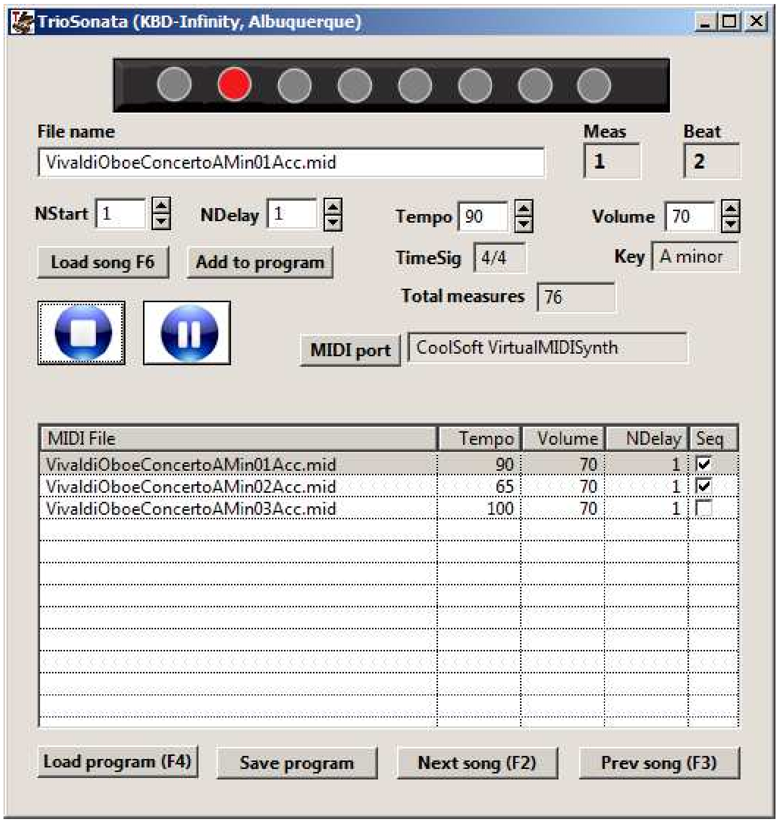
KBD-INFINITY

Power tools for digital keyboards

TrioSonata
Instruction Manual

Contents



File name: VivaldiOboeConcertoAMin01Acc.mid
Meas: 1
Beat: 2
NStart: 1
NDelay: 1
Tempo: 90
Volume: 70
TimeSig: 4/4
Key: A minor
Total measures: 76
MIDI port: CoolSoft VirtualMIDISynth

MIDI File	Tempo	Volume	NDelay	Seq
VivaldiOboeConcertoAMin01Acc.mid	90	70	1	☑
VivaldiOboeConcertoAMin02Acc.mid	65	70	1	☑
VivaldiOboeConcertoAMin03Acc.mid	100	70	1	□

Figure 1: **TrioSonata** interface.

1 Introduction

TrioSonata is an add on Windows utility for our **MIDI Doctor** software. We developed **TrioSonata** to give music students experience playing with a group. The program can utilize the thousands of MIDI files available for download on the Internet, covering almost every popular song and classical work. You can use **TrioSonata** to perform the solo part with full accompaniment of any song or composition. With the program, you can grab a MIDI file from the Internet and do the following:

- Separate the musical data into solo and accompaniment files.
- Change the range and key to match your instrument.
- Modify the accompaniment instrumentation to achieve a special sound.
- Create a printed score for your solo part.
- Play the accompaniment on your computer or keyboard with measure synchronization for practice or performance

Rather than simply playing audio recordings, **TrioSonata** is a digital MIDI-based program. There are significant advantages:

- You can make tempo changes without affecting the pitch.
- You can store settings for accompaniments and run through an entire performance set automatically.
- With the huge array of MIDI files available on the Internet, you can create scores and accompaniments with little effort and at no cost.

There are three components of the **TrioSonata** system:

- **MIDI Doctor**, a utility for dividing and customizing MIDI files.
- Step-by-step instructions in this manual for making printed scores of solo parts in your songs.
- The **TrioSonata** program itself, an advanced MIDI player with a metronome, measure and beat counters and other features for practice and performance.

This manual is arranged in the order of the activities to create an accompaniment and a score. To perform the activities described, you will need the freeware **MuseScore** program, available at

`https://musescore.org/`

The following section covers the use of **MIDI Doctor** to divide MIDI files into individual accompaniment and solo files. Section 3 is a tutorial on how to use **MuseScore** to create a printed score for the solo part. Section 4 describes **TrioSonata** functions for accompaniment playback, while Section 5 discusses the program's capabilities to store multi-song programs with custom settings.

