert MIDI to audio.
10. VST Instrument Plugins, VST plugins that can convert MIDI to audio.

MIDI Instruments are used in 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).

Instrument Slot

The Instrument Selector contains all built-in MultitrackStudio instruments, AU / CLAP / VST plugins, sampler patches, and instrument presets. The Plugins option's ☰ button (on the right) provides access to the Plugin Manager.



Instrument Selector (Pro edition)

Clicking the slot's button will show the instrument's user interface. When this window appears the instrument will be "live", so it responds to your MIDI keyboard. The instrument will also be live while the track's Rec button is engaged.
All instruments feature a red indicator on the right hand side that lights up when the instrument is currently responding to messages received from the MIDI In Device (i.e., your MIDI keyboard). If a "buffer error" occurs due to CPU usage being too high while the Transport is not running, the instrument will be deactivated. If this happens, the instrument can be reactivated by either hiding and showing its user interface or reactivating the track's Rec button.

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

Search

A search text can be typed to filter the Instrument Selector. AU / CLAP / VST list items have invisible tags so you can use "au", "clap", or "vst" search terms to hide the other types of plugins. The items in the MTSi and Sampler Patches section have invisible "mtsi" and "sampler" tags.
While an instrument's user interface is visible you can press the F3 key (Windows) / Option-Command-F (Mac) to pop up the Instrument Selector. It remembers the search text, so you can try the next instrument that matches the search text easily.

Presets

Presets can be loaded or created using the Presets button which appears on the instrument's user interface. Instrument presets can optionally include the audio and MIDI effects in the track.

Note Names

Each instrument window has an option to override the note names, accessible via the ☰ button. These note names appear in the Drum Editor.

Articulations

Articulations can be defined so you can use multiple articulations of an instrument in a single track. Bowed and pizzicato violin, for example. See Articulations.

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 chance of glitches. The downside of this approach is fairly high latency (usually slightly more than 0.5 seconds). This means it takes about half a second before you hear the effect of moving a Volume fader or any other control.

Obviously, playing a MIDI keyboard would be impossible 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 is not routed through the mixer, but directly 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 Studio menu's Devices 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 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 remain 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 commonly called "freeze".
A software instrument's output level could be too high for an audio file, causing the signal to clip. If this happens, you can use the MIDI track's Controller Editor to turn down the Volume or Expression controllers. Pro edition users can use 32-bit float .wav files. These files do not clip the audio signal, so the problem won't occur.

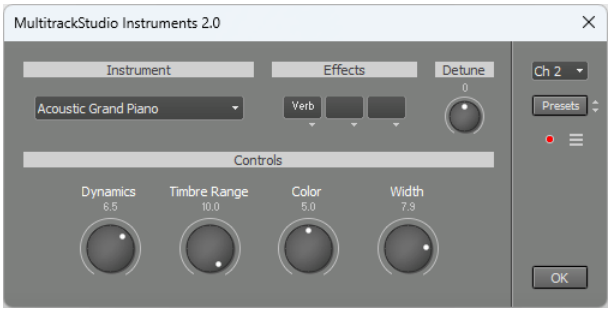
8.1 MultitrackStudio Instruments

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

The **Instrument** box lets 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** section 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.



MultitrackStudio Instruments window ("Acoustic Grand Piano")

Note 1: Most 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 effect send levels.

Keyboard instruments

Acoustic pianos have a Timbre Range knob, which determines the difference in tone color between softly and strongly played keys. At the lowest setting, note velocity 127 corresponds to *ff* (fortissimo), at the middle setting it corresponds to *fff* (forte fortissimo). Good weighted keyboards and piano plugins are often in this range. At the highest setting, note velocity 127 corresponds to *ffff*. This leaves a lot of room for extremely soft or loud playing, as Yamaha pianos such as the Clavinova do. The Dynamics knob determines the difference in volume between softly and strongly played keys. For a Yamaha piano, a Dynamics value of 6.5 equals a natural acoustic piano response. You'd typically use slightly lower values with other keyboards. The Color knob detemines the tone color. Higher values cause the sound to be "harder" and brighter. "5" is the neutral position.

The electric piano's Bass and Treble are tone controls, as found on amplifiers or even some electric pianos.

The Percussive Organ is always percussive even if another note is playing. Drawbar Organ follows the traditional style.

String instruments

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 reduce phasing problems 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 one that counts. It's not possible to add vibrato where the automatic system decides it's not appropriate.

Percussion instruments

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.

If you'd rather hear the Drum Kit from the drummer's perspective you can use a Stereo Imager effect with the Reverse Stereo preset.
You can use per-note pan controllers for detailed panning of the Drum Kit. It's probably best to set the Width knob to zero, so all panning is done with per-note pan controllers.

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. **8'D** is a slightly detuned version. **5'1/3** 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 messages. A sustain-off message will mute all sounding notes for which a note-off message has been received, so you can use the sustain pedal to mute harp strings or cymbals, etc.

Articulations

A few instruments support MultitrackStudio Articulations:

- Overdrive Guitar / Distortion Guitar: Normal, Muted, Harmonic
- Electric Bass (finger): Normal, Slap
- Violin / Viola / Cello / Contrabass: Bowed, Pizzicato

MIDI Implementation

Tip: the Controller Editor's VIEW button lists all MIDI controls supported by the current instrument.

The MultitrackStudio Instruments respond to Volume (#7), Pan (#10), Expression (#11), and Sustain (#64) controllers. Pitch Bend is also supported.
Acoustic pianos respond to Sostenuto (#66) and Soft (#67) pedals, and they support continuous "half pedal"

sustain (the half pedal range is value 44 to 84).
Bowed strings and many winds respond to Legato (#68).
Brightness and Treble knobs respond to #74. Vibrato knobs respond to #1. Attack, Decay, Sustain, and Release knobs respond to #73, #75, #79, and #72 respectively. Drawbars and drum level knobs respond to #12, #13, #14, etc.

The MultitrackStudio Instruments respond to poly aftertouch and MIDI 2.0 per-note pitch bend and release time. The synths respond to MIDI 2.0 per-note brightness, timbre, attack time, and decay time. Per-note brightness and timbre control the filter cutoff frequency and resonance, respectively.
For attack time and decay time, the value at note-on counts. For release time, the value at note-off counts.
Drum Kit and Timpani respond to per-note pan.
Synth Drum responds to per-note decay and per-note pan.

GM compatibility

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

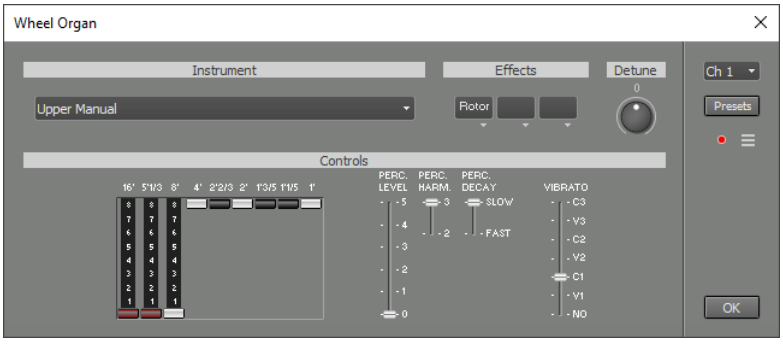
- Most "Sound Effects" programs (Gun Shot, etc.) are not available.
- A couple of percussion instruments are not available: vibraslap, guiro, and cuica.
- The MultitrackStudio Instruments include a few instruments that are not part of GM. The MIDI file will contain a program number that closely matches the sound. 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 use a highly optimized sound synthesis engine, they don't use samples. This allows each note to have a unique sound, which reduces "machine gun" effects. All 65535 MIDI 2.0 note velocities can have a unique timbre, which makes the instruments more "playable".

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.

Instrument



Wheel Organ window ("Upper Manual" 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 include the lowest and highest octaves 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 slightly different.

Effects

The Effects section contains three effect slots. By default, one of them contains a Rotor effect. You can use the MIDI keyboard's Modulation Wheel to switch between the two speeds.

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). The drawbars also control 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 harmonics, 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 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 MIDI Keyboard Mapper can be used to play instrument 2 or 3 using only one MIDI keyboard. Follow these guidelines to set up the MIDI Keyboard Mapper:

- Enable the Split option.
- Make sure the Left Hand and Right Hand section's Channel values match the Channel indicator in the top -right corner of the Wheel Organ window.
- The Split note can be set at C5 to start with.
- Set the Left Hand Transpose Oct to -3, and the Right Hand Transpose Oct to 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 supports multiple MIDI In devices. Instrument 2 or 3 can be played using two MIDI keyboards if the keyboards have an octave-shift function. Using 5-octave keyboards, the lower keyboard is shifted 3 octaves down, and the upper keyboard is shifted 3 octaves up.

MIDI Implementation

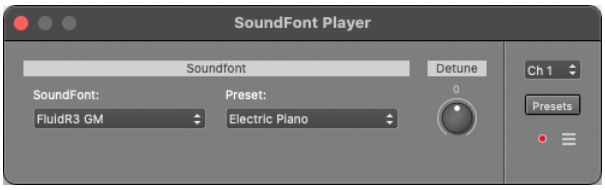
The Wheel Organ responds to Volume (#7), Expression (#11), and Sustain (#64) controllers. Pitch Bend is also supported. Note that the original tonewheel organ didn't have Sustain or Pitch Bend features.
The upper manual drawbars respond to #12 to #20, the lower manual drawbars respond to #21 to #29, and 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 SoundFont Player

Note: the SoundFont Player is available in the Mac version only.

The SoundFont Player can load .sf2 files. Many .sf2 files are available on the internet.



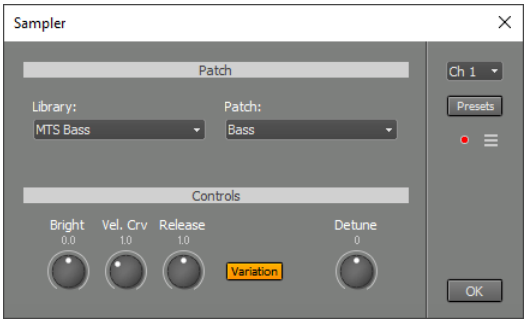
SoundFont Player window

Use the **SoundFont** box to load one of the available .sf2 files.
The Import option allows you to import additional files.
Alternatively, you can drop a .sf2 file onto the SoundFont Player window.
The ☰ button on the right-hand side of the Import option provides access to the SoundFont Manager. It allows you to add categories and override SoundFont names. It works similarly to the Plugin Manager.

Use the **Preset** box to select one of the presets provided by the current SoundFont.

8.4 Sampler

MultitrackStudio includes a disk-streaming sampler. Samples can be played directly from disk, allowing patches to be larger than the available memory.



Sampler window

You can load a sample library using the **Library box**.
The **Import...** option allows you to import .sf2, .sfz, .gig, or .exs files, as well as MultitrackStudio's .zptc and .ptc files.
The **Export...** option exports the library to .zptc format. You can use this to move a library to another computer, for example.

Tip: On Windows, you can import the system MIDI bank to get started. It's usually located at C:\Windows\system32\drivers\gm.dls

The **Patch** box lets you select one of the patches provided by the library.
Edit patch... opens the Patch Editor.

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

Tip: Simple patches containing just one sample can be created easily by dragging an audio file from File Explorer (Windows) / Finder (Mac) to a MIDI track's Instrument Slot. You can also drag a selected part from a track editor or clips from the Clip Shelf to an Instrument Slot. A Sampler will be loaded into the Instrument Slot, and a patch will be created for it. To use the patch in other songs, you need to export the library and import it again.

The Sampler responds to messages on all MIDI channels, so the **Channel** value usually doesn't matter. It does matter if you're recording using the MIDI Keyboard Mapper's split option or using multiple keyboards. In those cases, you want only messages received on this channel to be recognized.

If the track has multiple MIDI streams, the Sampler uses only the first stream.

The **Output** button, available if the patch uses multiple outputs, opens an 8-channel output mixer. This is typically used for drums. In the Pro edition, these output channels are available as sidechain sources in other tracks.

The ☰ menu offers some settings:

- **Polyphony**: The number of samples a Sampler is allowed to play simultaneously. You can reduce this setting to lower CPU or disk bandwidth usage.

- **Memory Limit**: The amount of memory that all Samplers combined are allowed to use. The operating system will resort to disk swapping if memory usage is too high, which can significantly reduce performance and should be avoided. This setting is intended to limit the Sampler's memory usage to make room for other audio programs (e.g., sampler-based instrument plugins). If available memory is too low, dropouts may occur when using a Sampler in record mode. You don't need to worry about this, playback will sound fine.

Note: The Sampler does not support all features of .sf2, .sfz, .gig, or .exs files. Differences include:

- *The Sampler cannot play multiple samples for a single key press. For example, a "piano + strings" soundfont that plays both piano and string samples simultaneously will not sound as intended. In the worst case, some keys will play piano, others strings. You can delete extra samples using the Patch Editor.*
- *There are no filters, modulation, or effects. You could use MultitrackStudio effects to enhance a patch's sound.*

MIDI Implementation

The Sampler supports the following MIDI messages:

- Note On/Off
- Modulation (#1)
- Volume (#7)
- Pan (#10)
- Expression (#11)
- Sustain (#64)
- Legato (#68)
- Brightness (#74)
- Pitch Bend
- Poly Aftertouch
- MIDI 2.0 per-note pitch bend
- MIDI 2.0 per-note modulation
- MIDI 2.0 per-note volume
- MIDI 2.0 per-note pan
- MIDI 2.0 per-note expression

Tip: To use per-note modulation with an MPE keyboard, use the MIDI Keyboard Mapper. Set it up to map per-note aftertouch or per-note brightness to per-note modulation.

Under the hood
Imported sample libraries are converted to MultitrackStudio .ptc format patches. Each library gets its own folder, typically named after the original file (e.g., "MyPiano.sf2"). You can change the location of these folders in the Studio → Preferences window. The audio samples are stored as losslessly compressed .gjm/.gjs files, so converted libraries usually take up significantly less disk space than the originals. Libraries can be exported to .zptc format, which is a .zip file containing the .ptc file(s) and the associated samples.

8.5 Matrix Sampler

The Matrix Sampler can load up to 16 audio samples. They can be played using the Matrix scherm-MIDI Keyboard, for example.

Matrix Sampler window

A 4x4 matrix of cells appears on the left. On clicking one of the 16 cells, the corresponding controls appear on the right. The **Load** button allows for loading samples. Several options are available:

- **Import**: imports an audio file.
- **Paste**: Pastes data copied from an audio or MIDI track editor.
- **Remove**: removes sample.

In addition, you can copy from one cell to another using drag-and-drop. Dropping a file onto a cell is also possible. Samples can be up to 6 seconds in length. If you have longer samples, you can consider slicing them into parts using a track editor, the parts can then be loaded into multiple cells using the paste option.

The text box next to the Load button shows the **name** of the cell and allows for changing it. The name appears in the cell itself if a sample is loaded.

Volume controls the volume of the sample. **Semitones** and **Cents** control the pitch. **Stretch** can be used to make the sample shorter or longer so it matches the song tempo. The box accepts fractions, so you can type "120/80" instead of "1.5" to make a 120 BPM sample match your 80 BPM song, for example. If **Oneshot** is engaged, the sample will play all the way to the end regardless of note-off messages.

You can use the play button to play back the sample.

The Matrix 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 MIDI Keyboard Mapper's split option or multiple keyboards: in these situations, you'll want only messages received on this channel to be recognized.

MIDI Implementation

The Matrix Sampler supports the following MIDI messages:

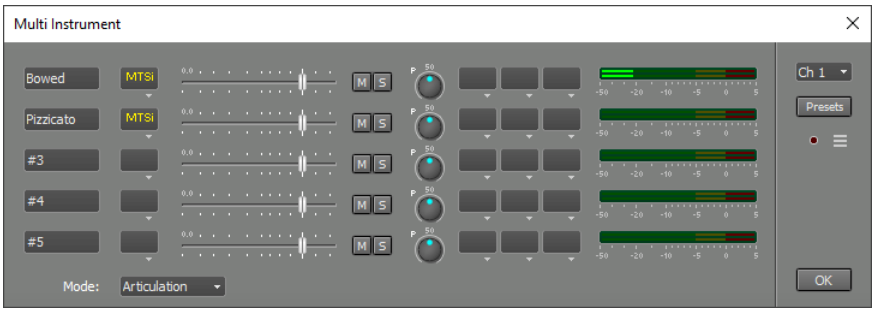
- Note On/Off
- Volume (#7)
- Pan (#10)
- Expression (#11)
- Poly Aftertouch
- MIDI 2.0 per-note volume
- MIDI 2.0 per-note pan
- MIDI 2.0 per-note expression

The cells are mapped to MIDI notes 36..51.

8.6 Multi Instrument

The Multi Instrument turns up to 5 MIDI instruments into a single instrument. You can either use a MIDI controller to select one of the sounds (see articulations), or you can play them all at once (also known as "layering").

There's a full mixer with effect slots to mix the instruments.



Multi Instrument window

The **Mode** box lets you choose between Layered and Articulation mode. It also allows you to customize the MIDI controller used for switching articulations (default is #89). This controller appears as "Articulation" in the track editor's Controller editor.

The names on the left appear in the Articulation controller Editor.

External MIDI Instruments can't be used in the Multi Instrument.

8.7 External MIDI Instruments

An External MIDI Instrument sends the track's MIDI data to the corresponding MIDI Out device. A MIDI Out Device is usually hardware, connected to the computer via USB. But it could also be a network connection or software emulation.
MultitrackStudio Pro supports four MIDI Out devices, lower editions support two. To select MIDI Out devices, go to the Studio menu's Devices window.

Patch section

External MIDI Instrument window

The large box in the **Patch** section shows the name of the patch. You can click it to select a patch by name. The names come from a Patchmap file. The ☰ button menu can be used to select the Patchmap file that corresponds to your MIDI Out Device. Also see the MIDI-CI paragraph below.

Tip: You can use the Up/Down Arrow keys to step through the patches.

The **Bank Hi:Lo:Prog** box indicates the bank (optional) and the program used. The values can be altered by clicking it. Bank Hi, Bank Lo, and Prog are numbers (0..127), separated by colons (for example: 0:1:2 means Bank 1 and Program 2). Bank Hi and Lo, also known as Bank MSB and LSB, correspond to MIDI controllers #0 and #32 respectively. Press Enter to accept the new value, or Esc to cancel the operation.

Channel (top-right corner) indicates the MIDI channel being used.

Controls section

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

Bright, **Reverb**, and **Chorus** control MIDI controllers #74, #91, and #93 respectively. They only work if your synthesizer supports them, of course. Different controllers can appear if the MIDI Out Device supports MIDI-CI, or if a patchmap file specifies supported controls.

Detune detunes the patch using Pitch Bend messages. The value is stored in the MIDI file as RPN 1.

Virtual MIDI channels

A MIDI Out Device contains 16 MIDI channels. MIDI Out devices are virtualized by MultitrackStudio, meaning a single MIDI channel on a MIDI Out device can be used by multiple tracks. MultitrackStudio will automatically handle playing each note using its own track's patch and controllers. Obviously, this only works correctly if tracks using the same MIDI channel do not play notes at the same time.

The following controllers have default values and do not require attention:

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

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

Note: strictly speaking, virtualization works per-stream rather than per-track.

MIDI 2.0

The MIDI 2.0 protocol is used if the MIDI Out Device supports it. This offers higher resolutions (16-bit note velocities and 32-bit controls) and new possibilities such as per-note controls.

Multi-timbral expression

If the MIDI Out Device doesn't support the MIDI 2.0 protocol, "Multi-timbral expression" is used to convert a few MIDI 2.0 per-note controls to MIDI 1.0 channel controls. This works multitimbral devices (this means it can play 16 instruments on 16 channels).

Like MPE, each note gets its own MIDI channel. Channels 12..16 and the channel used by the track are used for this purpose, giving a total of 6 channels (or 5 if the track uses channel 12 or above). The other channels remain available for other tracks.

"Multi-timbral expression" works with per-note Pitch Bend, Brightness, Aftertouch, and Expression. These messages are converted to their channel counterparts. "Multi-timbral expression" is used automatically when one of the per-note controls mentioned (minus aftertouch) is sent.

Pitch bend range values used won't exceed 24 semitones, to ensure good compatibility. If your hardware doesn't support 24 semitones, you can set a lower value in the per-note pitch bend editor. Pitch bend values will be converted to the range used automatically if necessary.

Tip: per-note Pitch Bend, Brightness, and Aftertouch work with an MPE keyboard. To use per-note expression, you can use the MIDI Keyboard Mapper. Set it up to map per-note aftertouch or per-note brightness to per-note expression.

MIDI-CI

MIDI-CI is part of MIDI 2.0 and allows a sender to retrieve information from a receiver. MultitrackStudio supports MIDI-CI to retrieve program names and controller names from a MIDI Out Device. This only works with devices that support MIDI-CI.

The Patchmap menu, available via the ☰ button, features an "Allow MIDI-CI" option. It's enabled by default. It reads "Allow MIDI-CI (available)" if program names are actually available. If they are, the MIDI-CI information replaces the selected patchmap automatically. You can switch "Allow MIDI-CI" off if you prefer to use a patchmap file instead.

MIDI-CI works automatically with USB MIDI 2.0 class-compliant devices. See MIDI-CI for information on how to set up MIDI-CI using two MIDI 1.0 ports.

Under the hood
The part of MIDI-CI used is called Property Exchange. The ResourceList, ChannelList, ProgramList, ChCtrlList, and Korg's X-ParameterList resources are used. MultitrackStudio subscribes to the ChannelList resource, so it gets notified when something changes.

8.8 AU Instrument Plugins

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

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

AU instrument windows have a **Channel** selector (top right). This is not only the channel used for recording, as with the built-in instruments, it is also the channel on which MIDI data is sent to the plugin. Some plugins respond to all MIDI channels in the same way, in which case the channel setting does not matter. Sometimes you can set a plugin to Omni mode to achieve this. Other plugins, especially multitimbral plugins that can produce a different sound per channel, require that the Channel setting be the same as the channel used by the plugin.

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

MIDI 2.0 / MPE

AU Instruments receive per-note pitch bend, per-note brightness, and poly aftertouch via MPE. Switching to MPE happens automatically when per-note pitch bend or per-note brightness is sent to the plugin. MPE will not be used if you've set the per-note pitch bend range to zero.
Plugins may have an MPE mode setting that needs to be set manually.

In macOS 12, AU plugins that support the MIDI 2.0 protocol will receive MIDI 2.0 instead of MPE.

MIDI output from the plugin is converted from MPE to MIDI 2.0. You can avoid this by setting the per-note pitch bend range to zero. In this case, MPE to MIDI 2.0 conversion will only occur if the plugin sends MPE configuration messages (RPN 6).

8.9 CLAP Instrument Plugins

A CLAP instrument is a CLAP Plugin that can convert MIDI messages to audio. You can select a CLAP instrument by clicking the instrument slot's down arrow. The CLAP instrument plugins appear in the list's Plugins section.

CLAP instrument windows have a **Channel** selector (top right). This is not only the channel used for recording, as with the built-in instruments, it is also the channel on which MIDI data is sent to the plugin. Some plugins respond to all MIDI channels in the same way, in which case the channel setting does not matter. Sometimes you can set a plugin to Omni mode to achieve this. Other plugins, especially multitimbral plugins that can produce a different sound per channel, require that the Channel setting be the same as the channel used by the plugin.

CLAP instruments respond to all the streams in the track's MIDI file. However, in most cases, it will be easier to use multiple tracks (each using an instance of the CLAP instrument) instead.

MIDI 2.0 / MPE

CLAP instruments can use MIDI 2.0 protocol messages, CLAP note expressions, or MPE. CLAP note expressions support per-note Pitch Bend, Volume, Pan, Expression, Brightness, Vibrato Depth, and Aftertouch. It is up to the plugin to tell the host which protocols it supports and which one it prefers to use.

8.10 VST Instrument Plugins

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

A VST plugin will initially appear in both the 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 instrument windows have a **Channel** selector (top right). This is not only the channel used for recording, as with the built-in instruments, it is also the channel on which MIDI data is sent to the plugin. Some plugins respond to all MIDI channels in the same way, in which case the channel setting does not matter. Sometimes you can set a plugin to Omni mode to achieve this. Other plugins, especially multitimbral plugins that can produce a different sound per channel, require that the Channel setting be the same as the channel used by the plugin.

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

MIDI 2.0 / MPE

VST3 instruments that support VST3 note expression receive per-note Pitch Bend, Volume, Pan, Expression, Brightness, and Vibrato Depth. Poly Aftertouch is sent as well. VST3 instruments that don't support note expression will receive MPE just like VST2 plugins (see below).

A VST3 plugin that generates MIDI output can use note expression to send per-note controls.

VST2 instruments receive per-note pitch bend, per-note brightness, and poly aftertouch via MPE. Switching to MPE happens automatically when per-note pitch bend or per-note brightness is sent to the plugin. MPE won't be used if you set the per-note pitch bend range to zero.
Plugins may have an MPE mode setting that must be set manually.

MIDI output from a VST2 plugin is converted from MPE to MIDI 2.0. You can avoid this by setting the per-note pitch bend range to zero. In this case, MPE-to-MIDI 2.0 conversion will only take place if the plugin sends MPE configuration messages (RPN 6).

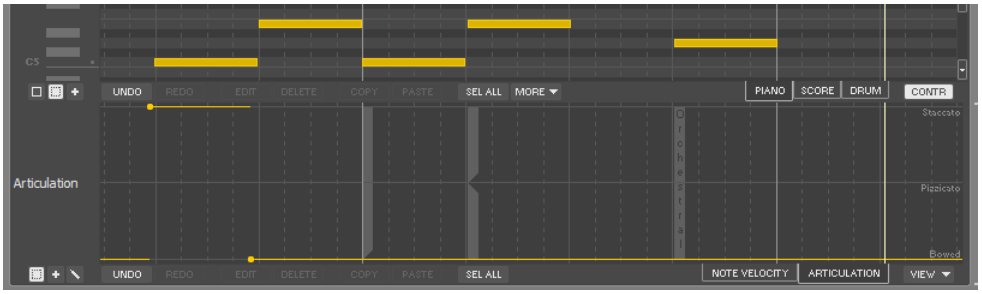
8.11 Articulations

External MIDI Instruments, AU / CLAP / VST plugins, and the Multi Instrument can be multitimbral (have multiple sounds). You can set up articulations to switch between sounds. The Articulations feature is intended for using multiple articulations of an instrument in a single track. Bowed and pizzicato violin, for example.

