KBD-INFINITY

Power tools for digital keyboards

MIDI Doctor
Instruction Manual

(Say C0h 52h)

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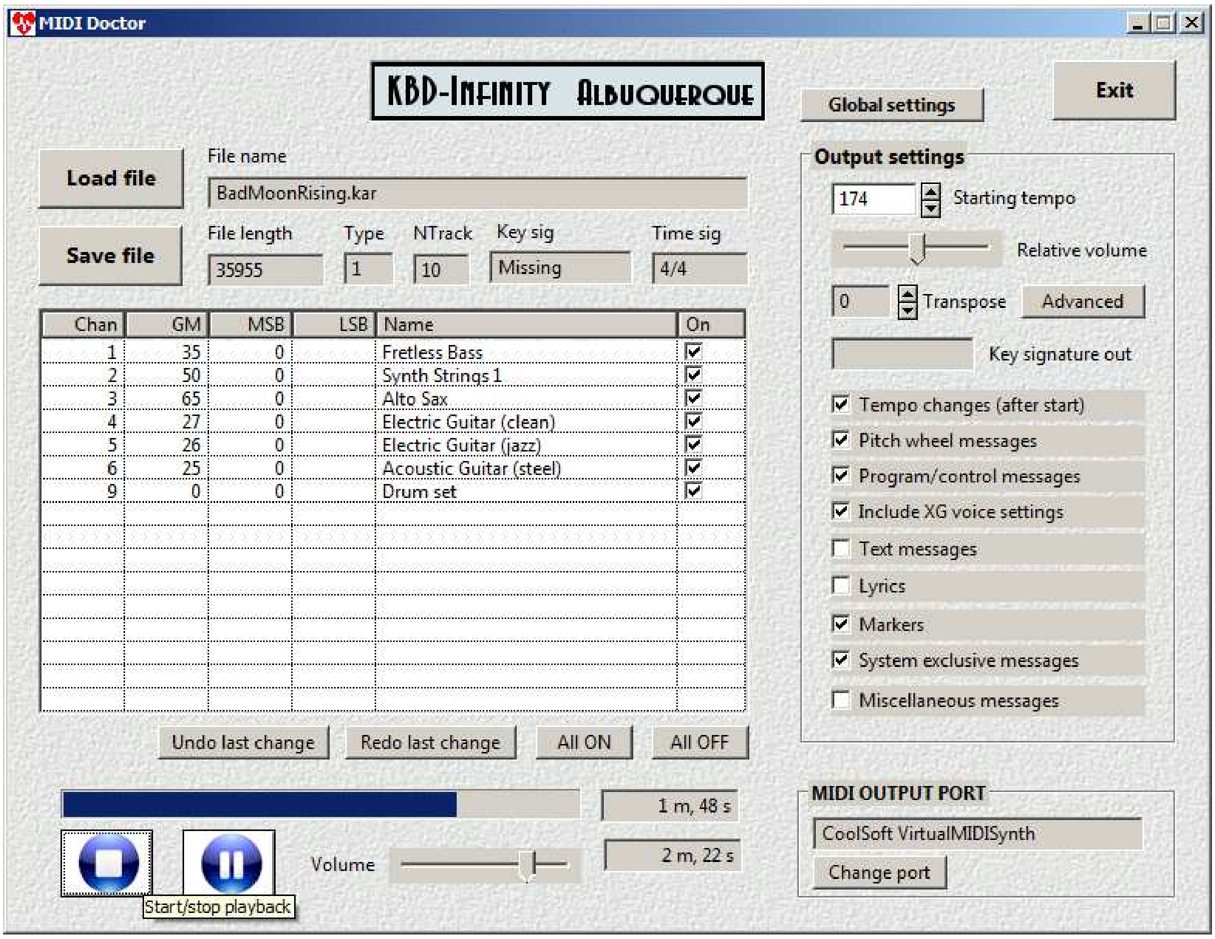


File name: BadMoonRising.kar

File length	Type	NTrack	Key sig	Time sig
35955	1	10	Missing	4/4

Chan	GM	MSB	LSB	Name	On
1	35	0		Fretless Bass	☑
2	50	0		Synth Strings 1	☑
3	65	0		Alto Sax	☑
4	27	0		Electric Guitar (clean)	☑
5	26	0		Electric Guitar (jazz)	☑
6	25	0		Acoustic Guitar (steel)	☑
9	0	0		Drum set	☑

1 m, 48 s

2 m, 22 s

Volume

Output settings

174 Starting tempo

Relative volume

0 Transpose

Key signature out

☑ Tempo changes (after start)

☑ Pitch wheel messages

☑ Program/control messages

☑ Include XG voice settings

☐ Text messages

☐ Lyrics

☑ Markers

☑ System exclusive messages

☐ Miscellaneous messages

MIDI OUTPUT PORT

CoolSoft VirtualMIDISynth

Figure 1: **MIDI Doctor** main screen.

1 What does MIDI doctor do?

MIDI files store music in digital format. There are thousands of MIDI files available for download on the Internet covering almost every popular song and classical work in existence. These files may have passed from hand to hand multiple times. Understandably, many files have accumulated errors or settings that are unsuitable for your application. **MIDI Doctor** creates corrected files through three functions:

- The program corrects the order of MIDI messages and stores files in a standard *Type 1* format.
- It removes unwanted or unnecessary information following your choices.
- **MIDI Doctor** provides quick path to make custom settings like channel voices (instrumentation), key signature or tempo to match your keyboard and performance.

Here are some **MIDI Doctor** operations:

- Change instrument voices of individual MIDI channels.
- Remove channels or divide channels into separate files.
- Generalize a file written for a specific synthesizer or keyboard so that it may be played on any device.
- Add XG voice specifications for individual instruments to optimize a file for your keyboard.
- Change all tempo messages in a file by relative factor to speed up or slow down a piece.
- Equalize the volume levels of individual instruments or change the general volume level in a file.
- Transpose notes in accompaniments to match the key or range of your instrument.
- Remove MIDI data that may be unnecessary for your application or synthesizer, such as text, lyric, marker, file identification or system exclusive messages.
- Invoke the full range of MIDI control messages recognized by your synthesizer (brightness, reverb, decay time, ...).
- Quickly set channel voices from INST specifications for your keyboard.
- Expand or compress the dynamic range of piece.
- Automatically adjust all tempo messages to achieve a specified playback duration.
- Extract excerpts from MIDI files.

MIDI Doctor runs on any Windows computer. Unlicensed software does not save modified files. To unlock all features of **MIDI Doctor**, you can purchase a license at:

`http://kbd-infinity.com/purchase_software.html`

2 Loading a file

Figure 1 shows the **MIDI Doctor** main window. Press `F1` at any time to view this manual. Use the `Load file` button (`F4`) to import a MIDI file. MIDI files are in binary format and come in three types with three suffixes:

- `MID`: standard MIDI files with instrumental musical parts.
- `KAR`: karaoke files with instrumental notes plus synchronized lyrics.
- `STY`: style files containing musical loops to create accompaniments[1]

MIDI Doctor displays information about the file after it is loaded. The file name and total byte length are displayed at top left (Fig. 1) along with the MIDI file *Type* and the number of tracks. The instrument settings of the MIDI channels are displayed in the list box below[2]. We'll discuss the meaning of *tracks* and *channels* in the next section. The program shows the key signature if the file contains a key signature message. Finally, **MIDI Doctor** displays the starting tempo (the content of the first tempo message in the file) under *Output settings*. The tempo unit is quarter notes per minute. If there is no tempo message, the program picks a default value of 120 qpm.

3 Channels and tracks

The polyphonic synthesizers of modern digital keyboards can create several instrumental voices simultaneously, each with its own set of notes. An instrumental voice is called a *channel*. A MIDI interface can control up to 16 channels, designated as Channel `00h` (0) to `0Fh` (15). The messages stored in MIDI files contain information about the destination channel as well as the operation that the synthesizer should perform. As an example, the MIDI `NoteOn` message consists of three bytes:

```
Byte 1: 90h + ChanNo
Byte 2: Note value
Byte 3: Volume
```

The quantity `90h` designates the action and the quantity `ChanNo` is the intended channel. For example, the number `96h` indicates that the synthesizer should turn on a note using the instrumental voice of Channel `06h`. The second byte is an integer that gives the pitch of the note. The values, ranging from `00h` (0) to `7Fh` (127), encompass the 88 keys of the piano with

[1] Style files contain special formatting in addition to MIDI information. Editing them with **MIDI Doctor** may destroy their utility. Use our **Style Voice Optimizer** program to set instrumental voices in style files.

[2] If the file contains a channel with no program (instrument) message, the channel is assigned a `GM` number of `00f` (piano) by default.

some extras. The final byte gives the relative volume of the note. Every `NoteOn` message must be followed eventually by a corresponding `NoteOff` message (with initial byte `80h` + `ChanNo`).

A MIDI file contains a sequence of bytes that specify a delay followed by the bytes of a message. The delay bytes tell how long to wait before sending the message. The simplest MIDI file of *Type 0* has the form:

```
(Delay 1)(Message 1)/(Delay 2)(Message 2)/(Delay 3)(Message 3)/...
```

A MIDI player runs through the sequence, sending each message when required. With delays of 0, programs send messages almost simultaneously. For example, several `NoteOn` messages sent to the same channel at the same time initiate a chord.

In a *Type 1* MIDI file, messages are organized in *Tracks*. The term track is confusing for two reasons:

- There is no standard that determines how the division should be carried out.
- In MIDI editors, the term track is often used to denote a channel. Most editors assign messages to tracks according to their channel numbers. Accordingly, the tracks displayed in editors may bear little resemblance to the track structure of the file.

In a typical MIDI file, messages with the same channel number are often grouped in a track. Sometimes, global messages like tempo changes that affect all channels have their own track. Lyrics could be collected in a one track, markers in another and even a separate track for a single copyright message. There are two things to remember: 1) there may be many more tracks than channels and 2) the track number may not correspond to the channel number.

A *Type 1* MIDI file can always be converted to a unique *Type 0* file with no loss of information. Conversely, a *Type 0* file can be reconverted to *Type 1*, but not necessarily the same one because the original track organization was arbitrary. The output files of **MIDI Doctor** are of *Type 1* with the following standards:

- Musical messages with channel identifiers are divided into individual tracks according to their channel number. Messages with the lowest channel number are assigned to Track 0 and so on up to the highest channel number. In other words, the musical information of a MIDI file with instruments in Channels 1,5 and 7 would be saved in Track 0(1), Track 1(5) and Track 2(7).
- A single additional track contains all global and non-musical information (markers, lyrics, system exclusive messages,...).

In a save operation, all content (except that excluded by user settings) is preserved.

4 The channel list

Information on the instrument voices of the file is listed in the box at left-center (Fig. 1). There is a row for each channel that **MIDI Doctor** detects when loading the file. The information is independent of any track structure the file may have. The first column lists the channel number. The second column lists the `GM` (General MIDI) number. The number refers to a standard set of 128 instruments; voices that are supported by compliant synthesizers. Table 1 shows the complete list. For example, if a channel definition includes the information `GM = 13`, then most keyboards will produce a sound like a xylophone. It's important to realize that the sound may differ considerably between different synthesizers.

The next two columns list the numbers `MSB` (most significant byte) and `LSB` (least significant byte). When combined, the numbers specify the `XG` (extended general MIDI) bank number. The synthesizers of most digital keyboards can create a set of instrument sounds that exceeds 128 in number. The extra voices can be accessed by sending an `XG` bank number as well as a `GM` number. It is important to note that the `XG` numbers are not standardized – generally each keyboard responds in a different way. This fact leads to the following implications:

- Most MIDI files that you download from the Internet have `GM` number messages only. In this case, most synthesizers make a reasonable approximation of the desired sound.
- MIDI and style files intended for a specific keyboard usually include `XG` messages. These files may sound strange on your device. The remedy is to remove all `XG` messages or change the values to match your synthesizer. The documentation for most keyboards contains a table of `MSB` and `LSB` values for extended voices.
- If you intend to distribute a MIDI file, it's best not to add `XG` messages.

Table 1: Standard instrument voices arranged by GM number.