MultitrackStudio Articulations

There are two ways to control articulations:

1. You can use a **Controller** to switch between articulations. The track editor's controller editor can then be used to switch sounds using the "Articulation" controller. By default, controller #89 is used.
2. **Per-note articulations** can be selected in the Note Editor or the Multi Note Editor. This option uses MIDI 2.0 note attributes. Per-note articulations override the articulation controller value.



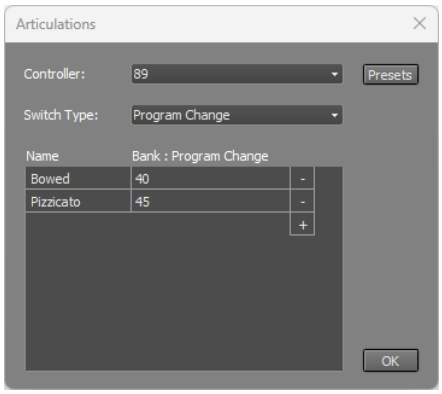
Articulation Controller Editor: notes 1 and 2 are controlled by the articulation controller, notes 3 and 4 have per-note overrides, note 5 has an Orchestral Articulation override.

The instrument window's ☰ button provides access to the Articulations feature. You can define up to 16 articulations.
Four switch types are available:

1. Program Change messages.
2. MIDI Channel.
3. Keyswitch (note messages).
4. Orchestral Articulation (see below).

The MIDI Channel and Keyswitch options aren't available for External MIDI Instruments. MIDI Channel (obviously) prevents a plugin from using MPE.

Note: MultitrackStudio Articulations only work in MultitrackStudio. If you plan to export the MIDI tracks to a .mid file, you should probably use separate tracks instead.



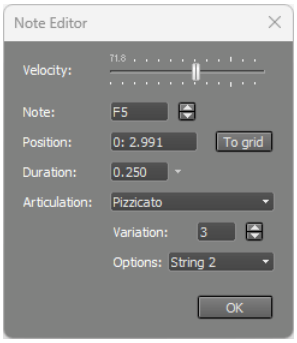
Articulations window

Under the hood
The MIDI 2.0 note-on attribute is used for the per-note articulation setting in the Note Editor / Multi Note Editor.
The note-on attribute is stored in the MIDI 1.0 file as an NRPN value.
99.99% of third-party MIDI effect plugins don't support MIDI 2.0 yet, which means the per-note articulation values will be lost if you use such a plugin in your track. MultitrackStudio tries to work around this limitation, but there may be cases where it doesn't work as expected.

Orchestral Articulations

The MIDI 2.0 Note On Orchestral Articulation profile defines a standardized articulation system, so you can swap one sample library plugin for another without breaking the articulations. .midi2 files can be used to exchange data without losing articulation information. The profile defines over 100 articulations. It uses the MIDI 2.0 note-on attribute, so the articulation is part of the MIDI note-on message.

Orchestral Articulations can be selected in the Note Editor or Multi Note Editor. Articulations and Variations can be selected. The profile allows up to 16 variations of a particular articulation. In addition, there's an Options box that provides access to playing direction, string number, and "reset round robin" options as defined by the profile.



Orchestral Articulations in Note Editor

Orchestral Articulations currently work with CLAP plugins that support the MIDI 2.0 Note On Orchestral Articulation profile. They will work automatically if the plugin supports the profile and no Program Change, MIDI Channel, or Keyswitch articulations are defined in the Articulations window.

The Orchestral Articulations can be integrated into the MultitrackStudio articulation system, similar to the other switch types (see above). Articulations and Variations can be selected in the Articulations window. In addition to the MultitrackStudio articulations, all Orchestral Articulations supported by the instrument will be available in the Note Editor or Multi Note Editor.

The profile also defines Orchestral Mute Type and Orchestral Mute Amount RPN controllers, and a Playing Position per-note controller. You can find these in a track's controller editor.

Tip: The Orchestral Mute Amount controller is an RPN. If you'd like to use a hardware knob that sends regular controller messages, you can use the MIDI Keyboard Mapper to convert the regular controller to the Orchestral Mute Amount RPN.

Playing articulations live

The MIDI Keyboard Mapper allows you to use some of your keyboard's keys for articulation switching. This feature generates per-note articulations, so they appear in the Note Editor / Multi Note Editor. Both MultitrackStudio Articulations and Orchestral Articulations are supported.

The articulation keys can be latching (an articulation is used until you press another articulation key) or non-latching (the articulation is used only while the key is held down).

You can right-click the list for options to move all keys one octave up/down, or to delete all keys.

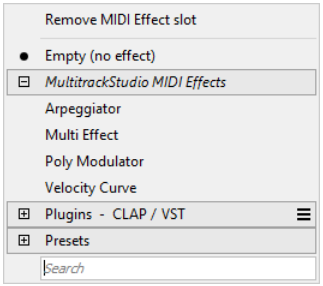
9 MIDI Effects

A MIDI effect processes MIDI messages. The following MIDI effects are available:

1. Arpeggiator.
2. Multi Effect.
3. Poly Modulator.
4. Velocity Curve.
5. AU MIDI Effect Plugins, AU plugins that can process MIDI.
6. CLAP MIDI Effect Plugins, CLAP plugins that can process MIDI.
7. VST MIDI Effect Plugins, VST plugins that can process MIDI.

MIDI effects are used in MIDI Effect Slots. To add a MIDI Effect Slot to a MIDI track, click the Instrument Slot's down arrow and choose the **Add MIDI Effect slot** option. Likewise, to remove a MIDI Effect Slot, click its down arrow and choose the **Remove MIDI Effect slot** option. A track can have only one MIDI Effect Slot. You can use a Multi Effect if you need more slots.

MIDI Effect Slot



MIDI Effect Selector

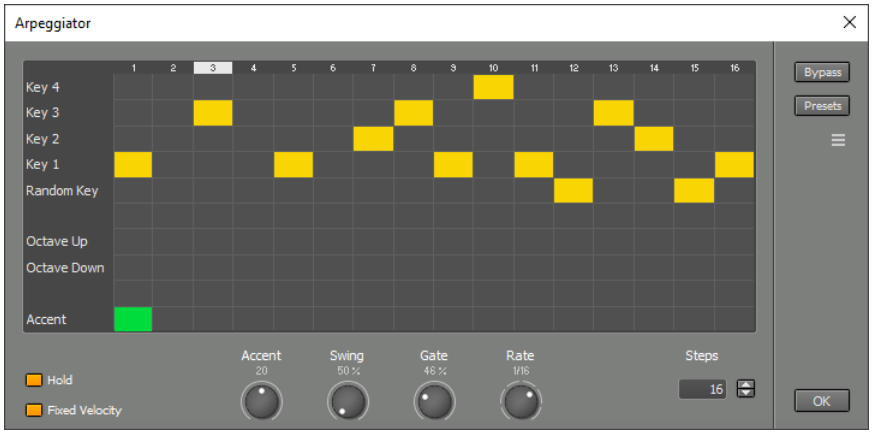
The data that appears in the track editor is sent to the MIDI effect. The MIDI effect processes the data and sends it to the MIDI instrument. A recording track records the data coming from your MIDI keyboard (i.e., the MIDI effect is not part of the recording).

A MIDI effect's options menu includes an **Apply in editor** option. This applies the effect in the track editor, and enables the effect's Bypass button.

If a MIDI track has multiple streams the MIDI effect will be applied to the first stream only.

9.1 Arpeggiator

The Arpeggiator turns a chord into an arpeggio.



Arpeggiator window

The arpeggio pattern is fully customizable:
Key 1..**Key 4** are the keys that are currently being played, with Key 1 being the lowest in pitch.
Random Key selects a random note from the currently held keys. You can choose one (or no) key for each step.
Octave Up / **Octave Down** can be checked to transpose the note.
Accent can be checked to make the note a bit louder. See the Accent knob.

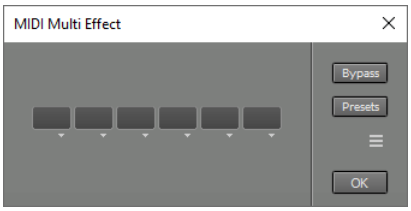
The following controls are available:

- **Steps**: The number of steps in the pattern. The maximum value is 32.
- **Rate**: The speed at which the steps are played. It can be "standard" notes like 1/16 or triplets.
- **Accent**: Sets how much velocity is added to notes with the Accent box checked.
- **Swing**: The amount by which 2nd, 4th, 6th (and so on) steps are delayed. 50% means "no swing".
- **Gate**: The (relative) note duration. Turn this down to make the notes sound more staccato.
- **Fixed Velocity**: Ignores the velocity of incoming notes and uses a fixed value (90) instead.
- **Hold**: Ignores incoming note-off messages so the arpeggio keeps playing after you release the keys. The notes will stop when you play a new chord. This feature can make using the Arpeggiator with a MIDI keyboard easier. You can press and release the sustain pedal to stop the Arpeggiator.

9.2 MIDI Multi Effect

The MIDI Multi Effect is a container for other MIDI effects. Use it if you need more than one MIDI effect slot.

When loading a MIDI Multi Effect, the effect currently in the slot is moved into the MIDI Multi Effect.

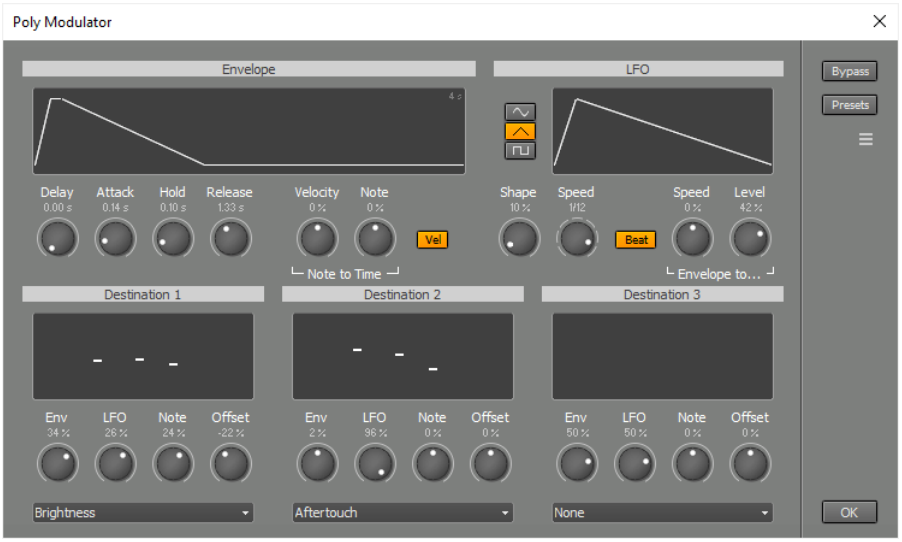


MIDI Multi Effect window

9.3 Poly Modulator

The Poly Modulator generates per-note controls using an envelope and a low-frequency oscillator (LFO). Each note has its own envelope and LFO, both of which start when the note begins.

The Poly Modulator works with instruments that support MIDI 2.0 per-note controls, CLAP/VST3 note expressions, MPE, or CLAP polyphonic modulation.



Poly Modulator window

Envelope

The envelope consists of four phases. The duration of each phase is controlled by the **Delay**, **Attack**, **Hold**, and **Release** knobs.

The **Note to Time** Velocity and Note knobs make the envelope phase durations depend on note velocity and pitch (note number), respectively.

The **Vel** button makes the envelope level depend on note velocity.

LFO

The three buttons next to the graph offer sine, triangle, or square waveforms. The **Shape** knob adjusts the waveform's symmetry. For example, it can turn a triangle wave into a sawtooth.

The **Speed** knob controls the LFO frequency. If the **Beat** button is engaged, the Speed knob offers beat-synced values instead of Hz, so the actual speed depends on the song tempo at the moment the note is played.

The **Envelope to Speed** and **Level** knobs apply the envelope to the LFO's speed and amplitude. At positive values, the envelope's Hold level is neutral, and the other phases reduce speed/amplitude. At negative values, the Delay level (and the level after the Release phase) is neutral, and the rest reduces speed/amplitude.

Destination

There are three Destination sections. Each one can send a mix of the envelope and LFO to a per-note control.

Env and **LFO** control how much of the Envelope and LFO is added to the destination control. These values can be positive or negative.

Note adds an amount to the destination control based on the note's pitch (note number). Middle C is neutral, so lower notes will have a negative value and higher notes a positive value, or vice versa. This is a static modulation and does not depend on the Envelope or LFO.

Offset adds a fixed value to the destination control.

The display shows the modulation depths for the notes currently playing. The center represents zero modulation. Higher or lower values indicate positive or negative modulation, respectively.

The knobs cannot be automated. You can use the Options menu's "Apply in editor" feature instead. Then you can edit the results using the Per-Note Controller Editors.

CLAP polyphonic modulation

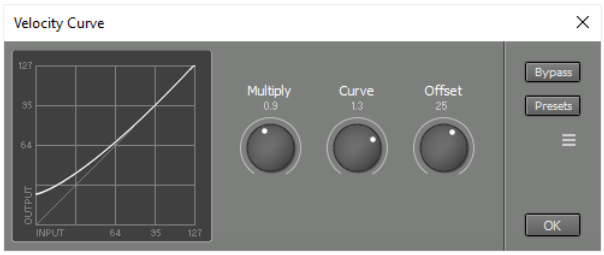
CLAP instrument plugins may have parameters that support polyphonic modulation. These parameters can be selected in the Destination boxes if the Poly Modulator is used in a track with a CLAP instrument plugin. If the Poly Modulator is placed in a Multi Effect, it must be in the last (rightmost) slot in order to use CLAP polyphonic modulation.

Note: "Apply in editor" does not work with CLAP polyphonic modulation (it can't be translated to MIDI).

9.4 Velocity Curve

The Velocity Curve effect remaps note-on velocities. You can use this to ensure the note-on velocities from your keyboard span the full 1..127 range, allowing a multi-layer piano instrument to respond correctly, for example.

Multiply multiplies the incoming velocities.
Curve adjusts the shape of the response curve in a non-linear way.
Offset shifts the curve up or down.



Velocity Curve window

The math: output = Offset + (input x Multiply) ^ (1 / Curve) for Curve = 0.5 to 2. It transitions to exponential at Curve = 0.33, and to logarithmic at Curve = 3.

9.5 AU MIDI Effect Plugins

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

An AU MIDI Effect is an AU Plugin that can process MIDI messages. You can select an AU MIDI Effect by clicking the MIDI effect slot's down arrow. The AU MIDI Effect plugins appear in the list's Plugins section.

Note: The "Apply in editor" option relies on plugins being able to save and restore settings, so it won't work with demo versions that can't do this.

MIDI 2.0 / MPE

Starting with macOS 12, AU plugins that support the MIDI 2.0 protocol will receive MIDI 2.0. AU MIDI effects do not receive per-note controls otherwise.
MIDI output from plugins is converted from MPE to MIDI 2.0. You can avoid this by setting the per-note pitch bend range to zero. In this case, MPE to MIDI 2.0 conversion will only occur if the plugin sends MPE configuration messages (RPN 6).

9.6 CLAP MIDI Effect Plugins

A CLAP MIDI Effect is a CLAP Plugin that can process MIDI messages. You can select a CLAP MIDI Effect by clicking the MIDI effect slot's down arrow. The CLAP MIDI Effect plugins appear in the list's Plugins section.

Note: the "Apply in editor" option relies on plugins being able to save and restore settings, so it won't work with demo versions that can't do this.

MIDI 2.0 / MPE

Per-note controls can be sent to the plugin as MIDI 2.0 or as CLAP note expressions. It is up to the plugin to tell the host which protocols it supports and which one it prefers to use. Plugin output can be MIDI 2.0, CLAP note expressions, or MPE.

9.7 VST MIDI Effect Plugins

A VST MIDI Effect is a VST Plugin that can process MIDI messages. You can select a VST MIDI Effect by clicking the MIDI effect slot's down arrow. The VST MIDI Effect plugins appear in the list's Plugins section.

Note: The "Apply in editor" option relies on plugins being able to save and restore settings, so it won't work with demo versions that can't do this.

MIDI 2.0 / MPE

VST3 MIDI effects can receive and send per-note Pitch Bend, Volume, Pan, Expression, Brightness, and Vibrato Depth. Poly Aftertouch is supported as well.

VST2 MIDI effects do not receive per-note controls. MIDI output from VST2 plugins is converted from MPE to MIDI 2.0. You can avoid this by setting the per-note pitch bend range to zero. In this case, MPE to MIDI 2.0 conversion will only take place if the plugin sends MPE configuration messages (RPN 6).

10 Automation

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

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

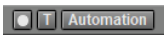
You can add automation by recording knob movements while the transport is running, or by using the automation editor.

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 adjusted using the mouse. This will move the entire automation curve, as it appears in the Automation Editor, up or down.

Automated fader and rotary knob (note the blue squares)

Recording fader/knob movements

Fader and roraty knob movements can be recorded while the transport is running. The **Automation Recording** button (near the bottom right corner of the main window) must be engaged for this. By default, the control won't return to its previous value until the transport stops ("latch mode"). The control will revert to the previous value immediately upon releasing the mouse button if the **Automation Touch Mode** button is engaged.

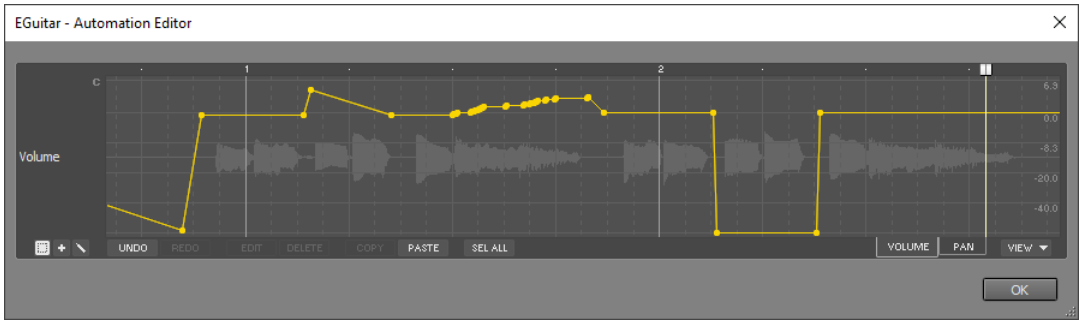


Automation Recording and Automation Touch Mode buttons

Note: automation recording is not available while the transport is cycling.

Using the Automation Editor

There are three ways to open the Automation Editor for a control:



Automation Editor

1. Right-click the control and choose "Show Automation Editor" from the menu.
2. Engage the **Automation** button in the bottom right corner of the main window, then click the control.
3. Click the control while pressing the "A" key.

The Automation Editor works just like an Automated Fader effect. 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 is available as well, it uses the parameter values at the needle position and does not include any effects.

The **VIEW** button can be used to add tabs for other automatable parameters of the mixer section or effect. You can switch between parameters easily using the tabs.

Tip: type "used" in the VIEW menu search box to show only the automated parameters. Type "checked" to show items that have a check mark and hence appear as a tab.

10.1 Mixer Automation

A mixer section's Volume fader, Pan knob, and Effect Send knobs can be automated.

Note: Automation doesn't work for a MIDI track using an External MIDI Instrument while the track is recording.

10.2 Effect Automation

The rotary knobs of all audio effects can be automated.

The Band Effect, the Convolutor's Delay knob, and the Guitar Amp's Mic Center/Edg and Output knobs cannot be automated. The Compressor's Auto button has no effect if the Threshold, Ratio, or Gain knobs are automated.

'Delay'-type knobs may cause glitches while being adjusted. It's best to move these knobs during a quiet section. This applies to the following knobs:

- Chorus, Doubler, Echo, Flanger: Delay.
- Master Limiter: Ahead.
- Reverb: Pre Delay.
- Stereo Imager: Color (Comb mode only)
- Vibrato: all.
- Phaser: Notches (not a "delay-type knob", but it can also cause glitches)

Plugins

Plugins can be automated too. CLAP/VST3 plugin controls may offer a "Show automation editor" option in their right-click menu if the plugin supports it. If not, you can right click the right hand side of the effect window (the area where the Bypass button is), and select "Show automation editor" from the menu that appears.

Tip: click a control before opening the automation editor. The editor will then display that parameter.

Knob movements can be recorded while the transport is running, just like MultitrackStudio's own faders and rotary knobs.

A multiple output plugin's output mixer can also be automated.

11 Editing

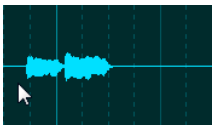
Each track has an editor that can be opened using the Edit button located on the right hand side of the track. The Tempo Editor affects the tempo of MIDI tracks, and optionally audio tracks as well. The Song Editor can remove or insert parts and affects "everything" (tracks, automation, markers, etc.).

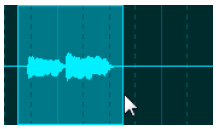
Time Bar

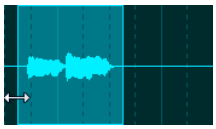
All editors feature a "needle" which indicates the current transport position (its position matches the transport's position counter). The thumb at the top of the needle can be moved using the mouse. At the top of every editor is a Time Bar that shows either seconds or bars (this can be changed in the Editing Options section). Clicking this bar will move the needle to the corresponding position, and the transport's position counter will be updated accordingly. You can also grab the time bar itself 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 time bar starts the transport, clicking stops it.

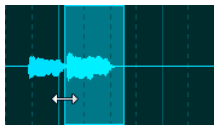
Selecting a part

A part can be selected by left clicking the editor and dragging the mouse while holding the 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 edge.


Selecting, before

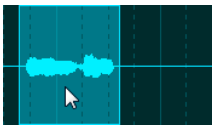

Selecting, after

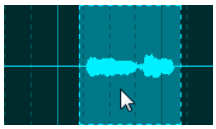

Resize, before

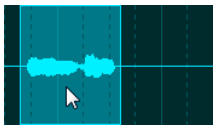

Resize, after

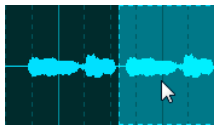
Moving or copying a part

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


Move, before

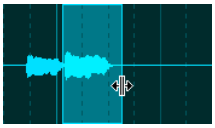

Move, after

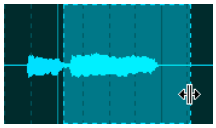

Copy, before

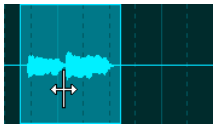

Copy, after

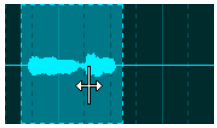
Stretching or Time Warping a part

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


Stretch, before


Stretch, after


Time Warp, before


Time Warp, after

Tweakable Edits

MultitrackStudio features "tweakable edits", which means that after performing an edit (for example, pasting some audio), you can tweak the edit (e.g., adjust the position and length of the pasted part, adjust volume, or even add effects). Every time you make an adjustment, the initial edit is completely redone, ensuring optimal sound quality. 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**: Undoes the last edit.
- **REDO**: Redoes an edit that was previously undone.
- **DELETE**: Deletes the selected part.
- **COPY**: Copies the selected part to the clipboard.
- **PASTE**: Pastes from the clipboard into the editor. The data on the clipboard will be placed at the current transport position (where the needle is).
- **SEL ALL**: Selects all.

In addition, the MORE button offers:

- **Cut**: Copies the selected part to the clipboard and then deletes it.
- **Repeat**: Repeats the selected part a specified 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**: Selects the part to the left.
- **Select Right**: Selects the part to the right.

Editing Options

The editing options area at the top of the main window contains several editing-related options:

Editing options

- **Time Sig** (*) : Changes the time signature or tempo for the entire song. Right clicking opens the Tempo / Time Signature Editor.
- **BPM** (*) : Changes the tempo for the entire song. If the tempo varies throughout the song, the different tempo values will be adjusted proportionally. Right clicking opens the Tempo / Time Signature Editor. The down arrow next to the Tempo box offers 3 options:
  - **Tempo / Time Signature Editor**: Open this editor.
  - **Tap Tempo**: Tap a new tempo using the space bar.
- **Song Editor**: Opens the Song Editor.
- **Ripple**: When enabled, pasted or drag-and-dropped parts will be inserted (the right-hand part will be moved to the right). Deleting won't leave a gap (the right-hand part will be moved to the left). Ripple mode is usually disabled to keep tracks aligned.
- **Snap**: Snaps the start and end points of selected parts to the grid. All subsequent mouse movements will also snap to the grid. Use Zoom In/Out to change the grid resolution. If the grid is set to bars, you can click the Editor Grid box at the bottom of the main window to override the automatic settings. Options include swing and custom tuplets.
- **Bars** (*) : Shows grid in bars. Also, MIDI paste and drag operations will be done in beats instead of seconds (e.g., the part will be sped up if you move it to a faster part of the song).
- **Follow**: Makes editors follow the transport position. You can disable this if you want to make edits while the transport is running, so the editor won't scroll to a new page unexpectedly. If Follow is off, the Page Up/Down and Left/Right arrow keys control the editors instead of the transport position.
- **Zoom In/Out**: Changes the horizontal scale of the editors (all editors use the same time scale). The current scale is shown on the bottom bar. Scale 1:1 means one screen pixel equals one audio sample. Zooming out fits more samples into each pixel.
- **Editing Options menu**: Provides access to various editors. If the main window is small, some items from the editing options area may appear in this menu.

(*) These options are available only if there is at least one MIDI track.

11.1 Editing Tracks

Each track has an editor that can be opened using the Edit button located on the right-hand side of the track. In MIDI track, you can edit individual notes in the Pianoroll, Score, or Drum editors (see Editing Notes). The Controller Editor can be used to edit MIDI controllers such as Volume or Sustain.