000	Acoustic Grand Piano
001	Bright Acoustic Piano
002	Electric Grand Piano
003	Honky-tonk Piano
004	Electric Piano 1
005	Electric Piano 2
006	Harpsichord
007	Clavinet
008	Celesta
009	Glockenspiel
010	Music Box
011	Vibraphone
012	Marimba
013	Xylophone
014	Tubular Bells
015	Dulcimer
016	Drawbar Organ
017	Percussive Organ
018	Rock Organ
019	Church Organ
020	Reed Organ
021	Accordion
022	Harmonica
023	Bandoneon
024	Acoustic Guitar (nylon)
025	Acoustic Guitar (steel)
026	Electric Guitar (jazz)
027	Electric Guitar (clean)
028	Electric Guitar (muted)
029	Overdriven Guitar
030	Distortion Guitar
031	Guitar Harmonics
032	Acoustic Bass
033	Electric Bass (finger)
034	Electric Bass (pick)
035	Fretless Bass
036	Slap Bass 1
037	Slap Bass 2
038	Synth Bass 1
039	Synth Bass 2
040	Violin
041	Viola
042	Cello
043	Contrabass
044	Tremolo Strings
045	Pizzicato Strings
046	Orchestral Harp
047	Timpani
048	String Ensemble 1
049	String Ensemble 2
050	Synth Strings 1
051	Synth Strings 2
052	Choir Aahs
053	Voice Oohs
054	Synth Choir
055	Orchestra Hit
056	Trumpet
057	Trombone
058	Tuba
059	Muted Trumpet
060	French Horn
061	Brass Section
062	Synth Brass 1
063	Synth Brass 2
064	Soprano Sax
065	Alto Sax
066	Tenor Sax
067	Baritone Sax
068	Oboe
069	English Horn
070	Bassoon
071	Clarinet
072	Piccolo
073	Flute
074	Recorder
075	Pan Flute
076	Blown Bottle
077	Shakuhachi
078	Whistle
079	Ocarina
080	Lead 1 (square)
081	Lead 2 (sawtooth)
082	Lead 3 (calliope)
083	Lead 4 (chiff)
084	Lead 5 (charang)
085	Lead 6 (voice)
086	Lead 7 (fifths)
087	Lead 8 (bass + lead)
088	Pad 1 (new age)
089	Pad 2 (warm)
090	Pad 3 (polysynth)
091	Pad 4 (choir)
092	Pad 5 (bowed)
093	Pad 6 (metallic)
094	Pad 7 (halo)
095	Pad 8 (sweep)
096	FX 1 (rain)
097	FX 2 (soundtrack)
098	FX 3 (crystal)
099	FX 4 (atmosphere)
100	FX 5 (brightness)
101	FX 6 (goblins)
102	FX 7 (echoes)
103	FX 8 (sci-fi)
104	Sitar
105	Banjo
106	Shamisen
107	Koto
108	Kalimba
109	Bagpipe
110	Fiddle
111	Shanai
112	Tinkle Bell
113	Agogo
114	Steel Drums
115	Woodblock
116	Taiko Drum
117	Melodic Tom
118	Synth Drum
119	Reverse Cymbal
120	Guitar Fret Noise
121	Breath Noise
122	Seashore
123	Bird Tweet
124	Telephone Ring
125	Helicopter
126	Applause
127	Gunshot

Table 2: Standard percussion instrument sounds arranged by note number.

InstNo	Instrument	InstNo	Instrument
035	Bass Drum 2	059	Ride Cymbal 2
036	Bass Drum 1	060	High Bongo
037	Side Stick/Rimshot	061	Low Bongo
038	Snare Drum 1	062	Mute High Conga
039	Hand Clap	063	Open High Conga
040	Snare Drum 2	064	Low Conga
041	Low Tom 2	065	High Timbale
042	Closed Hi-hat	066	Low Timbale
043	Low Tom 1	067	High Agogo
044	Pedal Hi-hat	068	Low Agogo
045	Mid Tom 2	069	Cabasa
046	Open Hi-hat	070	Maracas
047	Mid Tom 1	071	Short Whistle
048	High Tom 2	072	Long Whistle
049	Crash Cymbal 1	073	Short Guiro
050	High Tom 1	074	Long Guiro
051	Ride Cymbal 1	075	Claves
052	Chinese Cymbal	076	High Wood Block
053	Ride Bell	077	Low Wood Block
054	Tambourine	078	Mute Cuica
055	Splash Cymbal	079	Open Cuica
056	Cowbell	080	Mute Triangle
057	Crash Cymbal 2	081	Open Triangle
058	Vibra Slap		

Returning to the listbox, standard GM instrument names are listed in the fifth column. The check boxes of the sixth column have two functions:

- Only checked channels are included when you play the file.
- In saving a file, only the checked channels are included. This feature is useful, for example, to make an accompaniment file by removing the solo part.

The two buttons below the listbox turn all channels on or off.

Channels for percussion instruments have special features. Channel 09h is used for percussion by default and other channels may be used by setting MSB = 7Eh or 7Fh. Percussion instruments are generally atonal, so the second byte of a NoteOn message is used to specify the instrument type rather than the pitch. Table 2 lists the standard drum set supported by GM compliant synthesizers. Again, the standard set should be used in MIDI files for distribution. If you play a file and hear strange whistles and bells, it is usually because it is using a non-standard drum set. Changing the drum set may help. See your keyboard documentation for the GM, MSB and LSB settings for different sets.

5 Playing a file

The controls to play the currently-loaded file are located at the bottom-left corner of the window. The colored button on the left starts and stops playback. You can also use the keyboard shortcut `F2`. The `Esc` key terminates playback. Use the button on the right to pause or resume playback (`F3`). The progress bar shows the relative position in the file. The text field to the right shows the exact elasped time. To start a song in the middle, left-click inside the progress bar at the desired position. Click inside the progress to jump to any position when the file is playing. As mentioned in the previous section, only checked channels in the list are included in the playback.