Common track editor buttons

Track editors feature the following buttons:

- **UNDO**: Undoes the last edit.
- **REDO**: Redoes an edit that was previously undone.
- **EDIT**: Opens an Edit Control window. This window allows you to apply volume changes, fades, etc., to the selected part. Edit Controls may offer different features depending on the editor.
- **DELETE**: Deletes the selected part.
- **COPY**: Copies the selected part to the clipboard.
- **PASTE**: Pastes from the clipboard into the editor. The clipboard data is placed at the current transport position (i.e., where the needle is).
- **SEL ALL**: Selects the entire track.

The MORE button offers:

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

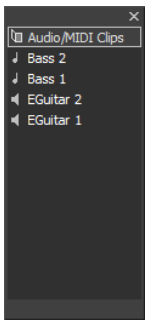
Moving audio or MIDI between tracks.

You can copy data 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 needed. MIDI is also converted to audio and vice versa automatically.
MIDI to audio conversion uses a software instrument. This instrument appears in the Edit Control window of the receiving track.
Audio to MIDI conversion works only with monophonic audio (monophonic means only one note plays at a time). The accuracy of note recognition depends on the audio signal. Some manual editing is usually necessary to correct errors.

Audio/MIDI Clips

Clips (pieces of audio or MIDI) can be stored on the Clip Shelf. The Clip Shelf appears when you click the Studio menu's Show Clip Shelf option.

You can drag audio or MIDI clips 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 main window.



Clip Shelf

Dropping audio/MIDI files on track editors

Audio and MIDI files can be dragged from File Explorer (Windows) / Finder (Mac) to a track editor. Some plugins also allow you to drag audio or MIDI from their user interface into a track editor. The sample rate of audio files will be converted to match the song's sample rate if needed. "ACIDized" WAV files will be adjusted to match the song's tempo.

Scrubbing

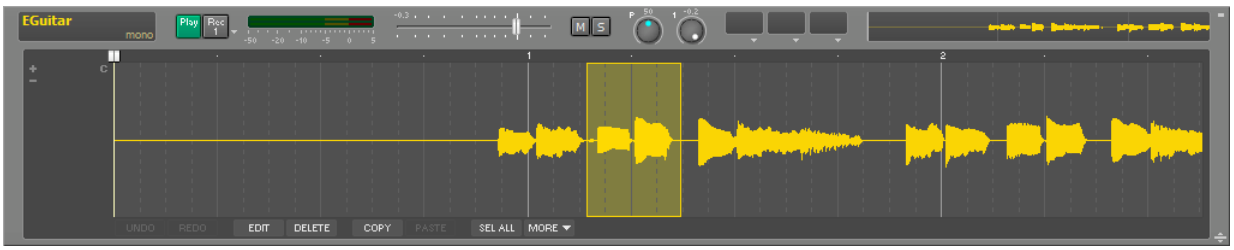
Track editors include a built-in "scrubber", allowing you to hear the part being selected. This helps you find the desired location, in addition to the visual clues in the editor. With tape recorders, this was done by moving the reels manually ("reel rocking"). Now it's done by moving the mouse. The scrubber is active when moving the needle, selecting a new part, or resizing an existing selection.

With audio tracks, the speed and pitch of the scrubbing sound depend on the mouse movements. Spectral filtering is applied to prevent damage to speakers or ears from excessive high or sub-low frequencies.

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

11.2 Editing Audio Tracks

The track editor is displayed by clicking on the Editor Preview pane (depending on your preferences, there may also be an Edit button here). The editor displays a graphical representation of the audio signal. You can select a part using the mouse (press the left button and drag).



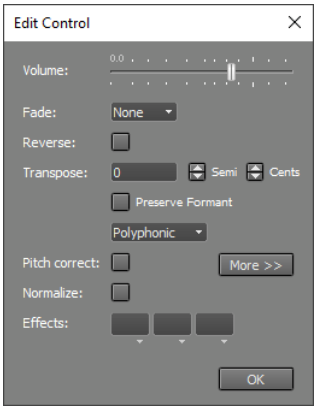
Audio track (mono) with editor

The two channels of a stereo track are 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).

Crossfades are applied automatically to prevent clicks. These crossfades are similar to traditional tape splices.

Audio Edit Control



Audio Edit Control window

The Audio Edit Control, invoked by clicking the **EDIT** button below the editor, lets you manipulate the selected part in various ways.

Audio Edit Controls offer the following features:

- **Volume** fader: Changes the volume of the selected part. Note: It is often better to use an Automated Fader effect to adjust volume levels, as this leaves the audio file unaltered.
- **Fade**: Applies a fade-in or fade-out to the selected part.
- **Reverse**: Reverses the selected part.
- **Transpose**: Pitch-shifts the audio signal by the specified number of semitones and cents. This feature is powered by Zynaptiq's ZTX technology.
  Two algorithms are available: **Monophonic** and **Polyphonic**. If the audio track is monophonic (this means only one note plays at a time), you can switch to Monophonic mode, which is faster and offers better sound quality. The selected algorithm is also used for time warping and stretching.
  Preserve Formant corrects the formant to make the transposed signal sound like the original (i.e., to avoid the "chipmunk" effect).
- **Pitch Correction**: See Vocal Pitch Correction.
- **Normalize**: Makes the selected part as loud as possible.
  Note: Normalizing introduces rounding errors, which can compromise sound quality, especially with 16-bit files. To make the final mix as loud as possible, use the Master Limiter effect instead.
- **Effects**: The effect slots can contain audio effects.

These effect slots support ARA 2: AU / CLAP / VST3 plugins that support ARA 2 can be used here without recording audio in realtime in the plugin.

You can use these slots to apply effects that are in the track itself:

1. Click SEL ALL in the track editor.
2. Click EDIT to open the Audio Edit Control.
3. Drag the effect(s) from the track slots to the Audio Edit Control slots.
4. If needed, check for clipping. If clipping occurs, reduce the Audio Edit Control's volume slider.

Deleting Audio - Tips

You can delete a part of an audio track using the track editor's DELETE button. However, it can be more convenient to take advantage of the Tweakable Edit feature: select the part you want to delete, click the EDIT button, and drag the Volume fader all the way to the left. The part is now effectively deleted, and you can fine-tune the edit by resizing the selection.

In critical cases where deleting results in audible silence, you can paste a recording of "studio silence" instead.

Tip: Don't edit the life out of your tracks. Sounds like breathing in vocals, a singer's movement, or guitar noises add liveliness to the song. Things you hear in a soloed track may well go unnoticed in the full mix, and don't need to be removed.

Sometimes you might want to truncate a file destructively (e.g., a master file that s slightly too long), rather than turning it into a .aem file. Right click the audio track's editor and choose "Truncate File" to truncate the file at the mouse position. This option isn't available for .aem files. Note that this is a destructive operation and cannot be undone. If you're unsure, use the track editor's Export function instead.

Moving Audio by a Small Amount - Tip

For best results, press the Ctrl key (Windows) / Option key (Mac) while dragging audio by a small amount.
Here's an example:
Suppose a word in a vocal track is slightly early. You can select the word, including some surrounding "studio silence", and drag it to the right. A piece of absolute silence will now appear on the left side of the selection because the original part is removed. You can get better results by pressing the Ctrl key (Windows) / Option key (Mac) while dragging. This copies the selection instead of moving it, leaving the original part in place. As a result, the background noise before the word is repeated, this is usually less noticeable than silence.

Under the hood
Audio editing is always non-destructive. This means the file containing the original recording remains unchanged. When an audio file is edited for the first time, a .aem file is created. This file references the original audio file and can reference one or more edit files as well. An edit file replaces 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 is created. A file called "Guitar - Edit123456.wav" is created (this file contains audio data). Guitar.aem contains information about which files to play and when.

You can view the files referenced by a .aem file in a track's Properties window.

Note: Do not delete edit files manually, as this may result in lost edits or punch-in recordings. Use the Clean up Song Folder tool instead.

11.3 Vocal Pitch Correction

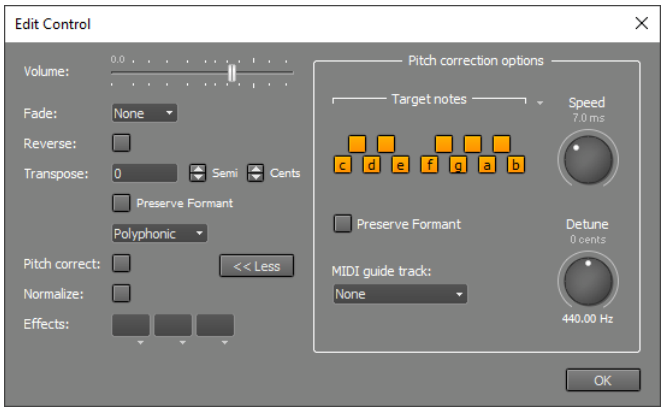
The audio track editors feature vocal pitch correction powered by Zynaptiq's ZTX technology. While it's easy to use the Vocal Tuner effect, using the editor options can be a better choice in some situations:

- You want to fix only a few specific issues.
- The vocal track is stereo (the Vocal Tuner is a mono effect).
- You want to use a MIDI guide track (see below).

Basic pitch correction

Pitch correction is very easy if the vocal track is just slightly out of tune:

1. Select the part you want to process in the track's editor.
2. Click the editor's EDIT button to open the Audio Edit Control.
3. Click the Pitch Correction button.



Audio Edit Control, Pitch Correction options opened

The **More** button reveals additional pitch correction controls. **Speed** adjusts how quickly the pitch is corrected. If it's set high, the result will sound synthetic (the "Cher effect"). If it's too low, the beginning of a note may not be fully corrected. **Detune** can be used if the song isn't in concert pitch.

Excluding notes

If the vocal track has serious pitch problems, basic pitch correction may produce the wrong notes. This happens when a note is so off-pitch that it's closer to a wrong note than the intended one. You can exclude incorrect notes as follows:

1. In the Audio Edit Control, click the More button to reveal the "Pitch correction options".
2. In the **Target notes** section, turn off notes that aren't part of the intended vocal part. Only the selected (on) notes will be considered for pitch correction. Clicking the down arrow opens a menu with presets such as major and minor scales.

Changing the melody

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

1. Add a MIDI track using the "Add Track" menu.
2. Open both the MIDI track's editor and the vocal track's editor.
3. In the vocal track editor, select the desired section, 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.

If you're not satisfied with the results, you can edit the MIDI track. Then go back to the Audio Edit Control, your changes will be applied automatically.

Note: The "Target Notes" section can still be used with a MIDI guide track, but it only applies to parts where no MIDI notes are playing.

Preserve Formant can produce a better sound if the pitch changes significantly.

11.4 Editing MIDI Tracks

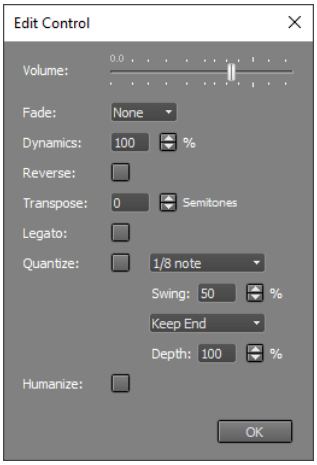
The track editor is displayed by clicking on the Editor Preview pane (depending on your preferences, there may also be an Edit button here). The editor can display MIDI notes in three different ways: Pianoroll, Score, and Drum. The tabs on the right (PIANO/SCORE/DRUM) can be used to switch between these editors. The default editor is Pianoroll, this can be changed in the Preferences window.

All three editors allow you to edit MIDI as if it were audio, as well as to edit the MIDI notes themselves. This section covers 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 Edit Control



MIDI Edit Control window

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 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**: Transposes all notes in the selected part by a number of semitones.
- **Legato**: Adjusts note durations 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 grid positions are moved closer to them. You can use this feature to improve the timing of a poorly timed performance.
  Note: a good musical performance becomes worse if you quantize it.
  The upper box sets the resolution. Various options are available:
  - Normal note: 1/1, 1/2, 1/4, 1/8, 1/16, or 1/32 note. A **Swing** option is available for normal notes.
  - Triplets of 1/2, 1/4, 1/8, or 1/16 notes.
  - You can type a custom value like "5 in 1/4". This example would be a quintuplet of 16th notes.

  The amount of correction (**Depth**) can range from 5% to 100% ('hard quantizing'). It is recommended to use a value lower than 100% to retain some of the live feel.
  Four types of quantization are available:
  - **Start and End**: Quantizes both note-on and note-off.
  - **Keep End**: Quantizes note-on, does not adjust note-off. This is the default type.
  - **Keep Duration**: Quantizes note-on, moves note-off to preserve the original duration.
  - **Duration only**: Quantizes the duration only, the note may not start on a grid position.
- **Humanize**: Shifts notes by a (small) random amount of time and slightly alters the note velocities.

11.5 Editing Notes

The Pianoroll, Score and Drum editors can not only select parts of a track (like an audio editor), they can also select or add notes. You can use this to correct mistakes or 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, i.e., 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 modes. 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, and in Add Notes mode you can lasso notes using this key.

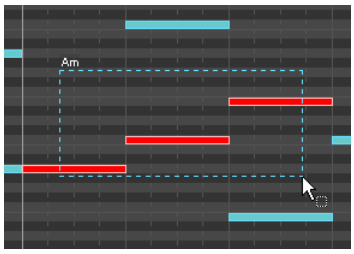
Mode buttons

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 holding the Ctrl key (Windows) / Command key (Mac) while clicking notes. In Select Notes mode, you can also lasso a rectangular region. Selected notes appear in red.



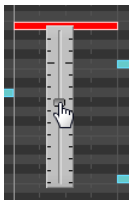
Lasso in action

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 editor. Notes that are being added, dragged or selected are audible.

Changing Note Velocity

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

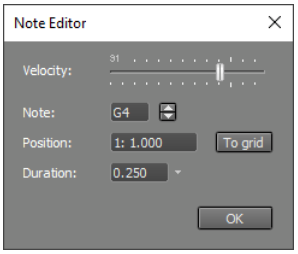


Note Velocity

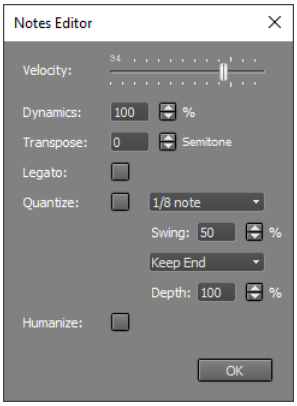
Note Editor

If a single note is selected, 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 (i.e., 0.25 is a quarter note). Values like "1/4" can be typed in the Duration box as well. The down arrow 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

Right click menus

Right clicking (Windows) / Ctrl-clicking (Mac) a note pops up a menu offering various edit options. Doing the same in "empty space" pops up a menu to add notes or tuplets, among other things.

11.6 Pianoroll Editor

Pianoroll editor

In Add Notes mode, notes can be drawn by moving the mouse horizontally while holding down the left mouse button. Clicking without dragging adds a note with the same duration as the previous one.

Notes can be dragged or resized using the mouse in both Select Notes and Add Notes mode.

Right clicking a note opens a menu that allows you to (among other things) split the note or join it with the previous note.

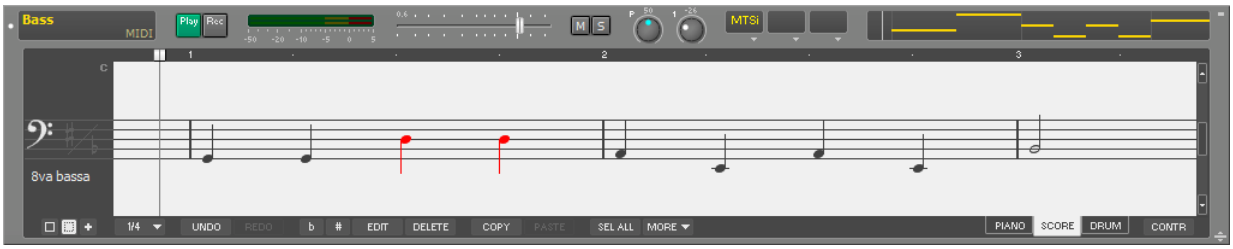
The name of the chord formed by the selected notes will be displayed in the editor while selecting.

Step Recording

The Pianoroll editor supports step recording. This works with the vertically oriented piano on the left:

- If you click while holding the Ctrl key (Windows) / Command key (Mac), the corresponding note will be recorded at the current transport position. The transport position will then move to the end of the new note. The duration of the new note equals one step of the current grid.
- If you also hold the Alt key (Windows) / Option key (Mac) the position moves one step to the left before adding the note, which is useful for placing multiple notes at the same position.
- Clicking while holding the Shift key adds a rest (i.e. moves the transport position forward). Here, too, you can add the Alt key (Windows) / Option key (Mac) to move one step to the left instead.

11.7 Score Editor



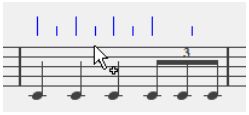
Score editor

The Score Editor has a resolution of 1/32nd note. It snaps to the grid automatically, regardless of the Snap setting. Although it is possible to use the Score Editor when the time scale is set to seconds, this obviously does not make sense.

In order to improve readability, notes will be moved horizontally so that they are spaced nicely without any overlaps. This means that, unlike all other MultitrackStudio editors, the notes do not necessarily line up visually with other tracks. The bar lines, however, always do.

Adding Notes

In Add Notes mode, notes can be added by left-clicking the mouse. The dropdown list next to the Add Notes mode button determines the duration of the notes being added. Holding down the S or F key while clicking the mouse adds or subtracts a semitone ("Sharp" or "Flat"), allowing you to add notes that are not in the current scale directly. 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 to place short notes (16th, 32nd) exactly where you want them.



Helper grid

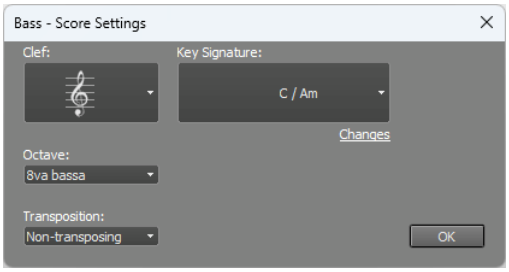
The **b** and # buttons can be used to transpose the selected notes one semitone down or up. Right clicking a note pops up a menu that allows you to (among other things) join the note with the previous note.

Tuplets

Triplets, quintuplets, and septuplets are recognized automatically. Tuplets can be added by right clicking the editor and selecting one from the Add Tuplet section of the menu. Alternatively, you can add a note and use the "MORE" button's "Split in equal parts" option.

Clef and Key Signature

The section on the left shows the clef and the key signature. Clicking this section opens the editor's Score Settings window. In this window, you can choose the **clef**. Possible values are Bass, Treble, both Bass and Treble, Tenor, or Alto. The **Octave** setting can be used for instruments that are notated one octave off. 8va bassa is suitable for bass guitar and double bass, for example. The **Transposition** settings can be used for transposing instruments like Bb clarinets.

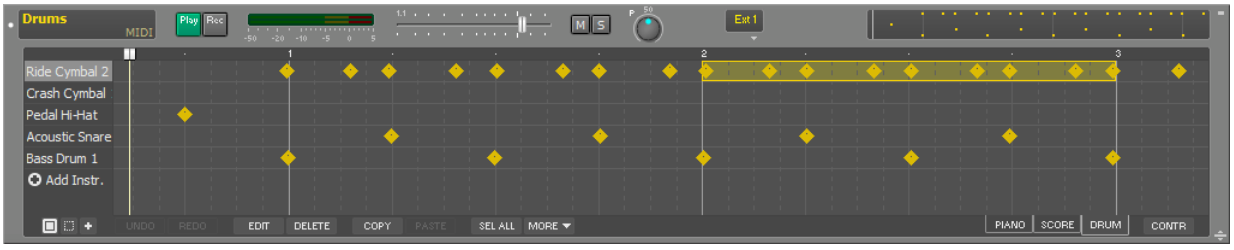


Score Settings

When both Bass and Treble staves are used, the **Split Note** setting determines which notes appear on either the Bass or the Treble staff. The Octave and Transposition settings are not available in this case.

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

11.8 Drum Editor



Drum editor

The Drum Editor features a horizontal strip called a Drum Instrument Editor for each instrument used. Every instrument corresponds to a MIDI note (e.g., C3 is a bass drum, E3 is a snare, and B4 is a hihat in General MIDI). The drum instrument's name is shown on the left hand side of the Drum Instrument Editor. The note corresponding to the instrument will be shown if no name is available.

A different instrument can be selected by double clicking the name. New instruments can be added by clicking **Add Instr**. You can change the order of the instruments by dragging the instrument names (on the left) up or down.

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

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 where it started, only that instrument is selected. If it ends on a different one, all instruments are selected. The **SEL 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 drag-and-dropped from an audio track editor to a drum instrument editor, only beats are detected (no pitch). You can, for example, tap a drum break on the table, record it as audio, and move it to a drum editor.

Selecting similar notes

A menu appears if you right click 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 (e.g., at beat 1). "Similar bar" means a bar with the same time signature. You can use this feature to, for example, select all hi-hat hits that 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 right click a note and use "Select similar notes" to select a particular note within the choruses.

11.9 Controller Editor

MIDI instruments can use controller messages to alter the sound they generate. A track editor's **CONTR** button opens/closes the Controller Editor. The editors appear in tabs, which can be added or removed using the **VIEW** button. The All submenu lists all controllers except for the per-note controllers, which have their own submenu. The VIEW menu itself lists all controllers that are supported by the MIDI instrument. This isn't possible for External MIDI Instruments and plugins, for those a few commonly used controllers appear instead.

Tip: type "used" in the All or Per Note submenu search box to see only the controllers that appear in the track. Type "checked" to see the items that have a check mark and hence appear as a tab.

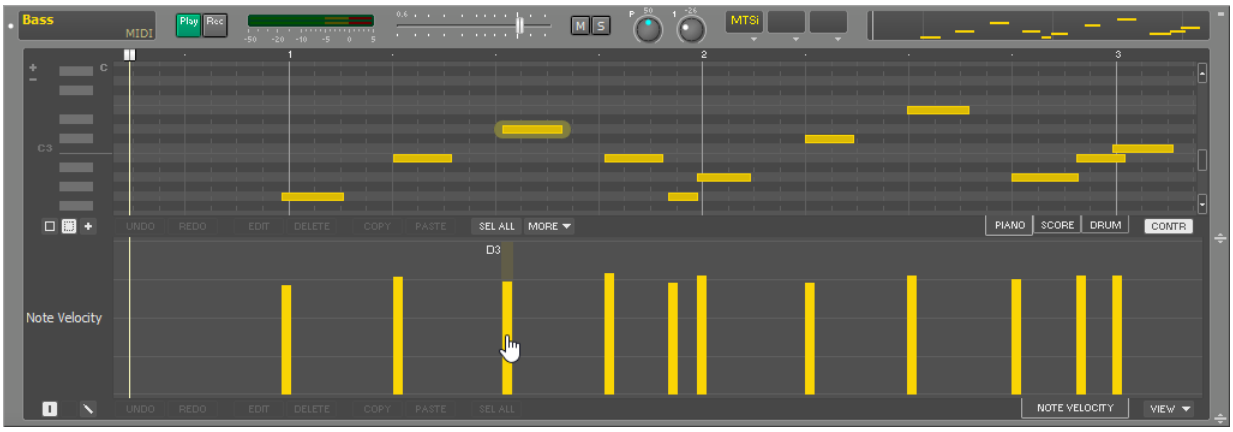
Note: the controller editor's UNDO/REDO buttons do exactly the same as the main editor's, i.e., both work on both note and controller edits.

Note Velocity Editor

The editor that appears by default 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 provide two modes:

1. Bar mode: move a bar up or down. The Shift key can be used to edit the decimal part.
2. Draw mode: draw a curve to which the bars will be adjusted.



Note Velocity Editor

A similar "Note Off Velocity" editor is available as well.

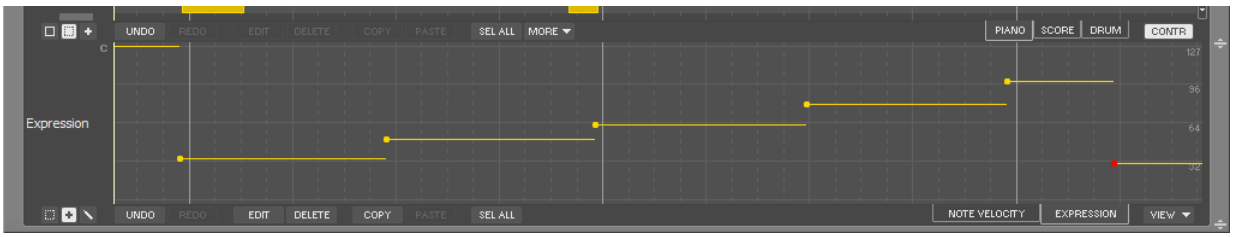
Tip: with the Drum editor, you can make just a single instrument appear in the note velocity editor by clicking an instrument name on the left (so it's highlighted).

Controller Editors

All controller editors use dots to represent the controller value. They work just like the Automated Fader effect.

The VIEW menu lists pitch bend, aftertouch, and all MIDI controllers except for the data entry and RPN controllers (#5, #38, and #96...101).

Tip: in MultitrackStudio Instruments and External MIDI Instrument windows, you can right-click a control to click "Show MIDI controller editor" and make the corresponding editor visible.



Controller Editor

Editors are available for NRPN parameters too.

Pitch Bend Range

The Pitch Bend editor features a small button labeled **RNG=..** in the bottom-left corner (see picture below). You can click it to change the pitch bend range. Valid values are 0..96 semitones (though most synths support values up to 24 semitones only). "0" prevents MultitrackStudio from sending pitch bend range messages, use this if those messages interfere with a plugin's MIDI implementation.
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 message appears.

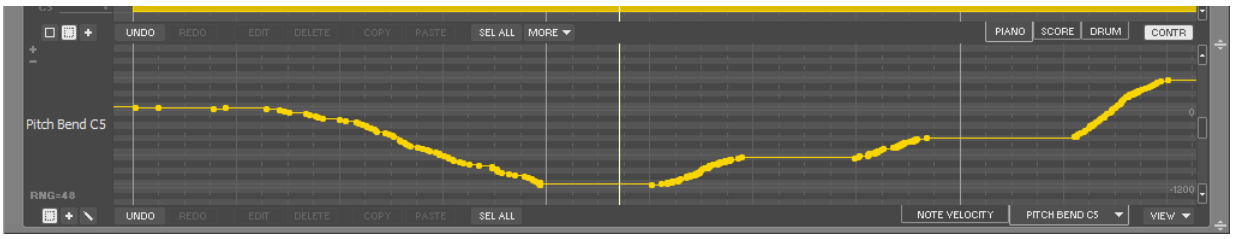
Note: External MIDI Instruments and instrument plugins may not support changing the pitch bend range.

Tip: A range of "0" prevents MultitrackStudio from sending pitch bend range messages. You can use this if such messages conflict with a plugin's MIDI implementation. It is an RPN value: in MIDI 1.0, controllers #6, #38, #100, and #101 are sent for this purpose.

Per-Note Controller Editors

The VIEW menu's "Per Note" section lists MIDI 1.0 poly aftertouch and MIDI 2.0 per-note pitch bend and registered per-note controllers. All MIDI 2.0 registered per-note controllers are available, except for #3 (absolute pitch).

The picture below shows per-note pitch bend for note C5. The visible note changes automatically when a note is selected: if you click a D4 note in the pianoroll, the per-note controller editor switches to D4, for example. Alternatively, you can click the down arrow on the tab below the editor and pick a note from the list.



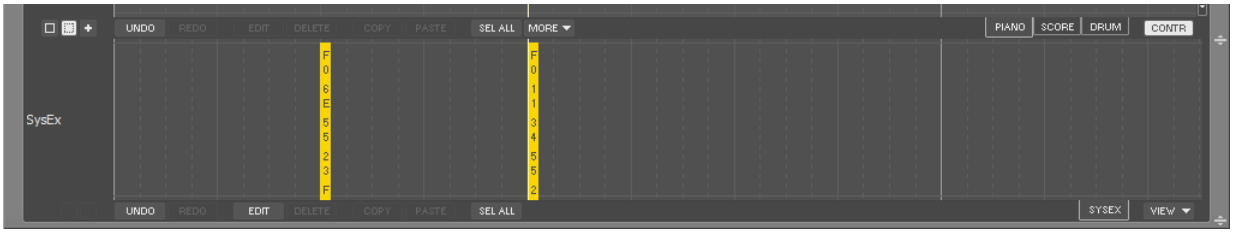
Per-note Pitch Bend Editor

The per-note pitch bend editor has a pitch bend range setting, just like the channel pitch bend editor. This value is the same for all notes. It defaults to 48 semitones, which is the default value MPE uses.

Per-note controllers are updated automatically: whenever notes are moved, deleted, etc., the associated per-note controllers are updated.

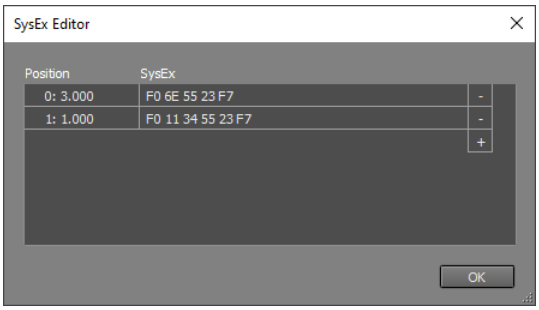
SysEx Editor

SysEx (System Exclusive) messages appear in the SysEx editor.



SysEx Editor

The EDIT button pops up a list of all SysEx messages. You can modify them or add new ones. SysEx messages always start with F0 and end with F7.
You can right click a SysEx or the "+" sign to load or create presets.



SysEx editor window

Note: SysEx messages aren't tied to a MIDI channel. If a certain SysEx does contain a channel field, you have to update it manually if you change the track's MIDI channel in the MIDI Instrument window.

Tip: make sure messages like "XG On" are at position 0 (the first beat of the first bar). This allows Export MIDI Tracks to put it before any other messages.

Tip: you can drop .syx files on the SysEx editor.

The SysEx editor also supports "Sequencer Specific" meta messages. These messages start with FF7F. They'll be saved in (exported) MIDI files. They won't be sent to MIDI instruments (the MIDI specs don't allow for this).

11.10 MIDI Pattern Editing

A pattern is a small piece of MIDI music. It typically has a size that makes sense in musical terms (e.g., a bar, two bars, or even a verse).

A plain MIDI track editor's MORE menu has an Enable Patterns option which turns the track into a pattern track. Alternatively, you can use the Add Track menu's Add MIDI Track option to create a new pattern-enabled MIDI track (make sure to set the Type box to ".mpt").

A pattern-enabled MIDI track features a Pattern Bar above the track's MIDI editor. Here you can add and move patterns.

Drum track with patterns

An important feature of the MultitrackStudio pattern concept is that there can be multiple instances of a pattern, and changing the pattern will update all instances. For example, you can change a pattern-based track's drum beat by modifying just a few notes.

Another important feature is that notes belonging to a pattern can be edited directly in the track editor. These adjustments are remembered and reapplied if the pattern itself is later modified in the Pattern Editor. The changes are added to the note’s position, duration, pitch, and velocity.

Adding Patterns

To create a new pattern, click the PATTERN button and choose New Pattern. If something is selected in the track editor, the new pattern will match this area, and any selected notes will be moved to the new pattern. If nothing is selected, a new pattern will be created at the current transport position.

The PATTERN button also provides access to preset patterns. Clicking one adds it at the current transport position. Alternatively, you can drag and drop presets to the Pattern Bar. You can create your own preset patterns using the Pattern Editor.

Tip: You can create a new pattern by dropping MIDI or audio onto the Pattern Bar.

Editing the pattern arrangement

All editor buttons (EDIT, DELETE, COPY, PASTE, etc.) work as expected when one or more patterns are selected in the Pattern Bar. You can select a single pattern by clicking it. Additional patterns can be selected by clicking while pressing the Ctrl key (Windows) / Command key (Mac) key.

A new instance of the selected pattern(s) can be created in three ways:

- Drag the pattern while keeping the Ctrl key (Windows) / Option key (Mac) down to copy the pattern.
- Use copy and paste.
- Use the Repeat option.

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 moved or deleted. Editing individual notes is also possible.

Pattern Editor

The Pattern Editor can be used to edit a pattern. When a pattern is selected, the EDIT button will invoke the Pattern Editor. Alternatively, you can double-click a pattern.

Pattern Editor (showing a one-bar drum pattern)

Any edits will be applied to the track immediately. You can use the **Play** button to loop the pattern so you can hear the results of your edits live.

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

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

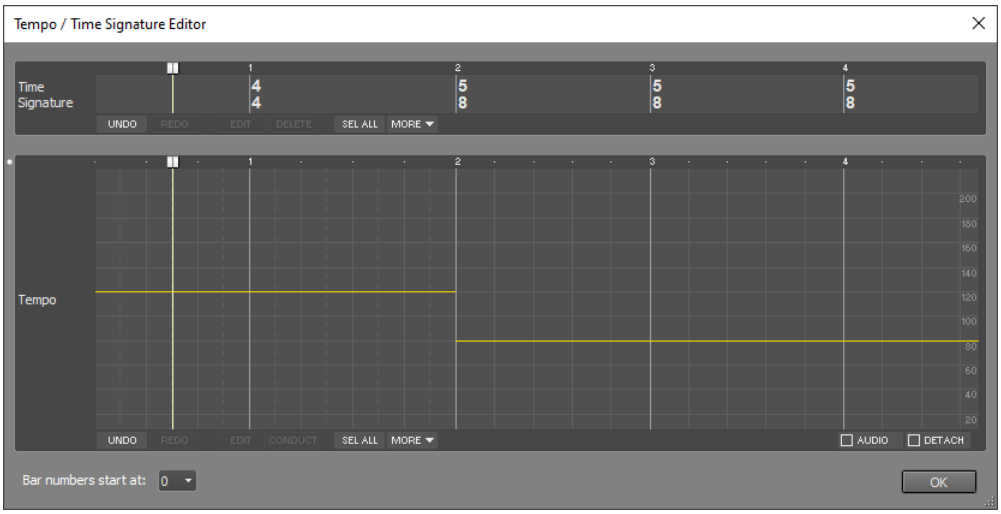
The **Options** button will bring up a menu with these items:

- **Color**: The color of this pattern (applies to all instances).
- **Clone**: Create a new pattern that is identical to this one. All other instances of the original pattern will remain untouched if you edit this one.
- **Remove changes to this instance**: Clears all changes that have been made to this instance's events using the track editor.
- **Import**: Import a pattern from a MIDI file.
- **Export**: Export the pattern to a MIDI file.

Instance 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.

11.11 Tempo / Time Signature Editor

The Tempo / Time Signature Editor window contains both the Time Signature Editor and the Tempo 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. This is because time signature and tempo information is stored in MIDI files.

Time Signature Editing

You can change the time signature (numerator/denominator) of a selected part using the EDIT button. Editing the time signature does not change the notes in MIDI tracks, use the Song Editor for that.

The Paste and Repeat options of the MORE menu respect the Ripple setting. The Cut and Delete options always act as if Ripple is on (i.e., the right-hand part shifts left when you delete a part).

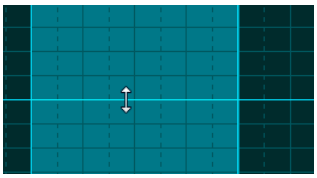
Tempo Editing

In the Tempo Editor, you can change the tempo (beats per minute, BPM).

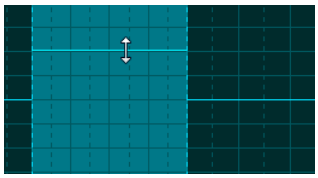
By default, the Tempo Editor affects MIDI tracks only. If the **Audio** button is checked, audio tracks are affected as well. It's recommended to ensure any monophonic audio tracks use the monophonic transpose algorithm. Use the track editor's EDIT button to access this option. The Tempo Editor features tweakable edits, which help avoid stretching audio parts multiple times.

The **EDIT** button opens a window where you can type a BPM value, tap the tempo using the space bar, or click the tempo in the **Tap tempo** box.

The tempo of the selected part can be changed by dragging the line up or down:

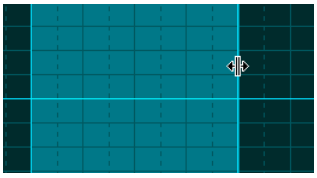


Dragging line vertically, before

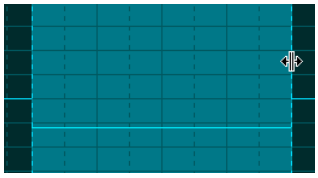


Dragging line vertically, after

If you drag the right-hand edge of the selected part while holding the Alt key (Windows) / Command key (Mac), the tempo will adjust accordingly:

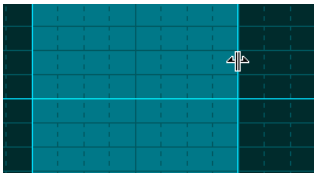


Stretch, before

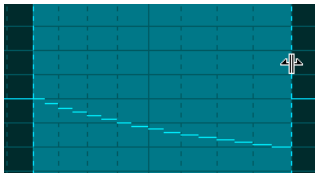


Stretch, after

Hold the Ctrl key in addition to create an accelerando or decelerando:

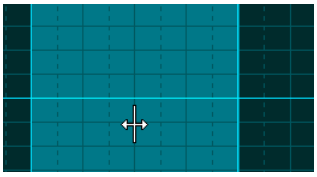


Stretch Accelerando, before

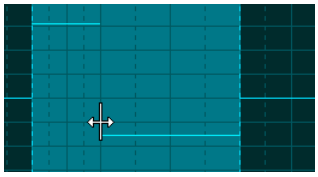


Stretch Accelerando, after

You can move any grid line in the selected part by holding down the Alt key (Windows) / Command key (Mac):

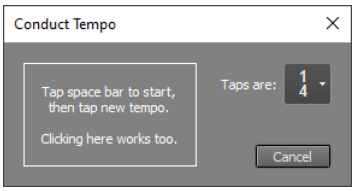


Time Warp, before



Time Warp, after

The **CONDUCT** feature lets you tap a new tempo. You can use this to create accelerandos, for example. Here's how it works:



Conduct Tempo window

1. Select a part in the Tempo Editor.
2. Click the Conduct button. The Conduct Tempo window appears.
3. Press the space bar to start. The transport starts automatically at least one bar before the selected part.
4. Start tapping the beat on the space bar.
5. When the selected part begins, the music will mute, and you can continue tapping the tempo for that part.
6. After you've tapped enough beats, the transport will stop. Click OK to close the Conduct Tempo window.

The **MORE** button provides access to lesser-used features like Delete, Cut, Copy, Paste, and Repeat. Paste and Repeat take into account the global Ripple setting. Cut and Delete always operate in Ripple mode (i.e., the right-hand part shifts left when a part is deleted).

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).
- If the Audio button is checked, or the song contains no audio tracks: Groups, Effect Returns, and Master sections (Automated Fader effects, Vocal Tuner effects, and automation data).

The **Detach** button detaches the tracks from the Tempo Editor. In this mode, tempo changes won't affect the notes in the tracks. You can use this feature to match the tempo to a "free time" recording, or to go from, for example, 100 measures at 120 BPM to 50 measures at 60 BPM.

Note: The Click Track and Chord Tracks will be updated even if Detach is enabled. These tracks follow the tempo (and time signature) by definition.

Note: The Tempo can't be edited while the transport is running.

Bar Numbers

The **Bar numbers start at** box sets the number of the first bar. The default is 0, so the music starts at bar 1 if the first bar is used for count-in. Use 1 if there's no count-in, or -1 for a two-bar count-in. The lowest possible value is -9, which allows for a ten-bar count-in.

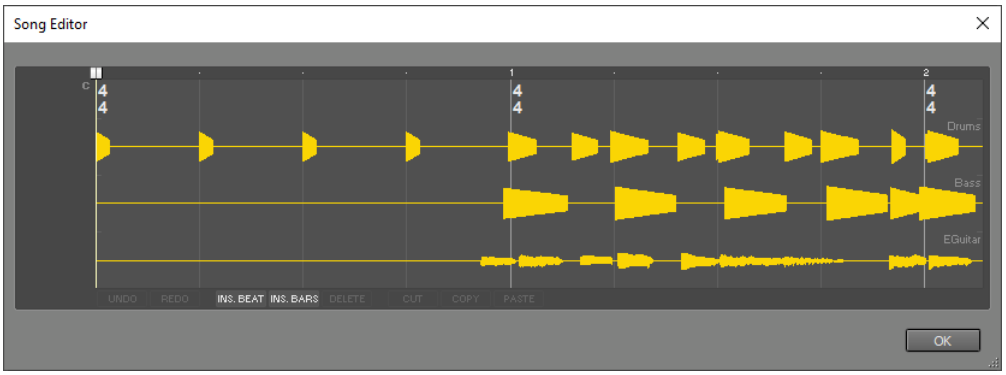
11.12 Song Editor

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 edition)

The Song Editor can't be used while the transport is running.



Song Editor window

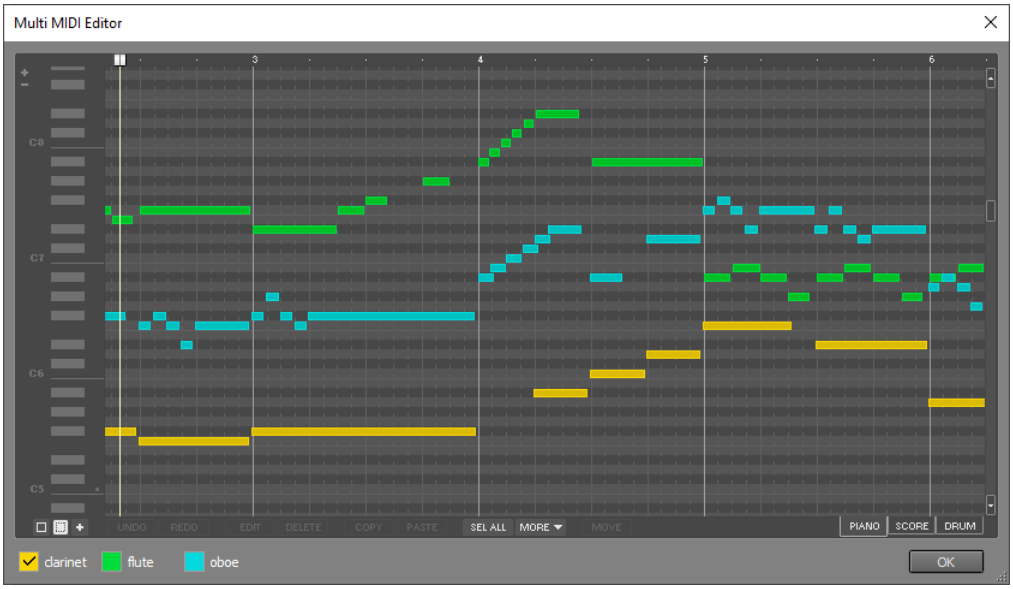
11.13 Multi MIDI Editor

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

The Multi MIDI Editor is available from the Editing Options menu. You can choose to show MIDI tracks of a certain color, MIDI tracks that have their editor open, or all MIDI tracks. If you use suitable colors for your instrument groups, you can open a group in the Multi MIDI Editor quickly by right clicking a track's Editor Preview pane (or the Edit button, if available) and choosing **Open same color MIDI tracks in Multi MIDI Editor**.

Pianoroll

The colored buttons at the bottom represent the tracks that are visible in the editor. The active one shows a check mark. Any new notes you add will go into this 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.

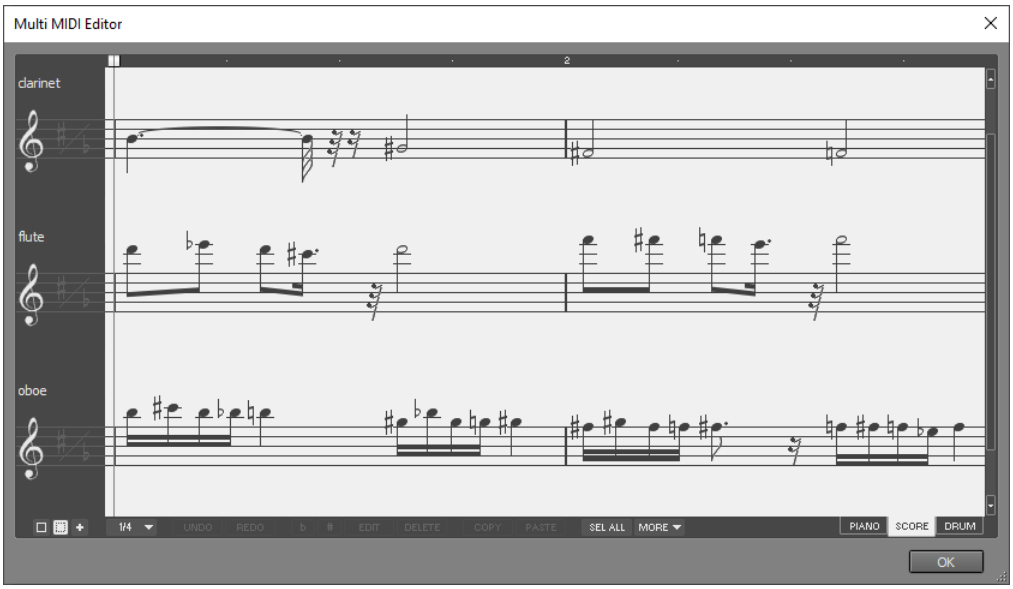


Multi MIDI Editor window, showing 3 tracks in pianoroll view

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.

You can click the clef (on the left) and use the **System Spacing** setting to change the vertical distance between the systems. The note ranges are analyzed when the Multi MIDI Editor appears or when changing the System Spacing setting. You can manually make the program re-analyze the note ranges and adjust system spacing accordingly by picking the current setting from the System Spacing list. This may come in handy if you've added very high or low notes.



Multi MIDI Editor window, showing 3 tracks in score view

Drum

The colored buttons at the bottom 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 when clicking the Add Instr. button, lists the instruments available in all the tracks' MIDI instruments. The track names, as they appear next to the colored buttons, appear in the selector as well.

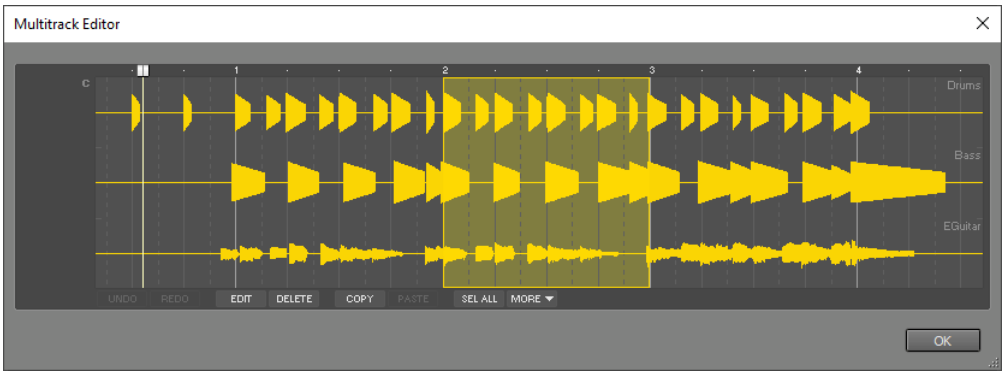
Edits in a single instrument are not tweakable, unlike a track's drum editor.

11.14 Multitrack Editor

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

Using the Multitrack Editor, multiple tracks can be edited simultaneously. The Multitrack Editor is available from the Editing Options menu. You can choose to show tracks of a certain color, tracks that have their editor open, or all tracks.

Tip: Use the Song Editor if you want to edit "everything", including tempo, automation, 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 features depend on the types of tracks being edited. It can equal the audio or MIDI track version, or it can contain just Volume fader, Fade, Reverse, and Transpose options.

The Multitrack Editor can't be used while the transport is running.

11.15 Chords and Lyrics

Chords and Lyrics can be entered in the Chords Editor and Lyrics Editor respectively, which are available from the Editing Options menu. These Chords and Lyrics can be made displayed in almost any editor using the small C and L buttons that appear on the left side of the editors. The Chords appear at the top of the editor, the Lyrics appear at the bottom. The lyrics and/or chords can be displayed in the Lyrics Prompter too.

Entering Chords is quite easy, since you probably already have them on paper or in your head. Entering Lyrics takes a bit more effort because it's not always easy to determine where the bars and beats should go. It's recommended to type the lyrics first, and then add the bar separators (and optionally the beat separators).

Bars are separated by "|" characters. You can type "\" instead for convenience.
Inside a bar, beats are separated by "-" characters. This isn't required if the number of beats in the bar can be divided by the number of chords. You can, for example, use "|C F|" instead of "|C - C - F - F|".