The main precursor to playing a file is to choose a destination for the MIDI signals. MIDI messages are simply numbers – a driver is needed to convert the number to an appropriate audio signal that is sent to computer speakers or an external device. You can choose a driver with the `Change port` button at lower-right. Here are some possibilities:

- In the first time run, the device is the **Microsoft MIDI Mapper**, a **Windows** default. This is a rudimentary driver that approximates the set of `GM` voices and sends the result to the computer speaker.
- For a better sound with lower latency, download **CoolSoft VirtualMIDISynth**. This blog article describes the procedure:

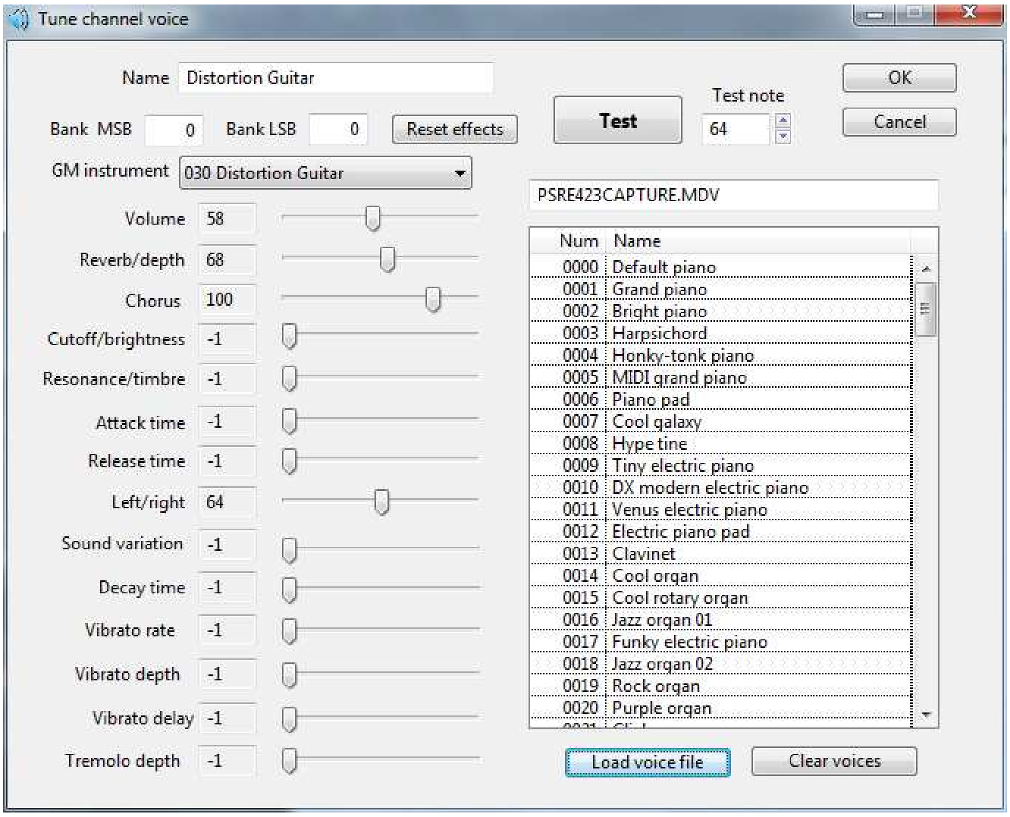
  `http://kbd-infinity.com/kbd-infinity-blog/replacing-microsoft-gs-wavetable-synth/`
- Install the **LoopBE** driver to send the output of **MIDI Doctor** to the MIDI input port of another software program on the computer. One possibility is **VST Host** where you can experiment with virtual instruments.
- You'll probably get the best sound by using the synthesizer of a good quality keyboard connected to the computer.

6 Editing channel voices

One of the primary functions of **MIDI Doctor** is tuning the voices of individual channels to change the arrangement of a file or to optimize it for your keyboard. To adjust a voice, double-click on a row of the channel list. **MIDI Doctor** opens the dialog shown in Fig. 2. The top controls show the current settings of the `GM` number and the `MSB` and `LSB` values of the `XG` bank number. You can change these quantities. Use the set of controls on the left-hand side to customize the voice. It is important to recognize that some of the controls may not have an effect, depending on the sophistication of your synthesizer. Moderately priced Yamaha keyboards generally respond to the controls above `Left/Right` but not to the lower controls. Experiment with your own keyboard to see which parameters are recognized.

All sliders have the range `00h` (0) to `7Fh` (127). A value of -1 appears if you move the slider all the way to the left. This condition designates that a MIDI message for that control will not be included in a saved file. The controls have the following functions:

- **Volume**. The default volume of the voice. Use this control to raise or lower an individual instrument relative to the others.
- **Reverb/depth**. Effect of the performance space – a higher value gives a longer echo effect.
- **Chorus**. Simulation of multiple players (like a string section). With a high value, the synthesizer broadens the frequency width of overtones. A low value corresponds to a solo instrument.
- **Cutoff/brightness**. A low-pass filter – a high value passes all frequencies while a low value passes only low frequencies for a mellow sound.
- **Resonance/timbre**. Instruments create a series of overtones, integer multiples of the fundamental note frequency. A instrument like a banjo has a high content of overtones, while a flute has a low content. A high value of this parameter gives strong overtones, while a low value gives reduced overtones.
- **Attack time**. Instruments like pianos typically do not produce notes with uniform amplitude. Instead, the amplitude follows an envelope like that of Fig. 3 – a louder section when the hammer strikes the string, a sustained period while the key is held down and then a decay when the key is released. The profile of Fig. 3 is called an *ADSR* envelope (attack/decay/sustain/release). Generally, the amplitudes are built into the parametric definitions of the synthesizer, but you can adjust the timings. Use this control to adjust the attack time. Note that there are only A, D and R commands – the S time is controlled by how long you hold the key.
- **Release time**. The release time of the *ADSR* envelope.
- **Left/right**. This command, also know as *Pan*, controls stereo effects. For a setting of `00h`, the voice sounds only in the left channel. A setting of `7Fh` gives sound in the right channel.