Here are examples of chords and lyrics:

```
||      empty bar for count in

Intro:
| C | Am | F | Gsus4 G |
| C | Am - Am - Am - Am/G | 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

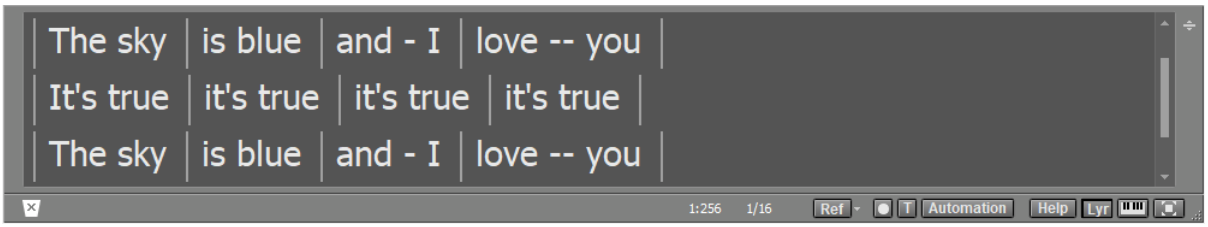
Note that any text which is not in a bar is ignored, and thus can be used to add comments. Spaces can be used anywhere you like, but not in chord names (i.e. you must type "Gsus4" instead of "G sus 4").

Since MultitrackStudio stores the tempo in MIDI files, there must be at least one MIDI track in a song in order to align the chords and lyrics with the tracks. See Extracting tempo from track if your song is audio-only.

The Lyrics Editor's **Copy** button copies the lyrics to the clipboard without any bar and beat separators. You can paste the lyrics into a text editor and print them.

The Chords Editor's **b** and # buttons can be used to transpose the selected chords. Any bass notes (separated from the chord by a slash, e.g. C/B) will be transposed as well.

Lyrics Prompter



Lyrics Prompter

If any chords or lyrics are available, a **Lyr** button appears near the bottom right corner of the main window. Clicking this button shows or hides the lyrics prompter. The lyrics prompter scrolls automatically while the transport is running, so it can be used to read the lyrics/chords while recording. Clicking a bar will move the transport position to that bar. Double-clicking a bar will pop up the Chords or Lyrics Editor and select that bar. The font size depends on the height of the lyrics prompter: if you make it taller, the font will get larger too.

If both chords and lyrics are available, subtle C and L buttons appear on the left (see picture). You can display either one or both.

Creating MIDI Tracks from Chords

Using the Add Track menu's **Chord Track** option, you can create MIDI tracks from the chords. Chord tracks can be used to verify the chords or to quickly create backing tracks for practicing a guitar solo, etc. Bass, Piano, Organ, Strings, Guitar, Banjo, and Drums tracks can be created.

Chord tracks are updated automatically if you edit the chords or change the time signature, etc. You can rename a track to keep it from being updated (remove the "(Chord)" part).

The following chords can be used: 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.). Unrecognized chords will be underlined in red.

A chord track's Properties window (click the name box) offers some options to control the generated parts. The **Pattern** box defines the rhythm pattern. Each beat can be in one of these states:

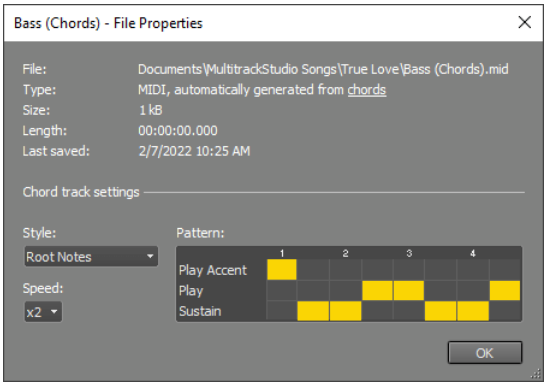
- **Play**: plays new notes.
- **Play Accent**: plays new notes, a bit louder.
- **Sustain**: keeps notes played in an earlier beat sounding.
- **None of the above**: keeps the beat.

A drum track's Pattern box works differently: there are three instruments, and you can choose whether each is hit or not.

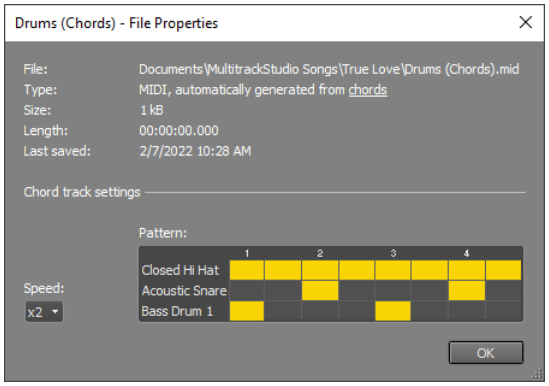
Speed controls the resolution of the Pattern box. x1, x2, and x4 equal 1/4, 1/8, and 1/16 notes respectively, x3 equals triplets.

Style offers options like Chords, Arpeggio, and Blues / Rock depending on the instrument.

Tip: To hear the results of any tweaks immediately, you can let the transport loop a couple of bars.



Chord track properties window (Bass)



Drums track pattern box

12 Devices

The audio and MIDI devices to be used by MultitrackStudio can be selected in the Studio menu's Devices window.

Audio

MultitrackStudio Pro supports up to 140 audio channels. Lower editions support two audio channels.

Choosing an audio driver type

On *Mac* there's just one audio driver type: Core Audio.

On *Windows* there are three audio driver types to choose from:

- Windows: Latency can be low, and it supports "shared mode", so other apps can play back sound while MultitrackStudio is running.
- ASIO: Can only be used if the sound device comes with an ASIO driver. Latency can be very low.
  If your device comes with an ASIO driver, you should use it. Be sure to try the Windows driver type if your ASIO driver causes system instability, or doesn't offer the sample rate you need.
  If your device doesn't come with an ASIO driver, you should try the Windows driver type rather than use a generic ASIO driver.
- Early Windows is the last resort. It should work with any sound device, but latency is very high, and there's no Soft Monitoring. Multichannel recording isn't possible using this driver type.

Audio Output Control

The Audio Output Control (available from the Studio menu) can be used to set the properties (channel selection, levels, etc.) of the audio output device. The controls depend on the audio driver type and devices used.

MIDI

MultitrackStudio Pro supports up to four MIDI In devices, and up to four MIDI Out devices. Lower editions support one MIDI In device, and up to two MIDI Out devices.

MPE MIDI Input

There's an MPE check box for each MIDI Input Device. MPE (MIDI Polyphonic Expression) uses separate MIDI channels for each note, so each note can have its own pitch bend, brightness, and aftertouch controls. MultitrackStudio maps these controls to MIDI 2.0 per-note pitch bend / per-note brightness and MIDI 1.0 poly aftertouch, respectively.

If an MPE keyboard sends RPN messages to change the MPE configuration, the MPE check box will be updated accordingly.

In most cases, the incoming MPE data will go to MIDI channel 1. If an MPE keyboard sends a different configuration, it could go to MIDI channel 16 or both 1 and 16 (two MPE zones).

Tip: do not use the MPE option if you don't have an MPE keyboard. There's no benefit and many potential problems.

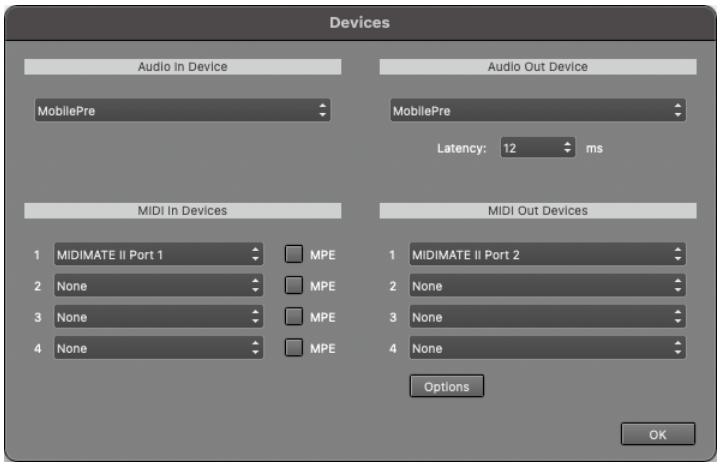
MIDI Out Device Options

The Options button in the MIDI Out Devices section pops up the MIDI Out Device Options window. It contains settings regarding sync code and recording connections.

12.1 Mac audio/MIDI devices

Note: this feature is available for Mac only.

Audio



Devices window (Pro edition)

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 sample rates probably won't match exactly. Recorded tracks can therefore gradually become out of sync during playback. To solve this issue, you can create an "aggregate device" using the Audio MIDI Setup application and use that device in MultitrackStudio. macOS will then handle synchronizing the two devices.

The **Latency** box determines the time it takes before you hear the sound when playing 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 low latency values. The actual latency appears if you hover the mouse over the Studio menu's Devices option.

MIDI

In the **MIDI In Devices** section, you can select the device used for MIDI recording. In the **MIDI Out Devices** section, you can select the device used for MIDI playback.

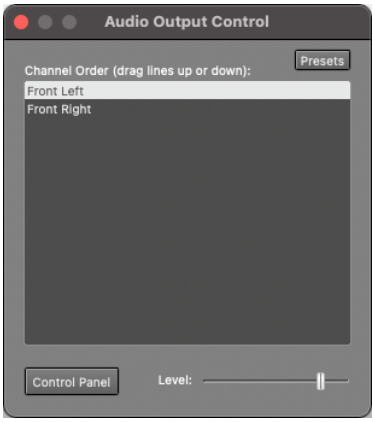
macOS 11 supports MIDI 2.0. MIDI In/Out Devices will use the MIDI 2.0 protocol if the connected device supports it.

Audio Output Control

The Audio Output Control (available from the Studio menu) controls which output channels will be used. The listed channels are used from top to bottom. The Master section therefore goes to the top two channels. They can be reordered by dragging and dropping them.

The **Level** fader, available only if the sound device supports it, controls the playback level.

The **Control Panel** button opens the Sound page in System Preferences, where you can adjust detailed playback levels, etc., if the sound device supports it.



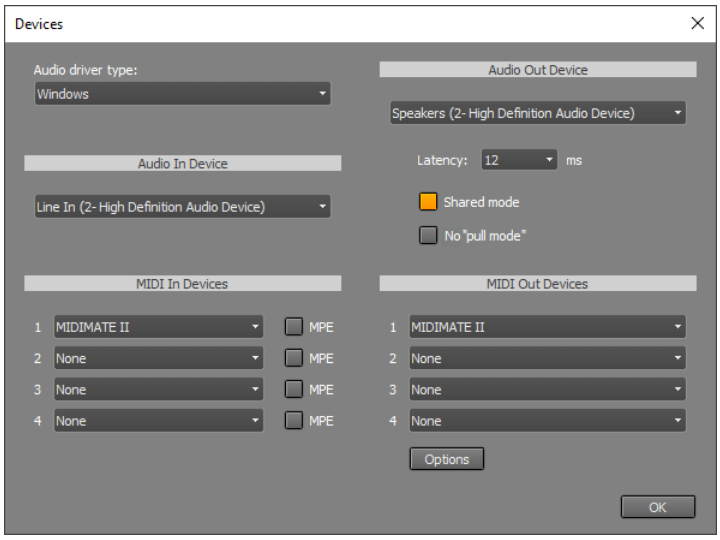
Audio Output Control

12.2 Windows Drivers

Note: this driver type is available for Windows only.

Windows drivers allow for low latency. Multichannel recording and playback is possible as well, provided the sound device driver supports this (Pro edition only).

Audio



Devices window using Windows driver type (Pro edition)

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 sample rates probably won't match exactly. Recorded tracks can therefore gradually become out of sync during playback.

Audio devices are opened in exclusive mode to ensure low latency. This means other programs can't use these audio devices while MultitrackStudio is running.
In Windows 10 (or newer), you can make the Audio Out Device operate in shared mode using the **Shared mode** button. Shared mode allows other programs to play back audio while MultitrackStudio is running. Latency will be a bit higher, depending on the audio driver. MultitrackStudio will automatically revert to exclusive mode if shared mode can't be used for any reason.

The **Latency** box determines the time it takes before you hear the sound when playing software instruments live or when using Soft Monitoring ('live effects'). You'll hear glitches if this setting is too low. MultitrackStudio is designed to prevent these glitches from being recorded: if, for example, you record the Guitar Amp effect live with low latency and hear glitches while recording, the glitches won't be in the track, and it will sound fine during playback.

Your sound device may not support low latency values. The actual latency appears if you hover the mouse over the Studio menu's Devices option.

The **No "pull mode"** button disables "pull mode" (also known as "event mode"). "Pull mode" generally performs better, especially when CPU usage is high. You shouldn't need to disable it on Windows 10 or newer. If you do, you might want to check if there's a better driver available for your device.

MIDI

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

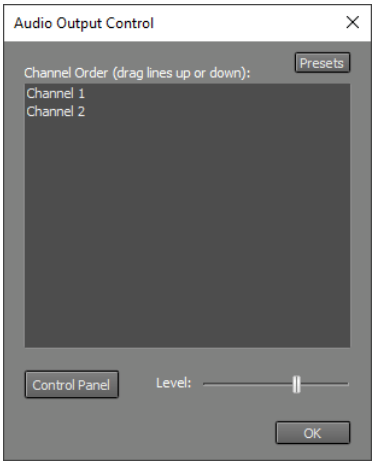
In the **MIDI Out Devices** section, you can select the device used for MIDI playback.

Audio Output Control

The Audio Output Control (available from the Studio menu) determines which output channels will be used. The listed channels are used from top to bottom. The Master section therefore goes to the top two channels. They can be reordered by dragging and dropping them.

The **Level** fader, available only if the sound device supports it, controls the playback level.

The **Control Panel** button opens the audio page of the Windows Control Panel, where you can adjust detailed playback levels and other settings, if supported by the sound device.



Audio Output Control

Under the hood
Windows Vista introduced a new low-latency driver model called WASAPI or "Core Audio". This is what MultitrackStudio uses. Sometimes the term WaveRT is used as well, although this actually refers to a technology used by drivers internally. Windows Vista also introduced MMCSS (Multimedia Class Scheduler Service), which helps prevent audio glitches under high CPU load.

12.3 ASIO Drivers

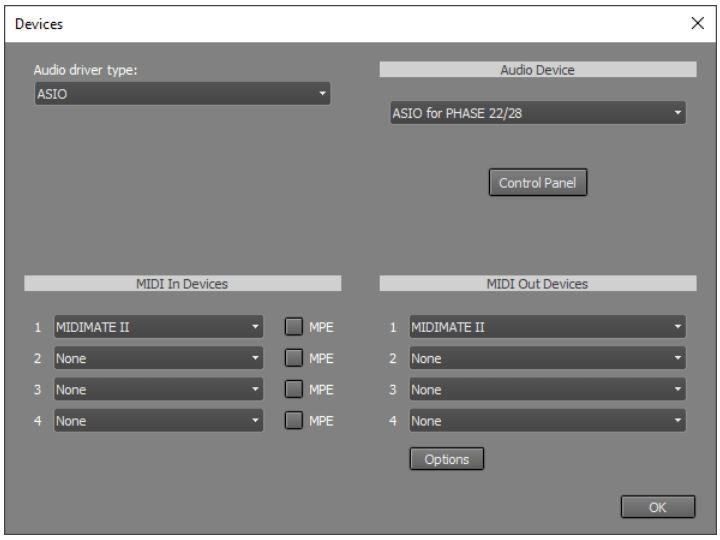
Note: this driver type is available for Windows only.

ASIO drivers allow for low latencies. In addition they allow for multichannel recording (Pro edition only). If a sound device comes with an ASIO driver, it's usually best to use it.

Audio

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

Clicking the **Control Panel** button opens the driver's control panel. This panel usually allows you to set the buffer size. Buffers can be up to 4096 samples. A buffer size of 256 samples (at 44.1 kHz) is generally a good compromise between reliability and low latency. If the buffers are too small, glitches may occur. This isn't necessarily a problem when recording MIDI, as the driver usually remains synchronized, ensuring that the MIDI recording is correct. However, it's strongly recommended to use large enough buffers when recording audio.



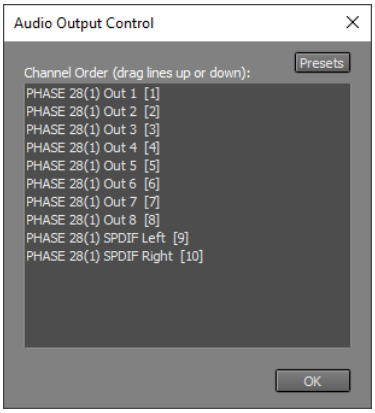
Devices window using ASIO driver (Pro edition)

MIDI

In the **MIDI In Devices** section, you can select the device used for MIDI recording. In the **MIDI Out Devices** section, you can select the device used for MIDI playback.

Audio Output Control

The Audio Output Control (available from the Studio menu) determines which output channels will be used. The listed channels are used from top to bottom. The Master section therefore goes to the top two channels. They can be reordered by dragging and dropping them.



Audio Output Control

12.4 Early Windows Drivers

Note: this driver type is available for Windows only.

This option uses classic Windows audio driver types. Latency is very high, and there's no Soft Monitoring. Multichannel recording isn't possible using this driver type.

Audio

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 Device (High Latency)** section, you can select the device that will be used when there is no recording software instrument. The devices listed are MME devices (which are very reliable, even when CPU usage is high).
In the **Audio Out Device (Low Latency)** section, you can select the device that will be used when software instruments are being recorded. The devices listed are DirectSound devices (which can have lower, but still significant, latency).

Devices window using Early Windows driver type (Pro edition)

In general, you will use MME and DirectSound devices that use the same sound device. It's also good idea to use Audio In and Out devices that are on the same sound device. If they're not, their sample rates probably won't match exactly. Recorded tracks can therefore gradually become out of sync during playback.

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 poorly or even crash your computer.

Creative Labs SoundBlaster Live! sound devices (and its cheaper siblings like the 128, 512, 1024, Ensoniq AudioPCI) use a slightly higher sample rate for recording than for playback at a sample rate 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 sample rate of 48 kHz, this problem does not occur, and the "EMU10k1 44.1 kHz Sync Correction" setting has no effect.

MIDI

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.

12.5 Windows MIDI Services

Note: Windows MIDI Services is available for Windows only.

Windows MIDI Services is the brand-new MIDI stack for Windows, supporting both MIDI 1.0 and MIDI 2.0. Microsoft expects to make it available for Windows 11 early 2026. We expect to update MultitrackStudio around that time so the MIDI 2.0 features can be used.

12.6 MIDI Out Device Options

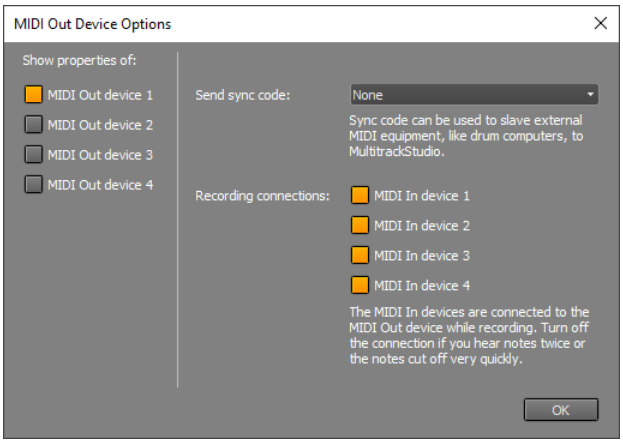
The MIDI Out Device Options window (available from the Studio menu's Devices window) determines the behavior of the MIDI Out devices, and consequently the External MIDI Instruments.

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 available options are None, MIDI Clock, MTC 24 frames/sec, MTC 25 frames/sec and MTC 30 frames/sec.

The **Recording connections** section defines which MIDI In and Out Devices will be connected when recording MIDI.
By default, messages received by the MIDI In Device will be sent to the MIDI Out Device that's being used by the

recording track. This works fine if you're using a keyboard and a 19 inch synthesizer module, for example. However, it can cause problems if you're using a MIDI keyboard with built-in sounds that is both MIDI In and Out device: notes may be triggered twice. Keyboards often have a Local Control setting that you can switch to Off, which disconnects the keys from the sound generator in the keyboard. This is the best solution because it allows MultitrackStudio to add MIDI effects, articulations and more.
If your keyboard has no Local Control setting you can uncheck the corresponding button.

Note: When recording a software instrument, recording connections for the MIDI channel used are automatically disconnected. This prevents your keyboard from also controlling a MIDI Out Device.



MIDI Out Device Options window (Pro edition)

Note: If the MIDI Out Device forwards messages to the MIDI In Device a loop exists that will slow down (and ultimately halt) your computer. MultitrackStudio will detect this loop and disconnect the MIDI In and Out Devices to prevent the computer from freezing.

12.7 MIDI-CI

MIDI-CI is part of MIDI 2.0. It allows a sender to receive information from a receiver. MultitrackStudio supports MIDI-CI for MIDI Out Devices (see External MIDI Instruments).

Note: on Windows, MIDI-CI currently isn't available. See Windows MIDI Services.

Bidirectional connections

MIDI-CI requires a connection in both directions. A bidirectional connection is detected automatically for USB MIDI 2.0 class-compliant devices. On Mac, this requires macOS 14.

MIDI-CI can also be implemented by MIDI 1.0 devices. In that case, the bidirectional connection consists of two traditional MIDI ports. You can select a MIDI-CI Bidirectional Return in the Studio → Devices window by right clicking a MIDI device box.

Tip: MIDI-CI connections are re-initiated when the Devices window closes. You can do this if it has stopped working.

12.8 Compensating for driver issues

Note: this feature is available for Windows only

Note: this only needs to be done in extremely rare cases. Make sure you're using the latest driver for your sound device first.

Aligning audio devices

Under normal circumstances all audio and MIDI devices are aligned by MultitrackStudio so that newly recorded tracks are perfectly in sync with existing ones. However, some audio device drivers fail to report the exact playback or recording position, which prevents MultitrackStudio from aligning the devices accurately. Offsets to the reported positions can be specified in text files to compensate for such issues.

Aligning the audio input and output devices step-by-step

This section describes how to compensate the audio input device so that new tracks align with existing ones.

Step 1
Start MultitrackStudio and load "C:\Program Files\MtStudio\Impulse.gjm" in a track. This file contains a single impulse at approximately 50 milliseconds. Set up another track to record the first track.

Step 2
Connect the audio input device to the audio output device using an audio cable. If your sound device supports internal routing, you can use that feature instead of the cable.

Step 3
Click the Studio menu's Devices option. Now close the window that appears, which causes the program to create sections in a file that you will edit in the next step. Note that "default" devices (Default, MIDI Mapper, or Primary Sound Driver) cannot 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 at the bottom of the main window. The difference between the two positions is the error that needs to be compensated.

Step 5
The settings for ASIO, Windows, and Early Windows drivers are stored in the "AsioSnd Settings.txt", "VistaSound Settings.txt", and "WinSound Settings.txt" files respectively. MIDI device settings are stored in the "MIDI Settings.txt" file. These files are located in the "C:\Users*Username*\AppData\Roaming\MtStudio" folder and can be edited using Notepad. 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 should not be modified. The [Brand X Wave Device] section refers to the name of the audio input device, as shown in the Devices window. The error value found in step 4 is entered here (15 milliseconds in this example).

Step 6
Close MultitrackStudio and restart it (this is necessary for the program to read the settings file again). Now repeat steps 1 through 4 to 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 across different sample rates. The offset can also be specified in ASIO buffers (ASIO drivers only). MIDI devices can be compensated as well.

This is the full list of possible compensation options:

Audio input devices support these values:
audioin_offset_millisecs=
audioin_offset_samples=
audioin_offset_buffers= *(ASIO drivers only)*

Early Windows high latency audio output devices and **ASIO output devices** support these values:
audioout_offset_millisecs=
audioout_offset_samples=
audioout_offset_buffers= *(ASIO drivers only)*

Early Windows low latency audio output devices support these values:
audiooutlowlat_offset_millisecs=
audiooutlowlat_offset_samples=

MIDI input devices support these values:
midiin_offset_millisecs=
midiin_offset_samples=

MIDI output devices support these values:
midiout_offset_millisecs=
midiout_offset_samples=

The _samples values must be integers. The _millisecs and _buffers values can be decimal values.

ASIO Delay

A small delay can be introduced in ASIO buffer processing. This can sometimes help work around sound device/mainboard/driver incompatibilities if the following symptoms occur:

1. Recording a MIDI track using a software instrument sounds fine while recording.
2. But it sounds garbled or extremely glitchy during playback.

To add an ASIO delay, open the "C:\Users*Username*\AppData\Roaming\MtStudio\AsioSnd Settings.txt" file in Notepad and add an "AsioDelay=" line in the [Settings] section like this:

[Settings]
AsioDelay=20000

The value has to be determined experimentally (higher values cause longer delays). MultitrackStudio should be restarted after editing the file.

ASIO MMCSS

Windows Vista introduced MMCSS (Multimedia Class Scheduler Service), which can help prevent glitches under high CPU load. While it is the ASIO driver's responsibility to enable this, some do not. You can add an "MMCSS=1" line to the "AsioSnd Settings.txt" file (see previous section) to make MultitrackStudio enable MMCSS. This line should appear in the [Settings] section:

[Settings]
MMCSS=1

MultitrackStudio must be restarted after editing the file.

Note that not all ASIO drivers work well with this setting. If performance worsens, you should remove the line again.

13 Remote Control

A remote control is a hardware device that can be used to control MultitrackStudio's transport, mixer, and effects. Traditional "control surfaces" use MIDI to communicate with the computer. MultitrackStudio can also be controlled using the MultitrackStudio Remote app (for iPad), or a web browser (on a phone or tablet).

MIDI Remotes

The Studio menu's Remote Control option opens the Remote Control window. Ready-to-use presets are provided for the FaderPort (PreSonus), Keystage (Korg), TranzPort and AlphaTrack (Frontier Design Group), BCF2000 (Behringer), and UC33 (Evolution). There are also generic Mackie Control and HUI presets, as well as a basic MMC (MIDI Machine Control) preset.

If there's no suitable preset for your device, you can assign remote control knobs to specific actions using the **Learn** function (see Remote Control Settings).

Use the **MIDI In** box to select the MIDI In device to be used for the remote. The **MIDI Out** device should also be specified if the remote has LEDs or motorized faders.

The MIDI In device used by the remote can also be selected as a regular MIDI In device (for recording a MIDI keyboard). In this case, the remote functions will have the highest priority, i.e., only MIDI messages that aren't mapped to a remote control action will be passed to MIDI tracks. This mechanism makes it possible to map some keys of a MIDI keyboard to remote control actions. You can, for instance, use a key to invoke the "Alternate Take" action.

Use the **Show Remote Control Bar** button to enable the Remote Control Bar. It shows the names of the mixer sections that are mapped to the remote control channels, along with the names and values of effect knobs.

Note: the MIDI In/Out and Remote Control Bar options are only available if the selected remote control uses MIDI.

13.1 Remote Control Settings

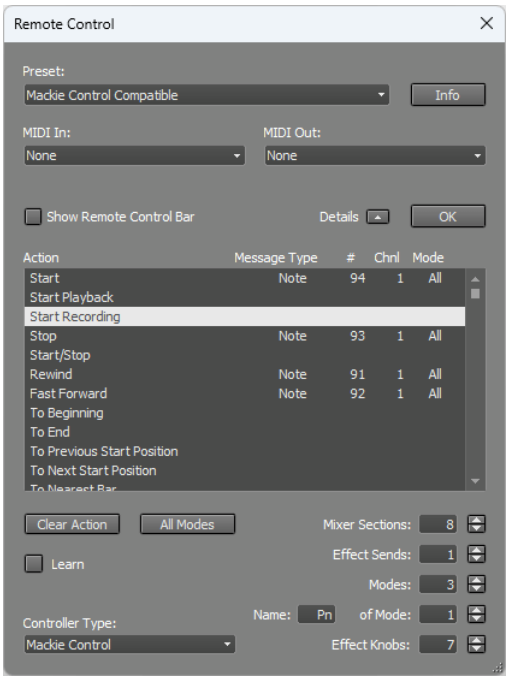
The Remote Control window defines the functionality of the remote control device being used. The **Preset** button can be used to load predefined presets or to create new ones. The **Info** button shows information about the current settings if available. Use the **MIDI In** and **MIDI Out** boxes to select the MIDI devices corresponding to the remote control device.

Note: the MIDI Out box value is ignored if the selected MIDI In device is a bidirectional MIDI 2.0 endpoint.

The **Clear Action** button clears the highlighted action. The **None** preset can be used to clear all actions. If the **Learn** button is engaged, any incoming MIDI messages will be mapped to the highlighted action. Custom mappings can be created easily this way.

Conversions are applied to remote controls that use SysEx messages, for example. Several **Controller Types** can be selected:

- MIDI Controller: plain MIDI messages
- HUI
- Mackie Control
- FaderPort
- Keystage
- TranzPort
- AlphaTrack



Remote Control window (Details expanded)

Controlling Mixer Sections

The **Mixer Sections** setting will typically match the number of channel strips the remote provides. The highest possible value is 64.
The **Effect Sends** setting determines how many Effect Send knobs can be controlled using the remote.

There can be multiple **Modes**. This is typically used to control multiple actions with a single rotary knob (Mode 1 = Pan, Mode 2 = Effect Send 1, etc.). The **All Modes** button makes the highlighted action appear in all modes. You'll probably want volume faders, transport buttons, etc. to be in all modes.

Controlling Effects/Instruments

The **Effect Knobs** setting determines the number of physical knobs available for controlling effects.
An effect can only be controlled while its user interface is visible on screen. The knobs used to control effects will often also be used to control mixer sections (e.g., pan knobs). MultitrackStudio handles this automatically (there's no need to use modes for this).

Effect parameter counts may exceed the number of available physical knobs. In this case, there will be multiple pages of parameters. You can assign the Effect Page Up and Effect Page Down actions to buttons, allowing you to step through the pages. Alternatively, you can assign the Effect Page Up/Down action to a rotary knob, so turning the knob steps through the pages.

Tip: You can right-click a rotary knob in an effect/instrument window and choose Find on Remote Control. This will:

1. *Move to the page that contains the knob.*
2. *Flash the corresponding cell on the Remote Control Bar.*
3. *For Mackie Control or HUI devices, the LED ring around the physical knob will flash.*

CLAP/VST3 plugins have right click menus too, if the plugin supports this. For other plugins, you can click (or even move) a control, then right click the right hand area and choose "Find last clicked on Remote Control".

Actions

The following actions can be controlled by the remote. Actions marked (cc) should be controlled by a continuous controller (rotary knob or fader), all other actions are meant to be controlled by a button.

The following actions control the Transport:

- Start
- Start Playback: start transport only if no track Rec buttons are engaged (ie. the Play button has a green triangle)
- Start Recording: start transport only if any track Rec buttons are engaged (ie. the Play button has a red triangle)
- Stop
- Start/Stop: equivalent to hitting the space bar.
- Rewind
- Fast Forward
- To Beginning
- To End
- To Previous Start Position
- To Next Start Position
- To Nearest Bar
- Transport Wheel (cc)
- Transport Shuttle (cc)
- To Previous Marker
- To Next Marker
- To Marker (cc)
- Add Marker
- Delete Marker
- VariSpeed (cc) *(Pro edition only)*
- VariSpeed Mode (cc) *(Pro edition only)*

- Loop: toggle Loop on/off.
- Set Loop Start: set start of looping region (uses the current transport position).
- Set Loop End: set end of looping region (uses the current transport position).
- Counter: turn on/off remote's counter display.
- Counter Format: toggle bars/seconds.
- Zoom In
- Zoom Out
- Zoom In/Out (cc)
- Automation Recording *(Pro edition only)*
- Automation Touch Mode *(Pro edition only)*

These actions allow for opening songs:

- To Next Song: to next song of songlist.
- To Song (cc): to song of songlist (zero = first song).
  If there's no songlist it looks for a file named "setlist.txt" located in the "root folder for new songs" as defined in the Preferences window. This file should map controller values to songs like this:

  0=C:\My Songs\Yellow Sun\Yellow Sun.hdr
  1=C:\My Songs\Blue Sky\Blue Sky.hdr

- To Song High (cc): adds another 7 bits to the "To Song" action, so more than 128 songs can be used. "To Song High" must be sent before "To Song". The song number is calculated like this: song = 128 x "To Song High" + "To Song".

Note: MultitrackStudio takes care that things work smoothly if "Save 'everything' in song" (see Preferences) is enabled. It won't show "save?" prompts for unimportant changes like transport position. After loading a song, transport will go to zero and looping will be turned off automatically.

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
- New Group
- New Effect Return
- Alternate Take: click the Recording option's Alternate Take item.
- Re-Arm: engage the Rec buttons of the last recorded tracks.
- Soft Monitoring: click the Soft Monitoring button.
- 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 Practice Mode: switch track to practice mode.
- Section Fader (cc)
- Section Mute
- Section Solo
- Section Half Solo: toggle between half solo and no 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 First Used Slot
- Section Last Used Slot
- 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 Remove
- Section Map: pop up selector to map a mixer section to remote control strip.
- Master Fader: controls the Master section's volume fader.
- Clear Solo: turn off any active Solo buttons.
- Level Meters: turn on/off the remote'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 remote (probably never needed).

These actions control modes and banks:

- Mode Button
- Mode Down
- Mode Up
- Mode Up/Down (cc)
- Bank Down: move (typically) 8 sections down
- Bank Up: move (typically) 8 sections up
- Bank Up/Down (cc)
- To First Bank
- To Last Bank
- Section Down
- Section Up
- Section Up/Down (cc)