Name: Distortion Guitar

Bank MSB: 0

Bank LSB: 0

GM instrument: 030 Distortion Guitar

Test note: 64

Volume	58
Reverb/depth	68
Chorus	100
Cutoff/brightness	-1
Resonance/timbre	-1
Attack time	-1
Release time	-1
Left/right	64
Sound variation	-1
Decay time	-1
Vibrato rate	-1
Vibrato depth	-1
Vibrato delay	-1
Tremolo depth	-1

PSRE423CAPTURE.MDV

Num	Name
0000	Default piano
0001	Grand piano
0002	Bright piano
0003	Harpsichord
0004	Honky-tonk piano
0005	MIDI grand piano
0006	Piano pad
0007	Cool galaxy
0008	Hype tine
0009	Tiny electric piano
0010	DX modern electric piano
0011	Venus electric piano
0012	Electric piano pad
0013	Clavinet
0014	Cool organ
0015	Cool rotary organ
0016	Jazz organ 01
0017	Funky electric piano
0018	Jazz organ 02
0019	Rock organ
0020	Purple organ

Figure 2: Dialog to adjust channel voice settings.

- **Sound variation**. A generalized control for synthesizers that support multiple variants of an instrument sound.
- **Decay time**. The decay time of the *ADSR* envelope.
- **Vibrato rate**. Vibrato is a low-frequency modulation of pitch. This control sets the modulation frequency.
- **Vibrato depth**. This control sets the frequency range for the vibrato modulation, generally small compared to the fundamental frequency.
- **Vibrato delay** This control sets the phase of the vibrato modulation relative to the *NoteOn* signal.
- **Tremolo depth** Tremolo is a low-frequency modulation of amplitude. This control sets the volume change.

MIDI Doctor updates the output synthesizer as you make changes. Click the *Test* button to hear the current voice. Use the up-down arrows to change the test note to hear the voice in different ranges[3]. When you are satisfied, click *OK* to update the voice and exit the dialog. Use the play controls to hear how the modified voice sounds in the file, with our without the other channels. Use the *Undo* button if you want to restore the previous voice setting.

[3] If you are editing a percussion channel, the value of the *Test* note determines the type of percussion sound.

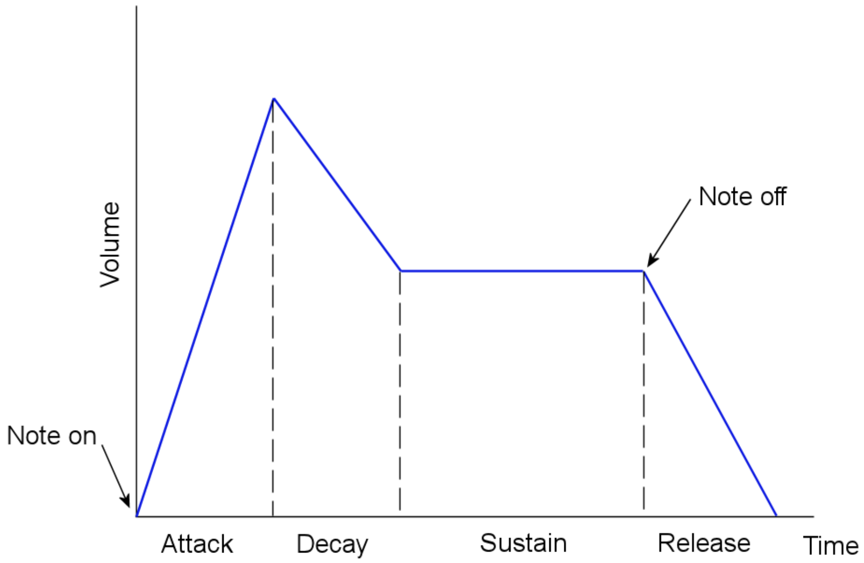


Figure 3: Parameters for note amplitude envelope.

MIDI voice files (MDV) contain control and program messages that represent the instrument collections installed on digital keyboards. In other words, a voice file consist of a large set of presets optimized for particular keyboards. You can save time and effort by using presets. Use the *Load voice file* button and enter the directory *Voices* where we have included data for 47 keyboards prepared from INST specifications. When the file is loaded, double-click on a row to transfer the information to the controls on the left-hand side. You can make changes before saving the voice.

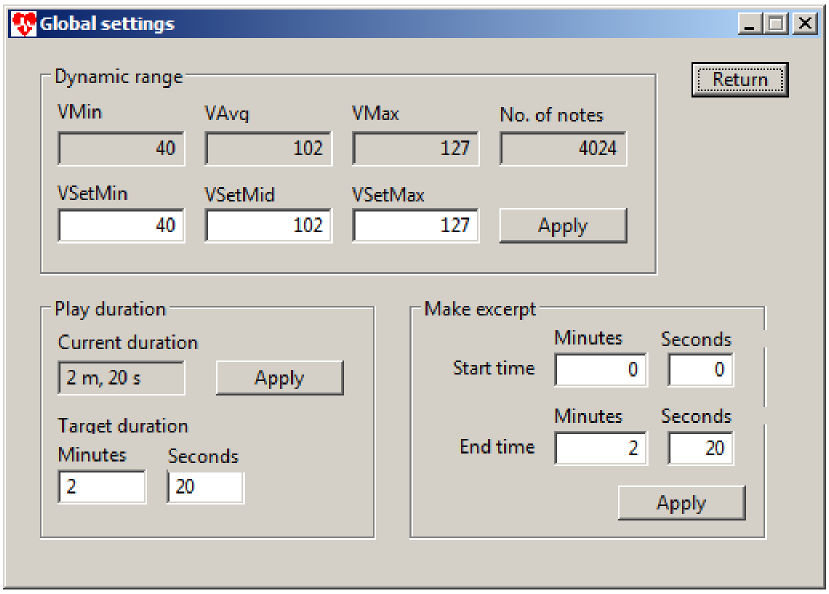
7 Global settings

Click the *Global settings* button to open the dialog of Fig. 4. There are three available operations that modify messages over the entire file.

Dynamic range
Use this operation to compress or to expand the volume (velocity) range of a piece. When the dialog opens, **MIDI Doctor** shows the present minimum, maximum and average volume values of all *NoteOn* messages with non-zero velocity. Set new values in the boxes below and then press *Apply* to change messages stored in memory. Here are some settings examples:

- Change the volume of a piece by raising or lowering all three values proportionately.
- To reduce unwanted loud sections, move *VSetMax* closer to *VSetMid*.
- To correct hard-to-hear sections, move *VSetMin* closer to *VSetMid*.