- To Section (cc)

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 Page Up and Mode Up can be on the same button etc.).

- Effect Knob (cc): control an effect's knob.
- Effect Control Map: pop up selector to map an effect control to a remote control knob.
- Effect Mouse Control (cc): controls the effect knob the mouse points to. Both this one and "Mouse Control" can work with 3rd party plugins after you've clicked a knob or moved it a bit.
- Effect Page Down
- Effect Page Up
- Effect Page Up/Down (cc)
- Effect To First Page
- Effect To Last Page
- Effect To Left Slot: close this effect/instrument and open the previous one
- Effect To Right Slot: close this effect/instrument and open the next one
- Effect Close: close the effect window.
- Effect Bypass. Also used for instrument channel, it can be (cc) in this case. An Effect Knob will be used for the Bypass action automatically if this action isn't assigned.

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).

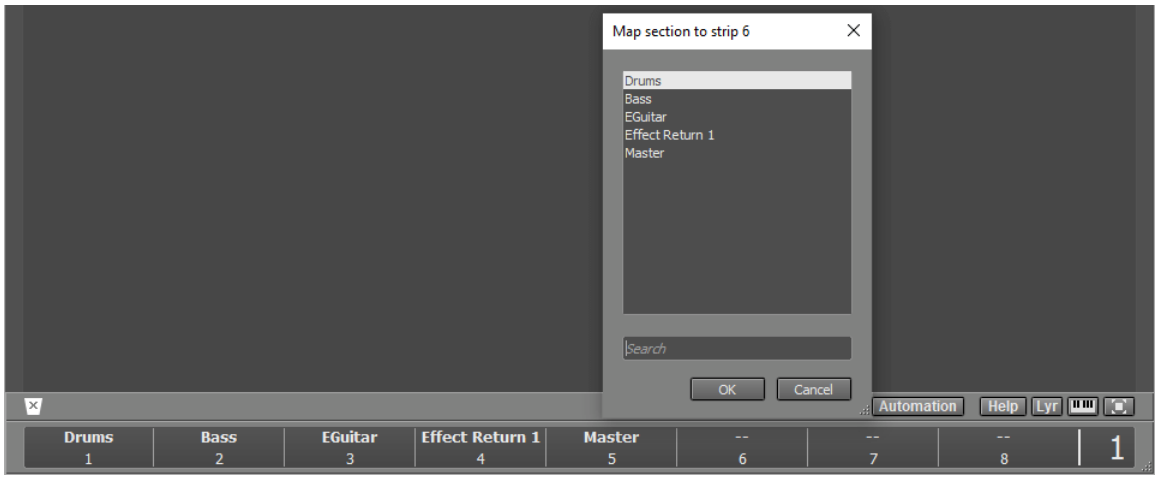
- Selector Down
- Selector Up
- Selector Up/Down (cc)
- Selector Category Down
- Selector Category Up
- Selector Category Up/Down (cc)
- Selector Accept: also used to invoke message dialog "OK" or "Yes" buttons.
- Selector Cancel: also used to invoke message dialog "Cancel" or "No" buttons.

Other actions:

- 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.

13.2 Remote Control Bar

Cheaper remotes often don't feature a display, so it's difficult to see what a knob's function is. MultitrackStudio features a Remote Control Bar at the bottom of the screen. It can be made visible using the Studio menu's Remote Control window.



Remote Control Bar, strip 6 is being remapped

The Remote Control Bar has eight sections (or more, depending on the number of mixer sections or effect knobs the remote control uses). These sections show the names of the mixer sections that are controlled by the corresponding remote control channel strips. The vertical line on the right can be moved to align the bar with the remote. The name of the current Mode is shown on the right-hand side. This typically indicates the function of the remote's rotary knobs (Pan, Effect Send 1, etc.).

If an effect window is currently visible, the names of the effect knobs will be shown, provided the remote is set up to control effects.

Mapping Mixer Sections

Songs can have more mixer sections than the available number of remote control channel strips. Traditionally, remotes 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 addition, MultitrackStudio lets you freely map mixer sections to remote control channel strips in any order. There are several ways to do this:

- Click the Remote Control Bar and use the selector window that pops up.
- Drag cells within the Remote Control Bar.
- Drag a mixer section to the Remote Control Bar.
- Drag a cell from the Remote Control Bar to the Garbage Bin to unmap.
- Use remote control knobs. A very convenient setup can be achieved with rotary knobs that also have a push function:
    - Map the rotary function to Selector Up/Down actions.
    - Map the push function to Section Map and Selector Accept actions.

  When you press the knob, a selector window appears that can be controlled using the knob. Note that the knob can still be used to control mixer section and/or effect controls as well.

Your custom mapping will be lost if you use the remote's bank up/down or section up/down buttons.

Mapping Effect Controls

Controls in the currently visible effect window can be mapped to Effect Knob actions. There will be multiple pages if the number of controls exceeds the number of knobs. The page name is displayed on the right. You'll typically want to switch pages using the remote control, but it can also be done using the mouse: either click the name on the right and select a page from the list, or use the mouse wheel.

Controls can be mapped dynamically just like mixer sections, with the only difference being that you can't drag an effect control to the Remote Control Bar.

Tip: tweak an effect control using the mouse, and then click the Remote Control Bar. The effect control is now highlighted in the selector window, and you can click OK to map it.

13.3 MultitrackStudio Remote

The MultitrackStudio Remote app for iPad turns an iPad into a powerful remote control for MultitrackStudio.

Connecting to MultitrackStudio

First, the MultitrackStudio Remote app needs to be installed. It's available from the App Store. Connecting to MultitrackStudio works like this:

1. In MultitrackStudio, go to the Studio menu and choose Remote Control. Select the MultitrackStudio Remote preset.
2. On the iPad, start the MultitrackStudio Remote app and tap the Connect button. Now enter the code that appears in the Remote Control Settings window and tap OK.
3. Close the Remote Control Settings window.

MultitrackStudio Remote, recording a track

Now the mixer sections will appear on the left, and you can control MultitrackStudio using the iPad.

The iPad must communicate via WiFi (5G etc. is not supported). Furthermore, the iPad and your computer must both be connected to your home network.

Tip: the code starts with the computer's IP address. If your computer has multiple network adapters you can simply replace it with the correct one.

Features

Using MultitrackStudio Remote, you can control many recording-related features:

- Control the transport, including VariSpeed, markers, and cycling.
- Add and control tracks, groups, effect returns (up to 3), and the master section.
- Add and control effects and MIDI instruments.
- Toggle the Monitor / Punch / Sound On Sound buttons.
- Control the click track and the MIDI Keyboard Mapper's Split option.

All mixer sections appear as tabs on the left. A signal indicator appears on the left hand side of the tab. It can be green, yellow, or red, corresponding to MultitrackStudio's level meter colors. A tab's right hand side shows a red bar if the track's Rec button is engaged. The lower half of the screen contains the current section's controls.

The transport controls appear in the upper half. The two buttons below the large start/stop button step through the history of recent transport start positions. The horizontal Shuttle Bar moves the transport slowly when used in the middle, and faster when used at the sides. While shuttling, you'll hear the current track, and the track's audio/MIDI data appears below the transport counter.

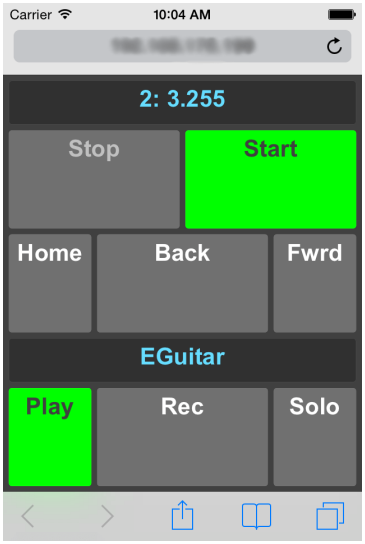
Shuttle Bar in action

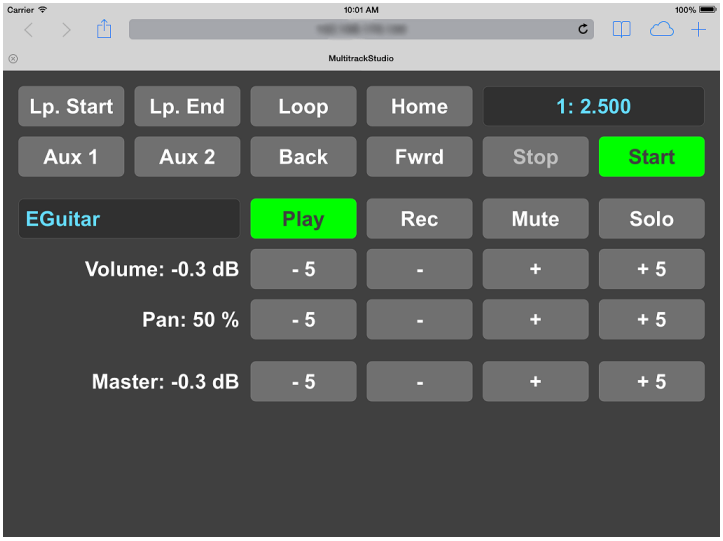
Some lesser-used features aren't easily discoverable:

- The position counter can be tapped to switch between seconds and bars.
- Pressing the position counter for a second moves to the start of the nearest bar.
- Tapping a rotary knob centers it, but only if that makes sense (e.g., Pan, VariSpeed).
- In the Add Track window, you can tap the Add Track title to change it to Add Group / Effect Return.
- Moving a finger horizontally over the current tab (on the left) reveals a Remove button.
- The Set In and Set Out buttons can be pressed for a second to move the transport to the corresponding position.
- Pressing an effect slot for a second pops up the effect selector rather than the effect itself.
- Pressing the Solo button for a second enables "half solo" mode.
- Pressing the Play button for a second switches the track to practice mode.
- Pressing the start/stop button for a second starts cycling.

13.4 Phone/tablet Web Browser

The Remote Control window features **Web Browser (Phone)** and **Web Browser (Tablet)** presets. Once a preset is loaded, MultitrackStudio's network address is shown. You can type this address into your phone or tablet's web browser. The phone/tablet must communicate via WiFi (5G etc. is not supported). Furthermore, the phone/tablet and your computer must both be connected to your home network.





iPhone controlling MultitrackStudio *iPad controlling MultitrackStudio*

The phone preset allows you to control the transport remotely. The upper half of the screen features transport Start/Stop and Home buttons. You can walk through the history of recent transport start positions using the Back and Fwrd buttons. Tapping the position counter takes you to a new page listing all markers. The position counter doesn't show the current position while the transport is running, it will just display "Playing" or "Recording".

The lower half of the screen shows the Play/Rec and Solo buttons of the current track. Tapping the track name box takes you to a page listing all tracks.

The tablet preset allows you to control track volume and pan. The bottom row of buttons controls the master section volume fader. The Aux 1 and Aux 2 buttons can be mapped to an action of your choice using the Remote Control window.

Note: The phone/tablet web page does not get updated automatically when you make changes using the computer mouse or keyboard. Please refresh the browser manually each time you've used the mouse or keyboard.

14 Audio and MIDI Files

14.1 Audio Files

The following audio file formats are supported:

- **.WAV files**: 16-bit mono or stereo (Pro edition also supports 24-bit, 32-bit, and 32-bit float files).
- **.AIF files**: 16-bit mono or stereo (Pro edition also supports 24-bit, 32-bit, and 32-bit float files).
- **.FLAC files**: 16-bit mono or stereo files using lossless compression (Pro edition also supports 24-bit).
- **.GJM files**: 16-bit mono using lossless compression (Pro edition also supports 24-bit).
- **.GJS files**: 16-bit stereo using lossless compression (Pro edition also supports 24-bit).
- **.M4A files**: 16-bit mono or stereo files using lossy compression.
- **.MP3 files**: 16-bit mono or stereo files using lossy compression.
- **.AEM files**: contain references to audio files to play. .AEM files are generated by MultitrackStudio (see Understanding Audio Editing).

The Windows version can open existing .aac, .ac3, .mp4, and .wma files.

The Mac version can open existing .aac, .ac3, .mp4, .aifc, .caf, .snd, .au, and .sd2 files.

WAV files

WAV files can be used with almost any program that supports audio. You need a WAV file to create an audio CD.

AIF files

AIF files are similar to WAV files. They're widely supported on Mac computers but rare on Windows.

FLAC files

FLAC files use lossless compression to reduce file size.
MultitrackStudio generates native FLAC files. It can read native FLAC files and files using an MP4 container.

On Windows, FLAC support requires Windows 10 (since 2015) or newer. On macOS, FLAC support requires macOS 11 or newer.

GJM/GJS files

GJM/GJS files use lossless compression to reduce file size. They can be used in MultitrackStudio only. The compression algorithm 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 compression: if you save a .WAV file in .GJM format and then save that file in .WAV format again, you get exactly the same file.

M4A files

M4A files use a lossy compression algorithm that degrades sound quality. Sound quality tends to be slightly better than MP3.

The Mac version supports lossless ALAC compression.

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 the format suitable for publishing your songs on the internet, or sending them via email.

Each time a new MP3 file is created, the audio quality can be selected: Medium, High, Higher, or Very High. These options correspond to 56, 128, 192, and 256 kbps (stereo files) or 32, 64, 96, and 128 kbps (mono files).

Note for Windows 7 users:
Windows 7 doesn't provide an MP3 encoder. A .dll file is required to create MP3 files:
The 64-bit version expects a "lame_enc64.dll" file in the C:\Program Files\MtStudio folder.
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).
You can search the web for the files mentioned.
If MultitrackStudio can't find a DLL file, any ACM codecs on your system will be used instead.

Legacy files

Existing files of these obsolete types can still be read:

- **.LST files**: pre-MultitrackStudio 5 equivalent of .AEM files.
- **.SAM files**: 16-bit mono headerless raw data files.

14.2 MIDI Files

The following MIDI file formats are supported:

- **.MID files**: Standard MIDI files. Additionally, .MIDI and .KAR files can be imported, pasted or dropped, they'll be renamed to .MID automatically.
- **.MIDI2 files**: MIDI 2.0 Clip Files. This is a recent format that can store MIDI 2.0 features. It isn't widely supported yet.
- **.MPT files**: MIDI Pattern Track files (see MIDI Pattern Editing).

.MID files can be saved as .MPT files and vice versa.

A MIDI file can contain more than one stream (called a "track" in MIDI terminology, but renamed here to avoid confusion). MultitrackStudio supports using multiple streams in a track, although this is not recommended.

MultitrackStudio does not support patch changes within a stream. If a program change or bank change is encountered while opening a file, a new stream will be created. Furthermore, MultitrackStudio streams can only send messages to one MIDI channel (using the channel the program change was sent to). So if a stream in your file sends messages to more than one MIDI channel (which is bad practice anyway), the file may not load as intended.

MIDI 2.0

.midi2 files can't be opened directly in a track. If you import one, it will be converted to a .mid file. The MIDI 2.0 information is retained (see below). Exporting to .midi2 is available in the MIDI Export window and in track editors.

Under the hood
MultitrackStudio stores MIDI 2.0 per-note controls in MIDI 1.0 files as NRPN values. Any software other than MultitrackStudio won't recognize the per-note control values in exported MIDI files, but it will still load the files. The higher MIDI 2.0 resolutions (16 bits for velocity, 32 bits for controllers, etc.) are preserved in .mid files used in tracks as well, again using NRPN parameters. The high resolutions do not appear in exported .MID files, unlike per-note controls.

15 Touch and Pen

Note: touchscreen support is available for Windows only

MultitrackStudio can be controlled using a touchscreen or a pen (stylus).

There is a special "Pen with touch scrolling" mode to make the most of devices like the Microsoft Surface.

15.1 Touch

Note: touchscreen support is available for Windows only

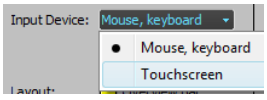
MultitrackStudio features a touchscreen mode that makes the program easy to use with tablets, convertible notebooks, and touchscreen monitors. You can interact with the knobs on the screen directly, without having to find and move the mouse first.

MultitrackStudio on Surface Pro tablet with Ultra Dark theme

Quickstart: 3 tips

1: Switch to touchscreen mode

MultitrackStudio will propose touchscreen mode if a touchscreen is detected. If it does not, you can 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, because mouse movements will be treated as touch.



Input Device selector

In touchscreen mode, some controls are larger to make them easier to use. The transport buttons are an example of this. Controls that don't get visibly larger still respond to a bigger area for ease of use with touch.

2: Check Windows DPI setting

Touchscreens are hard to use if controls 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 ensure tracks are not smaller than this. You can increase the DPI value even more if the touchscreen is still difficult to use. If you'd rather not change the Windows DPI setting, you can go to the Studio menu's Preferences window and use the Size setting to scale MultitrackStudio independently of the Windows DPI setting.

3: Use full screen mode

It is highly recommended to use full screen mode. The knobs at the top and the bottom bar are much easier to operate this way, and you avoid the risk of touching the "X" button or Windows taskbar accidentally. There is a button in the bottom-right corner of the main window to enter or leave full screen mode.

In depth: using user interface elements with touch

Some things work a bit differently with touch compared to using a mouse:

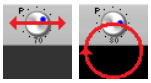
Mixer faders

- Place a finger on the fader and move it horizontally. The fader thumb does not move as fast as your finger, allowing for accurate control.
- Tapping the left half moves it down one step, tapping the right half moves it up one step.

Fader

Rotary knobs

- Place a finger on the knob and either move it horizontally or make a rotating motion below the knob.
- Tapping the left half moves it down one step, tapping the right half moves it up one step.



Knob

Buttons/boxes with right arrows (like the Input button)

- Place a finger on the button or box and move it horizontally. After moving about half a centimeter, a white area becomes visible, representing the menu that will appear when you lift your finger from the screen.

Input button about to show menu

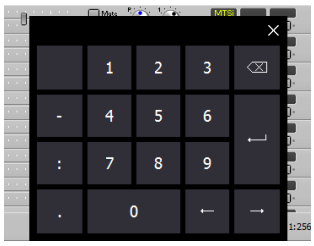
Up/down buttons

- Place a finger on the button and move it approximately 2 centimeters up or down to increase or decrease the value. If you keep your finger on the screen, the button will continue to increase or decrease the value automatically.

Up/down button

Text boxes

- An onscreen keyboard appears when you tap a text box. Use the keyboard's Enter key to confirm the new value, or close the keyboard to cancel.



Touch keyboard for position counter

Effect/Instrument slots

- Press and hold to open the effect/instrument selector for a non-empty slot (keep your finger down for about a second).
- To move a slot, start by moving it horizontally, even if you intend to move it vertically.

Overview Bar

- Even though markers appear at the bottom, you can (and should) touch them as if they span the full height.
- Use the position counter menu to add or delete markers. (Tap the marker before opening the menu to delete it.)
- You can pull down a marker to open a menu with options (see the "Buttons/boxes with right arrows" paragraph above).
- You can't change the transport position while recording, to avoid accidental changes.

Tapping a marker

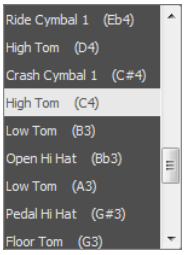
Transport

- Move your finger horizontally over the transport position counter to step through recent start positions (just like pressing Alt+Left/Right Arrow).

Step through start history

Lists with a vertical scrollbar

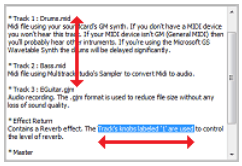
- Place a finger on the list contents and move it up or down. No need to use the scrollbar.



Scrolling a list

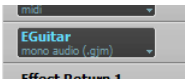
Text in Comments window and Chords/Lyrics editors.

- An onscreen keyboard appears when you tap the text box.
- If there's a vertical scrollbar, you can scroll by moving your finger up or down directly on the text. No need to use the scrollbar.
- Select text by moving your finger horizontally. Once the editor detects a selection gesture, you can move vertically too.
- With a multi-touch screen, use two-finger pinch gestures to zoom text in or out.


Text box: scrolling and selecting

Moving mixer sections

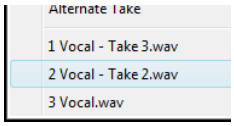
- To move a single section, place a finger on a track's file name box (or corresponding area in an Effect Return etc.), then move it a few centimeters horizontally before moving vertically. Moving vertically immediately will scroll all mixer sections instead.



Move right before moving vertically to drag section

Track file history

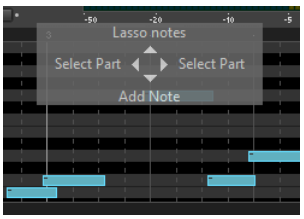
- When you tap a file, a message box appears so you can choose whether to open it in the current track or in a new one.



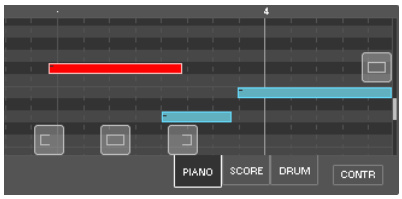
A track's file history

Editors

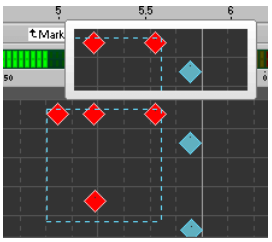
- The mode buttons in the editor's bottom-left corner aren't available. A mode selector appears when you touch the editor for about half a second (you can adjust this delay in the Preferences window). Move your finger in the desired direction (left, right, up or down) to select an action.
- Selected parts can be moved directly. Touch handles appear near the edges of small items like notes or dots to make them easier to drag. You can also change a note's duration using a touch handle.
- You can scroll an editor horizontally using one finger. Vertical scrolling works too, where applicable. With a multi-touch screen, you can zoom horizontally using two fingers. In the pianoroll, score, and audio editors, you can also zoom vertically using two fingers.
- While adjusting the start or end of a selected part, zoom in by moving your finger down (towards the bottom of the screen). The editor zooms in until you release your finger again. This helps set start/end points precisely without manually zooming.
- When lassoing notes, a copy of the lassoed area appears above the editor so you can see what your finger is covering.
- A semi-transparent "touchthumb" appears on the editor for moving the needle. The timeline bar above the editor cannot be used with touch. Double-tapping the touchthumb starts playback. Tap-and-drag activates cycling.
- The SEL ALL button is replaced by a SEL button, which opens a menu with options to select a part, play it in a loop, or stretch it.



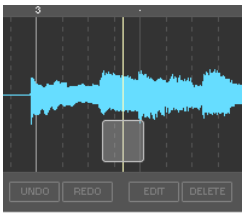
Mode selector (pianoroll)



Selected note with touch handles (pianoroll)



Lassoing (drum editor)



Touchthumb (audio editor)

Main window

- If the main window has a vertical scrollbar, place a finger anywhere on any mixer section and move it vertically to scroll all mixer sections.

Menus

- Tap outside a menu to close it.

Touch hardware and Windows versions

A tablet or convertible notebook (where the lid flips so the screen faces outward when closed) works well. Another good option is a touchscreen on a stand, connected to your computer. It's best if the screen is angled toward you.

The best experience comes from using a multi-touch screen. Multi-touch lets you use multiple fingers at once. The onscreen MIDI keyboard benefits from this, and two-finger zooming becomes available.

MultitrackStudio also works with single-touch screens or older versions of Windows. Be aware that resistive touchscreens (often found in older monitors) require more pressure and make finger-dragging difficult. These are not recommended, as they make faders, knobs, and editors hard to control.

Features not available in touchscreen mode

Some features aren't available in touchscreen mode. Most notably:

- Labels aren't available.
- Collapsing mixer sections isn't possible. The buttons would get in the way, and the collapsed sections would be too small.
- The editors' Time Warp feature currently doesn't support touch.

15.2 Pen

MultitrackStudio can be controlled using a pen (stylus) instead of a mouse. It basically works just like a mouse, but there are some convenient extras:

- You can scroll mixer sections vertically by grabbing a mixer section and moving the pen. Do not place the pen on a control (a knob, a button, etc.). Using the level meter is OK.
- Pianoroll and Score editors can be scrolled vertically using the left hand part of the editor.
- Editors can be scrolled horizontally using the main window's bottom bar.
- You can pull a track's Edit button horizontally to open its right-click menu.
- You can pull a mixer section's collapse button (in the top-right corner) horizontally to open its right-click menu.
- On the Overview Bar, you can pull down a marker to open a menu with options.
- You can press an effect/instrument slot for a second to open the effect/instrument selector.
- There are onscreen keyboards for typing text (see the "Keyboards for Pen" button in the Preferences window).

Important note for Windows 10/11 users

Windows 10 build 1709 (Fall 2017) changed the way the pen works by default: moving the pen now causes the window to scroll rather than move notes, etc.
You need to change a setting in Windows to restore the previous behavior:

- Windows 10: Go to the "Pen & Windows Ink" settings and check the "Let me use my pen as a mouse in some desktop apps" option.
- Windows 11: Go to the "Pen & Windows Ink" settings and check the "Let me use my pen as a mouse when it's available" option.

15.3 Microsoft Surface

The Microsoft Surface Pro not only features multitouch but also includes an active pen. MultitrackStudio offers a "Pen with touch scrolling" mode to take full advantage of these capabilities. This mode should also work with devices other than the Surface Pro, provided it supports both multitouch and an active pen.

The "Pen with touch scrolling" mode is designed to work primarily with the pen. You can use touch to scroll and zoom editors, scroll mixer sections vertically, scroll through lists, and play the onscreen MIDI keyboard. All other touch interactions are ignored, so you won't accidentally tap anything with your palm.

"Pen with touch scrolling" mode is ideal for MIDI editing because the pen is much more precise than a finger. You can edit quickly with the pen and navigate smoothly using touch.

A button is available in the main window to switch between pen and touch mode quickly. This button appears next to the Studio button. It is shown when the "Input Device" setting (see Preferences) is set to either Touchscreen or "Pen with touch scrolling".

Touch / Pen button

In "Pen with touch scrolling" mode, the pen behaves slightly differently compared to the standard pen mode to better match the touchscreen interaction style. Most notably, resizing notes in the piano roll editor works similarly to the touchscreen method.

Tip: you can disable the Surface's Windows button (in the bezel) using the Surface app to avoid pressing it accidentally.

16 Keyboard Shortcuts

16.1 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**: Start/stop transport. The "media start/pause" key works too.
- **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.
  Various keys can be combined with the left/right arrow keys:
  - **Alt**: Step through history of recent start positions (and the last stop position if transport is stopped). These positions are also available from the Transport menu.
  - **R**: Go to start/end of last recording.
  - **M**: Go to previous/next Marker.
  - **L**: Go to start/end of loop.
  - **B**: Go to previous/next bar.
  - **Shift-B**: Go to previous/next beat.
  - **S**: Go back/forward one second.
  - **I**: Go back/forward one minute.
  - **Q**: Go back/forward one quarter hour.
  - **H**: Go back/forward one hour.
  - **Ctrl**: Go back/forward one editor pixel. The actual amount of time depends on the zoom level.
- **Page Up/Down**: Go back/forward one editor page. The actual amount of time depends on the zoom level and the window width.
- **Ctrl+L**: Toggle Loop button.
- **F6**: Loop selected part of focused track.
- **F7**: Set looping region start point.
- **F8**: Set looping region end point.
- **L+Space Bar**: Engage the Loop button and start transport.
- **Ctrl+-**: Zoom Out.
- **Ctrl++**: Zoom In.
- **Ctrl+Shift+R**: Toggle Automation Recording button.
- **Ctrl+Shift+T**: Toggle Automation Touch Mode button.

These work in the main window only:

- **Ctrl+M**: Add Marker.
- **Ctrl+Alt+V**: Show/Hide VariSpeed control *(Pro edition only)*.

Main Window

- **Up/Down Arrow**: Scroll mixer sections up/down. Add Ctrl key to scroll one page. In "Multiple Columns of Mixer Sections" mode (see Preferences) these keys scroll one section's width left or right.
- **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 Windows audio recording settings.
- **Ctrl+J**: Toggle Soft Monitoring.
- **Ctrl+P**: Toggle Punch In/Out recording.
- **Ctrl+Q**: Toggle Sound On Sound recording.
- **Ctrl+T**: Add empty track.
- **Ctrl+Alt+A**: Add Audio Track.
- **Ctrl+Alt+M**: Add MIDI Track.
- **Ctrl+Alt+I**: Import audio/MIDI file.
- **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 MIDI Keyboard Mapper window.

- **Insert**: Toggle Ripple button.
- **Ctrl+G**: Toggle Snap button.
- **Ctrl+B**: Toggle Bars button.
- **Ctrl+F**: Toggle Follow button.
- **Ctrl+E**: Show Tempo / Time Signature Editor.
- **Ctrl+Alt+E**: Show Song Editor.
- **Ctrl+U**: Show Multi MIDI Editor with all MIDI tracks.
- **Ctrl+Alt+U**: Show Multi MIDI Editor with MIDI tracks that have same color as focused track.
- **Ctrl+H**: Show Chords Editor.
- **Ctrl+Alt+H**: Show Lyrics Editor.

- **Ctrl+O**: Show Audio Output Control.
- **Ctrl+D**: Show Devices window.
- **F11**: Enter / leave full screen mode.
- **F1**: Show help on the control the mouse points to.

- **E+Up Arrow**: Close all editors. Collapses all mixer sections if all editors are closed already.
- **E+Down Arrow**: Expand all mixer sections. Opens editor of focused track if all mixer sections are expanded already.
- **E+Left Arrow**: Temporarily switch off the "Align Editors with Editor Preview panes" option, this expands the editors to the left.
- **E+Right Arrow**: Temporarily switch on the "Align Editors with Editor Preview panes" option, this shrinks the editors to the right.
  The E+Left Arrow and E+Right Arrow options don't change the setting in the Preferences window.

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 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.

Chords/Lyrics editors:

- **Tab / Shift+Tab**: Go to next/previous bar.
- **Ctrl+-**: Zoom Out.
- **Ctrl++**: Zoom In.

Add Audio Track window

- **Ctrl+M**: Mono.
- **Ctrl+S**: Stereo.
- **Ctrl+N**: Show "Number of tracks" box *(Pro edition only)*.

Effect/Instrument selectors

- **F5**: Rescan CLAP / VST plugins.

Effect/Instrument windows

- **F3** or **Ctrl+F**: Show effect/instrument selector.
- **F5**: Reset Level History (Compressor, Dynamics, Noise Gate), Reset spectrum averaging (EQ), Reload plugin (CLAP / VST plugin window).