Note that the operation works in tandem with volume settings of individual channels and the *Relative volume* output setting.



Global settings

Dynamic range

VMin: 40
VAvg: 102
VMax: 127
No. of notes: 4024

VSetMin: 40
VSetMid: 102
VSetMax: 127

Play duration

Current duration: 2 m, 20 s

Target duration
Minutes: 2
Seconds: 20

Make excerpt

Start time: Minutes 0, Seconds 0

End time: Minutes 2, Seconds 20

Figure 4: Global settings dialog.

Play duration

One of the advantages of working with MIDI is that you can change the tempo of a piece without affecting the pitch. With this tool, you can set an exact duration for the file playback. One application is to generate background music closely synchronized to the timing of a videos. When the dialog opens, **MIDI Doctor** shows the current file duration in minutes and seconds. Simply fill in the desired values, click the *Apply* button and save the modified file.

Make excerpt

Use this tool if you want to make a demo or to pull out a favorite section. The end result is a modified file that plays only the desired section. When the dialog opens, the *Start time* and *End time* values are set to the beginning and end of the file. Narrow the range to make an excerpt by changing the times. You can use the time display in the play function of the main window to find values. You may notice that the excerpted file has the same byte length as the original. This follows from the nature of MIDI files. The state of the synthesizer at any time depends on the sequence of all preceeding MIDI messages. If a set of messages was simply cut out of a MIDI files, the result might be a hanging note that plays to infinity. The solution used in **MIDI Doctor** is to include all messages in the file, but to adjust those that occur before the excerpt so that they play at $t = 0$ with the velocity of *NoteOn* messages set to zero. The message time within the excerpt is adjusted to $(t - TStart)$. Messages after the excerpt are all sent at $(TEnd - TStart)$ and *NoteOn* message have zero velocity.

Global operations are performed on MIDI message values stored in memory. You can hear the effect by playing the file when you return to the main window. The output operations described in the next section act in conjunction with the global opeations to create the saved file. Global and output operations cannot be reversed, so it is best to save a copy of the input file.

8 Writing the output file

Use the *Save* button (*F5*) to write an output MIDI file in the Type 1 format described in Sect. 3. Only information from channels set to *ON* will be included. You can refine the type of information saved with the *Output settings* controls:

- **Starting tempo**. On load, **MIDI Doctor** sets this value from the first tempo message in the file. Change the number if you want the output file to play at a slower or faster speed. The program computes an adjustment factor (the ratio of the output to the input tempo) and adjusts all tempo messages accordingly. The effect is to speed up or slow down the entire song. Because of roundoff errors, the output tempo may vary by ±1 qpm from the designated value.

- **Relative volume**. The slider determines a relative adjustment factor for the volume byte in all *NoteOn* messages: 0.5 (full left), 1.0 (middle) and 2.0 (full right). The factor works in conjunction with the channel volume settings in the voice editor window (Sect. 6). Note that amplification may cause saturation if the calculated value of the volume byte exceeds 7Fh (127).

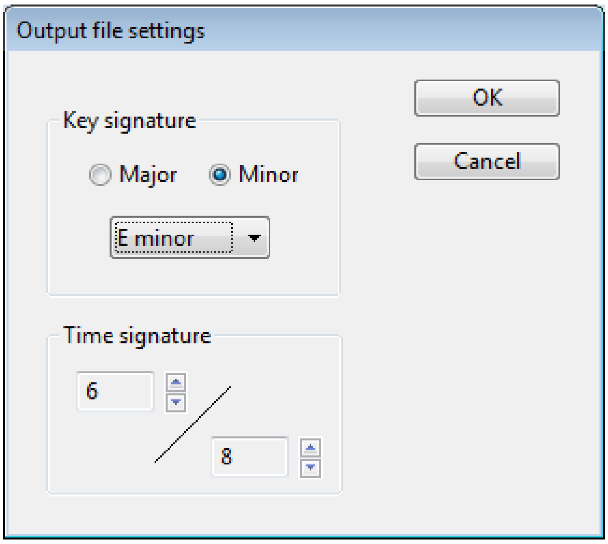
- **Transpose**. Shift the note values of *NoteOn* and *NoteOff* messages up or down by a specified number of chromatic steps. The effect is to change the range and key signature of the piece. If the input MIDI file contains a key signature message, the value is displayed on load in the *Key signature out* box. The key signature changes as you adjust the *Transpose* value. Unfortunately, the quality of MIDI files you find on the Internet varies considerably, and some may not contain a key signature message. In this case, you may need to use a MIDI editor to determine the input key and to calculate the transposition necessary for a desired output key.

- **Tempo changes (after start)**. Sometimes, MIDI files may contain a large number of tempo messages because the transcriber was either particularly expressive or did not use a metronome. Such tempo changes are undesirable if you are preparing an accompaniment. If you uncheck the box, all tempo messages after the first one will not be included in the file.

- **Pitch wheel messages**. Pitch wheel messages shift the frequency of the synthesizer to give a twangy or bluesy sound. Uncheck this box if you want all notes to sound at their prescribed pitch.

- **Program/control messages**. Program messages set the *GM* numbers of channels. Voice control messages (discussed in Sect. 6). These messages may cause a conflict if you are working with a digital workstation with a virtual instrument setup. Uncheck this box to exclude all program messages and voice control messages.

- **Include XG settings**. Unchecking this box excludes all *MSB* and *LSB* control messages from the output stream. Use this option if you want to ensure compatibility with all *GM* compliant devices.



Output file settings

Key signature

○ Major ● Minor

E minor

Time signature

6 / 8

Figure 5: File settings dialog.

- **Text messages and lyrics**. The words in karaoke files are sometimes stored as text messages and sometimes as lyric messages. Uncheck these boxes if you want to remove the information, converting a *KAR* file to a standard *MID* file. This option is useful for creating scores with music notation programs. Some programs attempt to include lyrics, making a messy display.

- **System exclusive messages**. These messages are extended structures that contain binary instructions for specific hardware devices. They are generally ignored, so you can remove them from files intended for general distribution.