- **S+Left Arrow**: Close this window and open the first slot on the left that isn't empty.
- **S+Right Arrow**: Close this window and open the first slot on the right that isn't empty.
- **Ctrl+M**: Reset custom remote control knob mappings.

MultitrackStudio Instruments window

- **Up/Down Arrow**: Step through available instruments.

External MIDI Instrument window

- **Up/Down Arrow**: Step through available patches.

Alt key shortcuts

Most windows, including the main window, feature Alt key shortcuts. 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

- **Alt** (on Overview Bar thumb): drag to select looping region and start transport.
- **Shift** (on Start button): Start at last start position.
- **S** (on Start button): Re-Arm (engage the Rec buttons of the last recorded tracks).
- **T** (on counter): Show text edit box to type new value.

Rotary Knobs

- **A**: Show automation editor.
- **T**: Show text edit box to type new value.
- **C**: Move to center position.

Faders

- **A**: Show automation editor.
- **T**: Show text edit box to type new value.

Effect Slots

- **B**: Toggle effect's Bypass button.
- **A**: Open all slots in the same group of slots (eg. all slots in a track, or in a Multi Effect etc.).

Track buttons

The Play, Rec, Mute, Edit and collapse buttons of all tracks will be toggled if you keep the "A" (or Ctrl) key down while clicking a button.
You can use the "C" (or Alt) key to toggle same-color tracks only. This also works with the Solo buttons.

"A" and "C" can also be used on Editor Preview panes, and on collapsed tracks.

Note: you can use Click..Shift+Click to toggle a continuous group of tracks (click a button on the first track, and then shift-click the same button on the last track).

Editor Time Bars

- **Alt**: drag to select looping region and start transport.

Audio/MIDI editors

- **Alt** (on edges selected part): Stretch selected part.
- **Alt** (in selected part): Time Warp selected part.

Pianoroll, Score and Drum editor notes

- **V**: Velocity 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).
- **L**: Legato (extend duration to next note).
- **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.
- **3**: Make it a quarter note.
- **4**: Make it an 8th note.
- **5**: Make it a 16th note.
- **6**: Make it a 32nd note.
- **A**: Add/remove dot (score only).
- **Shift**: Ignore the Snap button, so you can add/move notes anywhere.
- **M**: Move to active color (Multi MIDI Editor pianoroll).

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.).

The **1**..**6** and **A** modifiers can also be used on the score editor's "Duration of new notes" box.

Mouse wheel

The mouse wheel or touchpad can be used in various places:

- Move mixer sections vertically.
- Move faders and rotary knobs (in main window use horizontal movements or add the Shift key).
- Scroll lists.
- Scroll MIDI editors vertically.

Combined with Shift key:

- Zoom editors horizontally.

Combined with Ctrl key:

- While mouse is over left hand side of editor: zoom editor vertically.
- Zoom Lyrics Prompter.

16.2 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** or **Option-Right Arrow**: Go to end of song.
- **Space Bar**: Start/stop transport.
- **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.
  Various keys can be combined with the left/right arrow keys:
  - **Command**: Step through history of recent start positions (and the last stop position if transport is stopped). These positions are also available from the Transport menu.
  - **R**: Go to start/end of last recording.
  - **M**: Go to previous/next Marker.
  - **L**: Go to start/end of loop.
  - **B**: Go to previous/next bar.
  - **Shift-B**: Go to previous/next beat.
  - **S**: Go back/forward one second.
  - **I**: Go back/forward one minute.
  - **Q**: Go back/forward one quarter hour.
  - **H**: Go back/forward one hour.
  - **Ctrl**: Go back/forward one editor pixel. The actual amount of time depends on the zoom level.

- **Page Up/Down**: Go back/forward one editor page. The actual amount of time depends on the zoom level and the window width.
- **Command-L**: Toggle Loop button.
- **F6**: Loop selected part of focused track.
- **F7**: Set looping region start point.
- **F8**: Set looping region end point.
- **L+Space Bar**: Engage the Loop button and start transport.
- **Command--**: Zoom Out.
- **Command-+**: Zoom In.
- **Shift-Command-R**: Toggle Automation Recording button.
- **Shift-Command-T**: Toggle Automation Touch Mode button.

These work in the main window only:

- **Option-M**: Add Marker.
- **Option-Command-V**: Show/Hide VariSpeed control *(Pro edition only)*.

Main Window

- **Command-S**: Save song.

- **Command-I**: Show System Preferences audio settings.
- **Command-J**: Toggle Soft Monitoring.
- **Command-P**: Toggle Punch In/Out recording.
- **Option-Command-P**: Toggle Sound On Sound recording.
- **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 MIDI Keyboard Mapper window.

- **Command-R**: Toggle Ripple button.
- **Command-G**: Toggle Snap button.
- **Command-B**: Toggle Bars button.
- **Command-F**: Toggle Follow button.
- **Command-E**: Show Tempo / Time Signature Editor.
- **Option-Command-E**: Show Song Editor.
- **Command-U**: Show Multi MIDI Editor with all MIDI tracks.
- **Option-Command-U**: Show Multi MIDI Editor with MIDI tracks that have same color as focused track.
- **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 an 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. In "Multiple Columns of Mixer Sections" mode (see Preferences) these keys scroll one section's width left or right.
- **Ctrl-A**: Open Add Track menu.
- **Ctrl-B**: Edit BPM box.
- **Ctrl-E**: Open Edit menu.
- **Ctrl-I**: Edit Time Sig box.
- **Ctrl-L**: Open Songlist menu (if songlist bar is visible).
- **Ctrl-N**: Open transport position counter 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 counter 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-F1**: Open first slot (effect/instrument) focused section.
- **Ctrl-F2**: Open second slot focused section.
- **Ctrl-F3**: Open third slot focused section.

Note: macOS may override the Ctrl-function key shortcuts.

- **E-Up Arrow**: Close all editors. Collapses all mixer sections if all editors are closed already.
- **E-Down Arrow**: Expand all mixer sections. Opens editor of focused track if all mixer sections are expanded already.
- **E-Left Arrow**: Temporarily switch off the "Align Editors with Editor Preview panes" option, this expands the editors to the left.
- **E-Right Arrow**: Temporarily switch on the "Align Editors with Editor Preview panes" option, this shrinks the editors to the right.
  The E-Left Arrow and E-Right Arrow options don't change the setting in the Preferences window.

Editors

Most editors can be operated using the standard macOS keyboard shortcuts. A track editor can only be controlled using keyboard shortcuts if the track has focus.
The following shortcuts are supported:

- **Command-/**: Edit.
- **Command-Z**: Undo.
- **Shift-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.

Chords/Lyrics editors:

- **Tab / Shift-Tab**: Go to next/previous bar.
- **Command--**: Zoom Out.
- **Command-+**: Zoom In.

Add Audio Track window

- **Command-M**: Mono.
- **Command-S**: Stereo.
- **Command-N**: Show "Number of tracks" box *(Pro edition only)*.
- **Ctrl-T**: Open Type selector.
- **Ctrl-C**: Open Channels selector.
- **Ctrl-Q**: Open Quality selector.

Effect/Instrument selectors

- **Command-R**: Rescan CLAP / VST plugins.

Effect/Instrument windows

- **Command-F**: Show effect/instrument selector.
- **Command-R**: Reset Level History (Compressor, Dynamics, Noise Gate), Reset spectrum averaging (EQ), Reload plugin (AU / CLAP / VST plugin window).
- **Command-M**: Reset custom remote control knob mappings.
- **S+Left Arrow**: Close this window and open the first slot on the left that isn't empty.
- **S+Right Arrow**: Close this window and open the first slot on the right that isn't empty.
- **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-F1**: Open sidechain source menu.

MultitrackStudio Instruments window

- **Up/Down Arrow**: Step through available instruments.

SoundFont Player window

- **Up/Down Arrow**: Step through presets provided by current soundfont.

External MIDI Instrument window

- **Up/Down Arrow**: Step through available patches.

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

- **Option** (on Overview Bar thumb): drag to select looping region and start transport.
- **Shift** (on Start button): Start at last start position.
- **S** (on Start button): Re-Arm (engage the Rec buttons of the last recorded tracks).
- **T** (on counter): Show text edit box to type new value.

Rotary Knobs

- **A**: Show automation editor.
- **T**: Show text edit box to type new value.
- **C**: Move to center position.

Faders

- **A**: Show automation editor.
- **T**: Show text edit box to type new value.

Effect Slots

- **B**: Toggle effect's Bypass button.
- **A**: Open all slots in the same group of slots (eg. all slots in a track, or in a Multi Effect etc.).

Track buttons

The Play, Rec, Mute, Edit and collapse buttons of all tracks will be toggled if you keep the "A" (or Command) key down while clicking a button.
You can use the "C" (or Option) key to toggle same-color tracks only. This also works with the Solo buttons.

"A" and "C" can also be used on Editor Preview panes, and on collapsed tracks.

Note: you can use Click..Shift-Click to toggle a continuous group of tracks (click a button on the first track, and then shift-click the same button on the last track).

Editor Time Bars

- **Option**: drag to select looping region and start transport.

Audio/MIDI editors

- **Command** (on edges selected part): Stretch selected part.
- **Command** (in selected part): Time Warp selected part.

Pianoroll, Score and Drum editor notes

- **V**: Velocity 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).
- **L**: Legato (extend duration to next note).
- **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.
- **3**: Make it a quarter note.
- **4**: Make it an 8th note.
- **5**: Make it a 16th note.
- **6**: Make it a 32nd note.
- **A**: Add/remove dot (score only).
- **Shift**: Ignore the Snap button, so you can add/move notes anywhere.
- **M**: Move to active color (Multi MIDI Editor pianoroll).

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.).

The **1**..**6** and **A** modifiers can also be used on the score editor's "Duration of new notes" box.

Trackpad gestures

Trackpad gestures can be used in various places.

Two finger swipe:

- Move mixer sections vertically.
- Move faders and rotary knobs (only horizontal movements work in main window).
- Scroll lists.
- Scroll editors horizontally.
- Scroll MIDI editors 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 mixer sections vertically.
- Move faders and rotary knobs (in main window use horizontal movements or add the Shift key).
- Scroll lists.
- Scroll MIDI editors vertically.

Combined with Command key:

- Zoom editors horizontally.
- While mouse is over left hand side of editor: zoom editor vertically.
- Zoom Lyrics Prompter.

17 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.
- **Language**: Can be set to English, Deutsch (German), or Nederlands (Dutch). The Auto option uses one of this based on the system language. Language setting changes take effect after restarting MultitrackStudio.
  macOS always displays the help information in the system language, not in the language selected in MultitrackStudio. When changing the language, the computer may need to be restarted for macOS to use the correct language.
- **Size**: If you have trouble reading or using the user interface, you can make it larger. Changes take effect after restarting MultitrackStudio.
  Windows: The Auto option uses the Windows DPI setting. The "Plugin Scaling (blurry)" option makes the program not DPI-aware, so Windows scales it automatically. This looks blurry but also scales plugins. Only use this if the Plugin Manager's scaling option does not work properly with your plugins. The scaling value for plugins depends on the Windows DPI setting exclusively. MultitrackStudio itself uses the scaling value from the Size box (sizes smaller than the Windows DPI setting cannot be used).
- **Layout**: 3 predefined layouts are available:
  1. **Desktop**: Transport control in the center, editors aligned with editor preview panes.
  2. **Laptop**: Full-width editors.
  3. **Classic**: Looks like older MultitrackStudio versions (meters on the right, no editor preview panes).

  The 4th option ('Custom') lets you choose your own preferences:
  - **Transport at center**: Places the transport control in the center, making it easier to reach on large screens.
  - **Meters Left**: Places the level meters between the Rec button and the Volume fader.
  - **Large Meters**: Uses larger level meters.
  - **Editor Preview panes**: Tracks can have an Editor Preview pane that displays a compact view of the data in the track editor. Editor Preview panes appear only if there is enough room.
  - **Align Editor with Editor Preview panes**: An open track editor will replace the Editor Preview pane.
  - **Editor Preview panes replace Edit buttons**: If enabled, the editor preview pane can be clicked to open/close the track editor.
  - **Hide Editor Preview pane if Editor is visible**: This option provides a cleaner look and is enabled by default.
  - **Multiple Columns of Mixer Sections**: This option arranges mixer sections in multiple columns instead of just one. If the sections do not fit the screen, a horizontal scrollbar appears. This can be used for dual-monitor setups.
- **Effect Slots**: Mixer sections can have 3, 4, 5, or 6 effect slots. If a song is opened in a version of MultitrackStudio that supports fewer slots, the extra effects will appear in a Multi Effect.
- **Name Width**: Changes the width of the track name boxes.
- **CPU Usage**: Shows CPU usage on the bottom bar.
- **Free Disk Space**: Shows free disk space (available audio recording time) on the bottom bar.
- **Input Device** *(Windows only)*: Choose Touchscreen if you're using a touchscreen, choose "Mouse, Keyboard" otherwise. If the computer has a pen, there's also a "Pen with touch scrolling" option.
- **Show tooltips**: Shows a tooltip when the mouse hovers over a control. Note that many tooltips provide helpful information you will not see if this is disabled.
- **Keyboards for Pen**: Show the onscreen keyboard when tapping a text box with a pen.
- **Knob Style**: With the Rotary style, you can "grab the dot" and move it. Use the Vertical/Horizontal style if you prefer horizontal or vertical mouse movements.
  If Input Device is set to Touchscreen *(Windows only)*, the Knob Style selector offers Horizontal/Rotating and Vertical styles. With Horizontal/Rotating, you can either move your finger horizontally or draw a circle below the knob. The Vertical style uses vertical movements only. Note that the Vertical style does not allow for vertical scrolling of mixer sections while touching a Pan or Effect Send knob.

Transport:

- **Stop playback at end of song**: Stops transport when it reaches the end of the Overview Bar. That is, the end of the longest track or the last marker, whichever comes last. Reverb tails etc. are played back

correctly, so it may play past the end of the overview bar and then jump back. Transport will not stop if any tracks are recording.
- **Rewind on stop**: When transport stops, it rewinds to the position where playback started.
- **Mute click track during playback**: Engages the click track's Mute button when playback starts, and unmutes it when transport stops. Use this to hear the click track only during recording.
- **Switch counter to bars automatically**: Switches the transport counter and overview bar to bars if there is at least one MIDI track in the song.

Editors:

- **Scrubber on track editors**: Enables or disables scrubbing in the track editor. Also affects MIDI note lassoing.
- **Show all buttons (no "More")**: Hides the MORE button and displays all available options directly.
- **"Wave" tab (MIDI editors)**: Adds a "Wave" tab to the PIANO/SCORE/DRUM tabs. The Wave editor shows MIDI data as if it were an audio signal.
- **Switch grid to bars automatically**: Changes the time grid to bars if there is at least one MIDI track in the song.
- **Default MIDI Editor**: The MIDI editor-type used for new tracks.
- **Default Mode (MIDI)**: Determines which of the three buttons in the bottom-left corner of MIDI editors is enabled by default. Defaults to Select Part, which works similarly to audio editors and is useful for MIDI recording. You might prefer Select Notes or Add Notes if you frequently enter notes using the mouse.
- **Touch mode selector delay** *(Windows only)*: Sets how long it takes for the touch selector to appear when touching an editor. A shorter delay allows for quicker editing but may cause unintended popups. Affects touchscreen only.
- **Left-handed touch handles** *(Windows only)*: Places handles used for moving notes, etc., on the left side. You may prefer this if you're left-handed. Affects touchscreen only.

General:

- **Save 'everything' in song**: By default, songs only remember what is necessary for playback. With this option, songs can remember almost everything visible on screen (open editors, top window buttons, loop points, transport position, etc.). There will obviously virtually always be a "save?" prompt when unloading a song. Undo histories are not saved. Versions and templates do not include these extras.
- **Middle C Name**: Sets the name of MIDI note 60. Options are C3, C4, or C5 (default is C5).
- **Default Instrument**: Sets the default MIDI instrument for new tracks. Options are "MultitrackStudio Instruments" and "External MIDI Instrument 1".
- **MIDI File Format**: Sets the timing resolution for saving MIDI files. "480 ticks per quarter note" (default) is the most compatible option. "30 frames per sec./200 ticks per frame" offers higher resolution but may not be widely supported, especially by music notation software.
- **Presets, Export**: Saves all presets and templates to a zip file.
- **Presets, Import**: Reads presets and templates from a zip file.
- **Show "Don't show again" messages again**: Makes all previously hidden messages appear again.

Folders:

- **Root Folder for New Songs**: A new subfolder is created here for each new song. Defaults to "My Documents\MultitrackStudio Songs" (Windows) / "/Users/*username*/Music/MultitrackStudio Songs" (Mac).
- **Sampler patches**: Specifies the folder containing sampler patches.
- **Convolutor impulse responses**: Specifies the folder containing impulse responses. This is empty by default. You can create a folder for your IR files and select it here. Subfolders appear as Categories in Impulse Response Selectors.

18 Tools

The following tools are available from the Studio → Tools menu:

- **Sample Rate Converter**
- **Stereo Merger**

Sample Rate Converter

Changes the sample rate of a file. You can convert between 44.1 kHz and 48 kHz, for example. The sample rate can be thought of as the digital equivalent of an analog tape recorder's tape speed.

The **Noise Shaping** button determines whether or not to apply noise shaping to the dither signal.

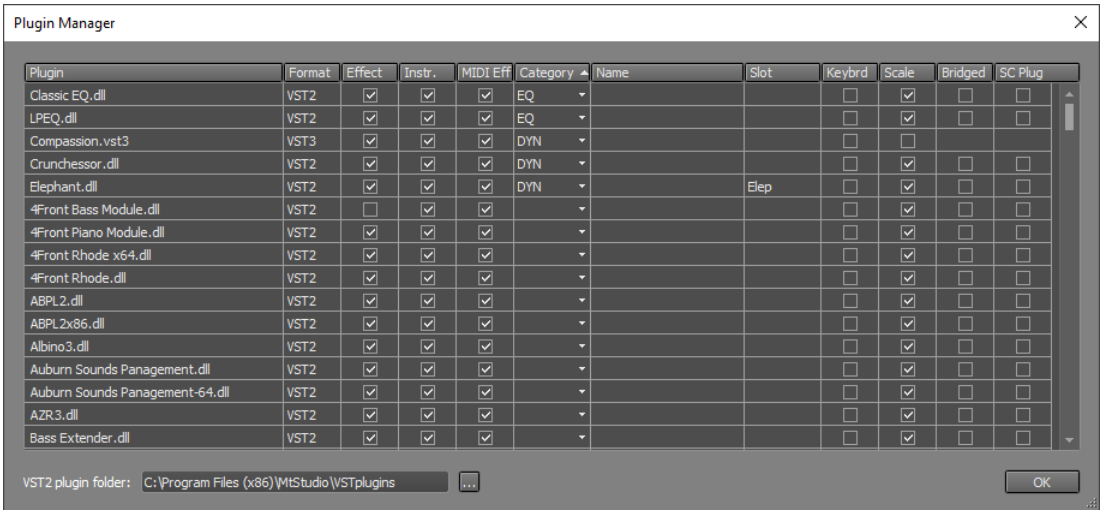
Stereo Merger

The Stereo Merger takes two mono audio files and merges them into one stereo audio file. One mono file is used for the left channel, the other for the right channel.

19 Miscellaneous

19.1 Plugin Manager

The Plugins section of a selector features a ☰ button on the right. You can click it to open the Plugin Manager. Alternatively, you can right click a plugin in the selector and choose "Show in Plugin Manager".



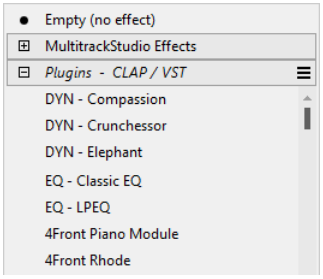
Plugin Manager window

Hide from Effect/Instrument/MIDI Effect selector

MultitrackStudio tries to show plugins in the appropriate selectors only, but it errs on the side of caution. You can manually hide a plugin from some or all selectors. In the Effect, Instr, and MIDI Eff columns, you can tick whether the plugin should appear in the relevant selector.

Categories

You can assign category names to plugins in the Category column. These categories appear in the plugin selectors. A plugin named "My Compressor" with a category name "COMP", for example, will appear as "COMP - My Compressor" in the effect selector. Plugins with a category will appear at the top of the plugin list.



Categories in effect selector

It s best to use very short category names so they fit within the selectors.

Override name

You can override the name that appears in the selectors in the Name column.

Override slot text

By default, the first 4 or 5 characters of a plugin s name appear in effect/instrument slots. You can override these texts in the Slot column This is useful if several plugin names begin with the same company name, for example.

Note: slot texts must be very short, typically no more than 4 or 5 characters.

Keyboard Focus

MultitrackStudio tries to prevent plugins from stealing keyboard shortcuts for transport control (see Controlling the Transport). If this causes problems, you can check the Keybrd box to disable this feature.

Scaling

Note: Scaling is available for Windows only.

Many VST plugins don't scale their UI, so they appear very small on a 4K monitor. If the Scale box is checked, MultitrackStudio will let Windows scale the UI, provided the following conditions are met:

1. Windows system scaling is set to 150% or higher.
2. The plugin doesn't scale the UI itself (as detected by MultitrackStudio).
3. The scaled UI fits on the screen.
4. Windows 10 version 1803 (April 2018) or later is installed.

Note: Scaling may not work properly with some plugins.

The Scale option is enabled by default for VST2 plugins.

Bridging

Note: Bridging is available for Windows only.

Tick the Bridged box to run a VST2 plugin "bridged". Bridged plugins run in a separate process, so they can't crash MultitrackStudio. See also VST Plugins.

Note: You don't need to check this option to use a 32-bit plugin in 64-bit MultitrackStudio or vice versa. This is handled automatically.

Sidechain input plugins

Some older VST2 plugins use a second plugin to receive sidechain input. This setup doesn't work reliably on multi-core systems. The "SC Plug" box adds a "Sidechain" box to the plugin window, where you can load the input plugin and use MultitrackStudio's built-in sidechain routing.

Under the hood
Plugin Manager settings are stored in a file called "C:\Users\Username\AppData\Roaming\MtStudio\Plugins.txt" (Windows) / "/Library/Application Support/MultitrackStudio/Plugins.txt" (Mac).

VST2 Plugin folder

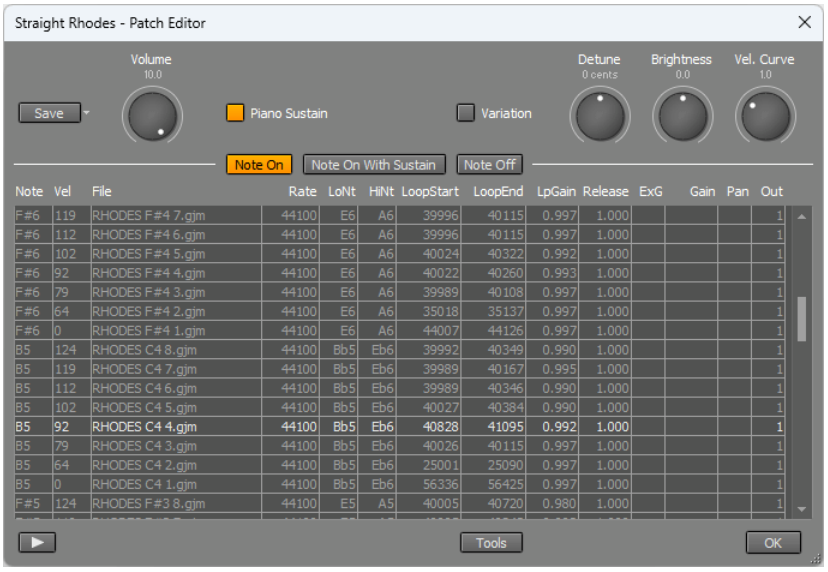
Windows: Specifies the VST2 folder. All VST2 plugins you want to use should be located in this folder or one of its subfolders. See also Customizing the VST folder.

Note: The 64-bit version will ask for permission to run MtStudio.exe as Administrator. This is required to update the registry, so VST2 plugin installers can locate the VST2 folder.

Mac: VST2 plugins are typically located in the user's or system Library/Audio/Plug-ins/VST folder, so there s usually no need to specify a folder here. You can specify an additional folder if needed.

19.2 Patch Editor

The Patch Editor allows you to modify existing Sampler patches or create new ones.



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 (e.g., a single piano key).

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.

The main grid lists the samples and their properties. The highlighted row can be edited. You can highlight a row by clicking it. You can click the button in the bottom-left corner to play the highlighted sample.

For every sample the following properties must be defined:

- **Note**: The note of the recorded sample (e.g., "C5")
- **Velocity**: The velocity layer the sample is in. The value is the lower limit.
- **File**: Audio file containing the sample. Can be either mono or stereo.
- **Rate**: The sample rate of the audio file (e.g., 44100). This parameter can also be used for fine-tuning (example: multiplying the sample rate by 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 of each loop iteration compared to the previous one (e.g., "0.900"). If LoopGain equals the sample's level at LoopEnd divided by the level at LoopStart, a natural decay results.
- **Release**: The time it takes to reach 60 dB attenuation after a note-off event is received. If this value is empty, an infinite release time is used, meaning the sample will play until it reaches the end. This is useful for drum patches.
- **Exclusive Group**: Only one note can be active at a time per group, so currently playing notes will stop when a new one is triggered. This can be used to mute a hi hat when it is closed. Values range from 1 to 255 (0 = none).
- **Gain**: Gain level, where 1.000 is neutral.
- **Pan**: Pan position, where 50 is center.
- **Output**: Sends sound to output mixer channel 1..8. There is no output mixer if all samples use output 1.

You can add multiple samples with the same note and velocity. They will be used in round-robin fashion. All such samples should have identical Lowest Note and Highest Note values.

Sustain, release, and pedal noise samples

"Note On with Sustain" and "Note Off" samples are typically used in large piano patches.
"Note On with Sustain" samples are used instead of "Note On" samples if the Sustain controller is 64 or higher at the time the note is played.
"Note Off" samples are triggered when a note ends. The **Match Note-Off Levels** button can be used to automatically match the level of the "Note Off" sample to the current level of the playing note. The sample's Gain property sets the maximum level in this situation.

The highest note (G10) samples of the "Note On with Sustain" and "Note Off" types 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 piano pedal noise.

General Controls

- **Volume**: The overall level of the patch.
- **Piano Sustain**: Makes the sustain pedal behave like it does on a piano, i.e., it can still "catch" keys that have already been released but whose strings have not yet been completely dampened.

These controls provide the default values for their counterparts in the Sampler itself:

- **Variation**: Subtly changes the brightness and volume level of each note. This makes the instrument sound more natural. It also helps prevent the "machine-gun" effect when notes are played repetitively.
- **Velocity Curve**: Controls dynamics.
- **Brightness**: Controls the relative level of a sample's harmonics.
- **Detune**: Adjusts the pitch of the patch.

Tip: When a library is opened in the Sampler, the patch with the latest file timestamp will be loaded. So you can open the Patch Editor and click Save to make the current patch the default.

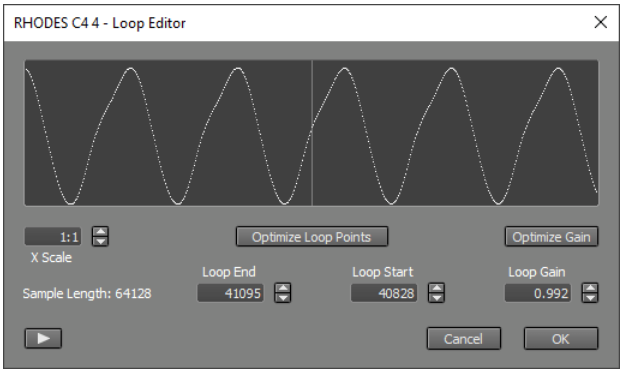
Tools

The Tools menu offers several options:

- **Loop Editor**: Opens the Loop Editor for the highlighted sample (see below).
- **GM Drum outputs**: Maps samples to 6 outputs (kick, snare, hi-hat, toms, cymbals, other), assuming they are mapped to GM notes.
- **All to output 1**: Maps all samples to output 1, and removes the output mixer.
- **Highlight last played sample**: Helps identify which sample caused an issue if you heard something unexpected.
- **Remove sample**: Removes the highlighted sample.

Loop Editor

The Loop Editor, available from the Tools menu, helps you set the LoopStart, LoopEnd, and LoopGain properties for the highlighted sample.



Loop Editor window

The left hand side of the display shows the part before the LoopEnd point. The right hand side shows the part starting at the LoopStart point. Additionally, the left shows a dimmed version of the part before LoopStart, and

the right shows a dimmed version of the part after LoopEnd. The loop will sound good if the bright curves align with the dimmed ones, ensuring a seamless connection in the middle of the display.

The **LoopStart**, **LoopEnd**, and **LoopGain** boxes contain the values corresponding to those in the Patch Editor.

The most important feature is the optimize buttons: **Optimize Loop Points** moves LoopEnd to a zero crossing and finds the best LoopStart to go with it. **Optimize Gain** finds the best loop gain.

The button in the bottom-left corner plays the sample, so you can hear how the current settings sound.

19.3 Patchmap Files

MultitrackStudio uses patchmap (*.pmp) files to define the names of patches and drum instruments of hardware synths, so they can be displayed instead of plain bank:program numbers where appropriate.

The Options menu of an External MIDI Instrument window has a Patchmap option, which has an Import option to import your patchmap. Alternatively, you can drop the file on an External MIDI Instrument window. If you've edited the file, you can simply import it again.

Tip: You can search the web for a .ins (instrument definition) file for your synth. It will be converted to .pmp when it's imported.

Under the hood
Windows: User patchmap files are stored in the "C:\Users*Username*\AppData\Roaming\MtStudio\PatchMaps" folder.
Mac: User patchmap files are stored in the user's "Library/Application Support/MultitrackStudio/PatchMaps" folder.

Patchmap files can be edited using NotePad (Windows) / TextEdit (Mac) . The following examples demonstrate how to create patchmap files for your own hardware synthesizer. The italic text represents comments and should not be included in actual patchmap files.

Example 1: Banks and Patch Names

This example shows a plain simple patchmap having just two banks.

```
[patchmap]    mandatory identifier

[bank 0]      This section holds the first bank. Note it's 0, not 1. Also note the space.
bank=1280     The MIDI bank it applies to. This number equals 128 * MSB + LSB.
              MSB and LSB correspond to MIDI controllers #0 and #32 respectively.
              In this example MSB=10 and LSB=0.
0=Piano       MIDI program 0 is a piano
1=Bass        MIDI program 1 is a Bass
              These values can go up to and including 127

[bank 1]      This section holds the second bank. Banks must be numbered sequentially
bank=1281     MSB=10 and LSB=1
32=Guitar     MIDI program 32 is a guitar
33=Violin     MIDI program 33 is a violin
```

Example 2: Drum Instrument Names

Assume our synth has one drum patch. Let's add both the patch and the drum instrument names to the patchmap:

```
[patchmap]

[bank 0]
bank=1280
0=Piano
```

```
[bank 1]
bank=1281
32=Guitar
33=Violin
64=Acoustic Drum Kit    The drum patch is on program number 64

[drum 0]
bank=0                  The drums are in bank 0. This equals 128 * MSB + LSB,
                        see explanation in [bank 0] section of example 1.
patch=8                 The drums are on MIDI program 8
36=Bass Drum            Note 36 is a bass drum
40=Snare                Note 40 is a snare
```

Additional drum kit sections must be numbered sequentially ([drum 1], [drum2] etc.)

Example 3: Percussion Channel

Assume it's a GM synth, which has one bank only, and drums on channel 10:

```
[patchmap]

[bank 0]
bank=-1                 -1 means "all banks", we do this because GM doesn't support
                        banks
                        If you omit the "bank=" statement then it will default to 0 because
                        it's
                        the [bank 0] section. [bank 1] defaults to 1 etc.
channel=1,2,3,4,5,6,7,8,9,11,12,13,14,15,16   [bank 0] is not valid for channel 10
0=Piano
1=Bright Piano
12=Marimba
25=Acoustic Guitar
26=Electric Guitar

[bank 1]
bank=-1                 -1 means "all banks", we do this because GM doesn't support
                        banks
channel=10              [bank 1] is valid for channel 10 only
0=Drum Kit

[drum 0]
channel=10              These instrument names are valid for channel 10
36=Bass Drum
40=Snare
```

Example 4: Patch Categories

Let's add some categories. They will appear in the External MIDI Instrument's patch selector.

```
[patchmap]

[category]              This is the section which defines the categories
#0=Piano                The first section must be #0. In this case it holds the pianos
#1=Guitar               The second section holds the guitars
                        Categories must be numbered sequentially
[bank 0]
bank=-1
0=Piano#0               Add #0 to the name, so MultitrackStudio knows it's in category #0
1=Bright Piano#0
12=Marimba              No category specified here, it will end up in the "Other" category
25=Acoustic Guitar#1    Add #1 to the name, so MultitrackStudio knows it's in category #1
```

```
26=Electric Guitar#1
```

Example 5: Drum Instrument Categories

Drum Instrument Categories can be defined locally within a drum section:

```
[patchmap]

[bank 0]
bank=0
0=Piano
1=Bright Piano

[drum 0]
#0=Bass              The first section must be #0. In this case it holds the bass drums
#1=Snare             The second section holds the snare drums
35=Acoustic Bass#0   Add #0 to the name, so MultitrackStudio knows it's in category #0
36=Bass Drum 1#0
38=Acoustic Snare#1  Add #1 to the name, so MultitrackStudio knows it's in category #1
39=Hand Clap         No category specified here, it will end up in the "Other" category
40=Electric Snare#1
```

Example 6: Controller Names

Let's override some default controller names with custom ones:

```
[patchmap]

[bank 0]
bank=0
0=Piano
1=Bright Piano

[controllers]
2=Joystick -Y              New name for controller 2
83=Dynamic Modulation
```

NRPNs can be named too:

```
[patchmap]

[bank 0]
bank=0
0=Piano
1=Bright Piano

[nrpn]
160=Cutoff          New name for nrpn 160 (=128 * MSB + LSB)
161=Resonance
```

Example 7: GM compatibility

GM2, GS and XG use bank messages while GM doesn't. You can specify a compatibility mode to ensure the patchmap works regardless of the bank being specified or not. It also affects the handling of GM percussion channel.

```
[patchmap]
compatibility=XG    Can be GM2, GS or XG

[bank 0]
bank=0
```

```
0=Piano
1=Bright Piano
```

Example 8: Supported Controls

The controllers, NRPNs etc. which are supported can be listed. They appear in the controller editor's VIEW menu. Channel controllers appear as rotary knobs in an External MIDI Instrument window's Controls section.

```
[controllers]
supported=pitchbend,7,10,nrpn100,aftertouch,polyaftertouch,sysex
2=Joystick -Y                                    Controller name as per example 6
```

Example 9: Channel Names

Channel names appear in the channel selector dropdown menu:

```
[channels]
10=Percussion
```

Example 10: Patch Switch Time

Some synths need quite some time to load a patch. Let's make sure MultitrackStudio sends the patch change messages in time. Note that it's usually not necessary to add this.

```
[patchmap]
patchswitchtime=750    Schedule patch changes 750 milliseconds earlier

[bank 0]
bank=0
0=Piano
1=Bright Piano
```

Example 11: Initialization Sysex

A sysex message can be sent before recording or playback starts. This can be used to switch a synth to multi-mode for example.

```
[patchmap]
initsysex=f0123456f7    Hex numbers representing sysex MIDI message

[bank 0]
bank=0
0=Piano
1=Bright Piano
```

If a sysex needs to be send to each MIDI channel used you can replace a hex digit with "<channel>":

```
[patchmap]
initsysex=f0123<channel>56f7    Hex numbers representing sysex MIDI message
                                "<channel>" will be replaced with the actual MIDI channel.

[bank 0]
bank=0
0=Piano
1=Bright Piano
```

Example 12: Don't send Program Change

Some synths lose your custom settings if a Program Change is received. You can prevent MultitrackStudio from sending Program Change messages to certain channels. Bank messages won't be sent either.

[patchmap]
no_programchange=15,16 *Don't send Program Change to channel 15 and 16*

19.4 MIDI 2.0 Overview

MultitrackStudio supports the following MIDI 2.0 features:

- MIDI 2.0 protocol for MIDI In Devices and MIDI Out Devices.
- Per-note controllers and per-note pitch bend.
  MIDI 1.0 data from an MPE keyboard is converted to per-note controls. The MultitrackStudio Instruments, Sampler, and Matrix Sampler support some per-note controls. Per-note controls are sent to AU/CLAP/VST plugins using the best available method (MIDI 2.0 protocol, Note Expressions, or MPE).
- MIDI Clip File (.midi2):
  - Import via Add Track → Import Audio/MIDI File.
  - Export via Song → Export → Export MIDI Tracks.
  - A MIDI track editor can export the selected part to a MIDI Clip File.

  Imported files can use either the MIDI 1.0 or MIDI 2.0 protocol. Exported files always use the MIDI 2.0 protocol.
- MIDI-CI Property Exchange for MIDI Out Devices. Can retrieve program names, control names, and MIDI channel names. Uses ProgramList, ChCtrlList, and Korg's X-ParameterList.
  See External MIDI Instruments and MIDI-CI
- Orchestral Articulation Profile for CLAP plugins. Fully supported except for the note-off attribute. The profile is included in exported MIDI Clip Files.
  See Orchestral Articulations
- In general, all MIDI 2.0 protocol Channel Voice message types are supported, except for Assignable Per-Note Controller. All assigned Registered Per-Note Controllers are supported, except for #3. Note-on attributes are used for articulations. Only Registered Controllers (RPNs) used by supported profiles are supported.

Note: on Windows, any features related to MIDI devices currently aren't available. See Windows MIDI Services.

19.5 Level Meters

Level meters show several things:

- The current level.
- Signal peaks are shown by a narrow segment for 2 seconds.
- The peak recording level since transport start is indicated by a red line (legacy color themes use a dimmed segment instead). Only audio tracks in record mode have this feature.
- The right hand part will start flashing if clipping occurred (i.e., if the level exceeded 0 dB). This only happens if the overload is actually a problem:
  - Recording audio tracks.
  - Recording MIDI-tracks using a software instrument.
  - Master section.
  - Group and Effect Return sections routed to the audio device *(Pro edition only)*.

  You can click a meter to reset it and stop the flashing.
- A speaker symbol appears to indicate output clipping in soft-monitored audio tracks (the meter itself shows the input level).

The Level Meters are based on DIN PPM meters, where 0 dB = 0 dBFS.

If the audio signal is stereo, a meter will display both the left and the right channels, the upper signal being the left channel.

You can right-click a meter to temporarily change its size. Options are Small, Large, and Huge. The latter can be used if you need to watch the meter from a distance (to set recording levels, for example).

Small meter

Large meter

Huge meter

19.6 Dither

MultitrackStudio's internal data format is 32-bit fixed point. Every time truncation to 16 or 24 bits is performed, adequate dithering is applied. This can happens, for example, when sending the mixer output to the sound device, or when saving files with a lower bit depth. 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 human ear doesn't hear very well, thereby improving the perceived sound quality even further. 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 noise shaping at higher sample rates. Noise shaping is applied only when truncating to 16 bits, not when truncating to 24 bits.

20 Requirements

MultitrackStudio has been designed to run very efficiently, so computer requirements are fairly modest. Some performance issues are discussed in the following paragraphs. With newer computers, the sound device is usually the only thing to worry about.

Operating System

Windows: The 64-bit version works with the 64-bit versions of Windows 11/10/8/7. The 32-bit version of MultitrackStudio can be used on any computer that runs Windows 11/10/8/7, including the 64-bit versions.
Mac: MultitrackStudio works with macOS 26, 15, 14, 13, 12, 11, 10.15/14/13/12 and OS X 10.11. Both Apple Silicon and Intel Macs are supported natively.

Sound Device

At minimum, a 16 bit/44.1kHz/stereo sound device capable of full-duplex operation (i.e., simultaneous playback and recording) is needed for audio recording/playback. Virtually any modern device will be capable of this.

CPU

Real-time audio processing requires a fast processor. MultitrackStudio is very efficient, so any computer currently in use should be suitable. You need a faster computer if you want to use higher sample rates like 96 or 192 kHz (Pro edition).
MultitrackStudio takes advantage of multiple-core CPUs (up to eight CPUs can be used).

32-bit Windows version: features that use audio pitch shifting are only available if the CPU supports SSE2. SSE2 was introduced in 2000, so virtually every computer in use today supports this.

Memory Usage

MultitrackStudio's memory requirements are very modest, unless you're using very large sampler patches. Note that the memory usage of plugins can be (much) greater than that of MultitrackStudio.

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 cables to connect microphones, etc., to your sound device, especially if you have a cheaper sound device that typically uses 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 the 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.

21 Troubleshooting

All other tracks are on the track I recorded. What's wrong?
Your sound device is recording its own audio output. If your sound device includes a mixer window, you can look for the problematic setting there.

My vocals are only on the left or right channel.
Record to mono audio files. Microphones are mono, so recording to a stereo file results in one silent channel.

The track's Play or Rec button turns gray when starting the transport.
No audio or MIDI device is available to play or record this file.

Audio recording doesn't work in Windows 10.
A Windows 10 update introduced some privacy changes that may prevent audio recording. To fix this, go to Start → Settings → Privacy, and ensure the "Allow apps to access your microphone" setting is enabled.

Other programs are silent while MultitrackStudio is running.
MultitrackStudio uses Windows audio devices in "exclusive mode" to provide the lowest latency possible. You can go to the Devices window in the Studio menu and enable "Shared mode". This requires Windows 10 or newer.

I can't load my master file in my CD writing program.
Make sure the file is a stereo .wav file. If you're using the Pro edition, also make sure it's a 16-bit file (CDs are always 16-bit).

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.

There are glitches or short bursts of static in my recordings. or
A MIDI device seems to pause periodically. or
The transport stops with a "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 driver for your sound device.
- Try using a sample rate of 48 kHz instead of the default 44.1 kHz (see Song Properties).
- *Windows*: Try a different audio driver type.
- *Windows*: MultitrackStudio's support for the Early Windows audio driver type includes an "Apply EMU10k1 44.1 kHz Audio Sync Correction" setting. Sound cards like the Sound Blaster Live! (including 128, 512, 1024, and Ensoniq AudioPCI) use slightly different sample rates for playback and recording at 44.1 kHz. MultitrackStudio compensates for this if the "EMU10k1 44.1 kHz Sync Correction" button is enabled in the Devices window. Make sure this button is enabled if you have one of the aforementioned sound cards, and disabled 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 sample rate setting, make sure it matches the one set in the Song Properties window.
- *Windows*: In the Windows Control Panel, set the Sound Scheme to "No Sounds."

I want to restore a previous version of a file.
Song, songlist, MIDI, patch, and .aem files are backed up each time they are saved to disk. Older versions get a file extension starting with "~": .hdr, .lml, .mid, .ptc, and .aem become .~hdr, .~lml, .~mid, .~ptc, and .~aem respectively. You can restore an old version by renaming it with the correct file extension.

I hear glitches when opening windows or performing other actions in Windows.
If you're using an ASIO driver, try enabling MMCSS (see Compensating for driver issues).