- **Miscellaneous messages**. Specialized non-MIDI messages that are usually not required to play the file, including SMPTE, MIDI port, MIDI channel, copyright, cue point, instrument and sequence track name.

Finally, sometimes input MIDI files may lack messages to define the key signature and time signature, or the information may be incorrect. In this case, you can set values to record in the output file. Click the *Advanced* button or right-click in any open area of the program window to display the popup menu. Choose *File settings*. The dialog of Fig. 5 is opened. To set the key, first set the *Major/Minor* radio buttons and then choose a key from the popup menu below. Use the up/down arrows to set the time signature. Click *OK* to save the changes and return to the program. Note that these settings do not affect the musical content of the MIDI file.

9 The MIDI voice file specification

This section contains advanced information for developers that is not essential to use **MIDI Doctor**. The MIDI voice-file is a compact entity for saving detailed information on sets of MIDI voice specifications (MIDI patches). Voice files are used in the **Accompaniment Machine** and other KBD-Infinity software to define melody voices to be used with styles for song performances.

MIDI voice files have names of the form `FilePrefix.MDV`. Following the lead of style files, voice files are standard Type 0 (single track) MIDI files that can be read by any MIDI device. The format is compact (the full set of voice specifications for a keyboard may occupy 10 kB) and simple. It is relatively easy to create software routines to transfer voice information to any MIDI device.

Figure 6 shows a screen display of **MIDI Microscope** with a voice file loaded. As with all MIDI files, the first section is the *Header Chunk*:

1. UInt8: 4Dh 54h 68h 64h to represent the characters **MThd**.
2. UInt32: The number 6, always the length of data in the header chunk.
3. UInt16: The number 0, the MIDI file type
4. UInt16: The number 1, the number of tracks
5. UInt16: Pulses per quarter note, set to the arbitrary value of 100 (64)

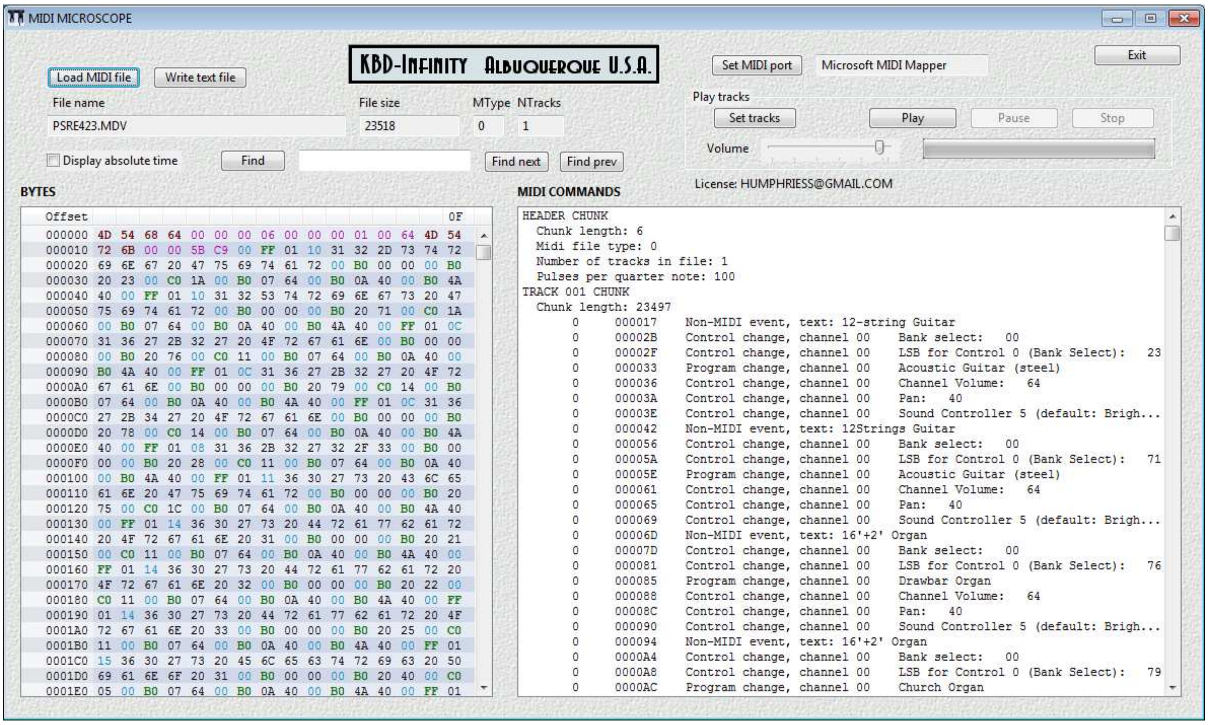
There is a single track section that begins with

1. UInt8: 4Dh 54h 72h 6Bh to represent the characters *MTrk*.
2. UInt32: The number of bytes in the track.

The data that follow consists of a set of standard MIDI messages (with no *System Exclusive* messages). Each message is preceded by a timing byte, always 00h. The first message must be a non-MIDI type text message that contains the name of the first voice:

```
FF 01 StringLength VoiceNameString
```

The quantity *StringLength* is the length of the following string expressed as a variable-length quantity. The next *StringLength* bytes are ASCII values to define *VoiceNameString*. The voice designator is followed by any number of voice definition messages that a software program ports directly to the MIDI device. All messages are three bytes in length except *Program change* (2 bytes). All parameter values are in the range 00h → 7Fh. All messages are directed to MIDI channel 1 (00). The software is responsible for redirecting the information to other channels for multiple voices. Not all commands may be recognized by all MIDI devices. Unrecognized commands are ignored. The following messages are allowed:



File name: PSRE423.MDV
File size: 23518
MType: 0
NTracks: 1
Set MIDI port: Microsoft MIDI Mapper
License: HUMPHRIESS@GMAIL.COM

```
Offset                                                0F
000000 4D 54 68 64 00 00 00 06 00 00 00 01 00 64 4D 54
000010 72 6B 00 00 5B C9 00 FF 01 10 31 32 2D 73 74 72
000020 69 6E 67 20 47 75 69 74 61 72 00 B0 00 00 00 B0
000030 20 23 00 C0 1A 00 B0 07 64 00 B0 0A 40 00 B0 4A
000040 40 00 FF 01 10 31 32 53 74 72 69 6E 67 73 20 47
000050 75 69 74 61 72 00 B0 00 00 00 B0 20 71 00 C0 1A
000060 00 B0 07 64 00 B0 0A 40 00 B0 4A 40 00 FF 01 0C
000070 31 36 27 2B 32 27 20 4F 72 67 61 6E 00 B0 00 00
000080 00 B0 20 76 00 C0 11 00 B0 07 64 00 B0 0A 40 00
000090 B0 4A 40 00 FF 01 0C 31 36 27 2B 32 27 20 4F 72
0000A0 67 61 6E 00 B0 00 00 00 B0 20 79 00 C0 14 00 B0
0000B0 07 64 00 B0 0A 40 00 B0 4A 40 00 FF 01 0C 31 36
0000C0 27 2B 34 27 20 4F 72 67 61 6E 00 B0 00 00 00 B0
0000D0 20 78 00 C0 14 00 B0 07 64 00 B0 0A 40 00 B0 4A
0000E0 40 00 FF 01 08 31 36 2B 32 27 32 2F 33 00 B0 00
0000F0 00 00 B0 20 28 00 C0 11 00 B0 07 64 00 B0 0A 40
000100 00 B0 4A 40 00 FF 01 11 36 30 27 73 20 43 6C 65
000110 61 6E 20 47 75 69 74 61 72 00 B0 00 00 00 B0 20
000120 75 00 C0 1C 00 B0 07 64 00 B0 0A 40 00 B0 4A 40
000130 00 FF 01 14 36 30 27 73 20 44 72 61 77 62 61 72
000140 20 4F 72 67 61 6E 20 31 00 B0 00 00 00 B0 20 21
000150 00 C0 11 00 B0 07 64 00 B0 0A 40 00 B0 4A 40 00
000160 FF 01 14 36 30 27 73 20 44 72 61 77 62 61 72 20
000170 4F 72 67 61 6E 20 32 00 B0 00 00 00 B0 20 22 00
000180 C0 11 00 B0 07 64 00 B0 0A 40 00 B0 4A 40 00 FF
000190 01 14 36 30 27 73 20 44 72 61 77 62 61 72 20 4F
0001A0 72 67 61 6E 20 33 00 B0 00 00 00 B0 20 25 00 C0
0001B0 11 00 B0 07 64 00 B0 0A 40 00 B0 4A 40 00 FF 01
0001C0 15 36 30 27 73 20 45 6C 65 63 74 72 69 63 20 50
0001D0 69 61 6E 6F 20 31 00 B0 00 00 00 B0 20 40 00 C0
0001E0 05 00 B0 07 64 00 B0 0A 40 00 B0 4A 40 00 FF 01
```

```
HEADER CHUNK
  Chunk length: 6
  Midi file type: 0
  Number of tracks in file: 1
  Pulses per quarter note: 100
TRACK 001 CHUNK
  Chunk length: 23497
        0     000017    Non-MIDI event, text: 12-string Guitar
        0     00002B    Control change, channel 00    Bank select:   00
        0     00002F    Control change, channel 00    LSB for Control 0 (Bank Select):   23
        0     000033    Program change, channel 00    Acoustic Guitar (steel)
        0     000036    Control change, channel 00    Channel Volume:   64
        0     00003A    Control change, channel 00    Pan:   40
        0     00003E    Control change, channel 00    Sound Controller 5 (default: Brigh...
        0     000042    Non-MIDI event, text: 12Strings Guitar
        0     000056    Control change, channel 00    Bank select:   00
        0     00005A    Control change, channel 00    LSB for Control 0 (Bank Select):   71
        0     00005E    Program change, channel 00    Acoustic Guitar (steel)
        0     000061    Control change, channel 00    Channel Volume:   64
        0     000065    Control change, channel 00    Pan:   40
        0     000069    Control change, channel 00    Sound Controller 5 (default: Brigh...
        0     00006D    Non-MIDI event, text: 16'+2' Organ
        0     00007D    Control change, channel 00    Bank select:   00
        0     000081    Control change, channel 00    LSB for Control 0 (Bank Select):   76
        0     000085    Program change, channel 00    Drawbar Organ
        0     000088    Control change, channel 00    Channel Volume:   64
        0     00008C    Control change, channel 00    Pan:   40
        0     000090    Control change, channel 00    Sound Controller 5 (default: Brigh...
        0     000094    Non-MIDI event, text: 16'+2' Organ
        0     0000A4    Control change, channel 00    Bank select:   00
        0     0000A8    Control change, channel 00    LSB for Control 0 (Bank Select):   79
        0     0000AC    Program change, channel 00    Church Organ
```

Figure 6: Screenshot of Midi Microscope with a voice file loaded.

```
XG parameters:
  B0 00h BankMSB
  B0 20h BankLSB
General MIDI instrument (program change): C0h GMInst
Channel volume: B0h 07h ChanVolume
Pan (left/right speakers): B0h 0Ah Pan
Sound variation: B0h 46h SoundVariation
Timbre (resonance):B0h 47h Timbre
Release time: B0h 48h ReleaseTime
Attack time: B0h 49h AttackTime
Brightness (cutoff): B0h 4Ah Brightness
Decay time: B0h 4Bh DecayTime
Vibrato rate: B0h 4Ch VibratoRate
Vibrato depth: B0h 4Dh VibratoDepth
Vibrato delay: B0h 4Eh VibratoDelay
Depth (reverb): B0h 5Bh Depth
Tremolo depth: B0h 5Ch TremoloDepth
Chorus: B0h 5Dh Chorus
```

There is an additional non-MIDI message that does not directly affect the output MIDI device, but may be used by the software. The octave displacement parameter is defined by the proprietary message

```
FF F7 01 (OctaveDisp + 64)
```

The value 01 is the length of the data (one byte). For an octave displacement of -1, the software should add or subtract 12**OctaveDisp* from note values in *NoteOn* and *NoteOff* messages.

The end of data for one voice is signaled by the text message header for the next voice:

```
FF 01 StringLength NextVoiceNameString
```

The end of data for the last voice is designated by a end-of-track message:

```
FF 2F 00
```