2 Making solo and accompaniment midi files

To get started, you need to get MIDI files. Which brings up the question, what is a MIDI file? The acronym stands for *Musical Instrument Digital Interface* – a standard for sharing musical information between computers and digital instruments via a serial interface. A MIDI file is simply a sequential list of numbers:

```
[Delay 1][Operation 1] / [Delay 2][Operation 2] / [Delay 3][Operation 3] / ...
```

A MIDI player sends operation codes at the correct times to a MIDI device (the synthesizer) that produces the appropriate sound. MIDI devices may be drivers built into the operating system (**Microsoft MIDI Mapper**), soundfont interpreters that you add (**Coolsoft MIDISynch**) or a keyboard attached to the computer. The operations may be directed to up to 16 channels on the device, representing different instrumental sounds. The most important operations are the `NoteOn` and `NoteOff` messages:

```
NoteOn:  90h+ChanNo   Note   Velocity
NoteOff: 80h+ChanNo   Note   Velocity
```

The first byte specifies the operation type and intended channel. The second byte, in the range 00h to 7Fh, gives the pitch (the 88 keys of the piano plus extras). The third byte is the velocity with which the key has been struck, generally interpreted as volume. In a `NoteOff` message, the parameter has no effect on many synthesizers.

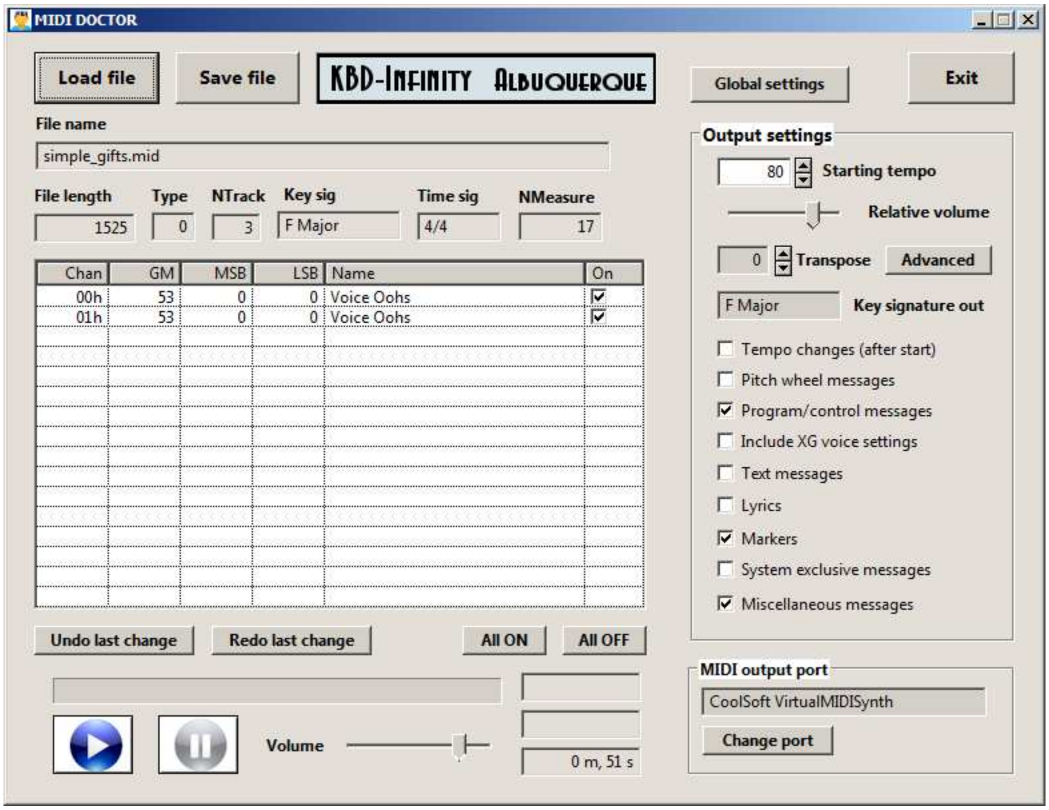
The simplest way to find a file on the Internet is to enter the song title along with a term like *MIDI file* in a search engine. There are two classes of files: 1) MIDI files with suffix `MID` that contain only musical information and 2) karaoke files with suffix `KAR` that also contain synchronized lyrics. The one requirement to apply **TrioSonata** is that the song has a clearly identifiable solo part appropriate for your instrument.

There are two activities to create an accompaniment and score from a MIDI file for use with **TrioSonata**:

- Divide the file into two files: one for the solo and one for the accompaniment. All the musical messages intended for the solo channel go into the first file and messages for the rest of the channels go into the second file. Optionally, at this stage you can modify the accompaniment instrumentation so it is appropriate for your application.
- Create a PDF or printed score for your performance.

We'll use **MIDI Doctor** for the first task. The remainder of this section reviews the procedure. The next section covers the creation of scores with **MuseScore**.

To continue, download **MIDI Doctor** from the KBD-Infinity site and then install the program. The program has extensive capabilities described in the instruction manual, but here we'll follow a simple example to understand the steps to create an accompaniment. Figure 2 shows the main window of **MIDI Doctor**. Click the `Load file` button and choose the file `simple_gifts.mid` (included in the program resource folder). The file for the American folk song contains information on two channels.



MIDI DOCTOR

File name: simple_gifts.mid

File length	Type	NTrack	Key sig	Time sig	NMeasure
1525	0	3	F Major	4/4	17

Chan	GM	MSB	LSB	Name	On
00h	53	0	0	Voice Oohs	☑
01h	53	0	0	Voice Oohs	☑

Output settings

80 Starting tempo

0 Transpose

F Major 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

0 m, 51 s

Figure 2: **MIDI Doctor** display with the test file loaded.

To listen to the music, **MIDI Doctor** must be connected to a MIDI device. 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.

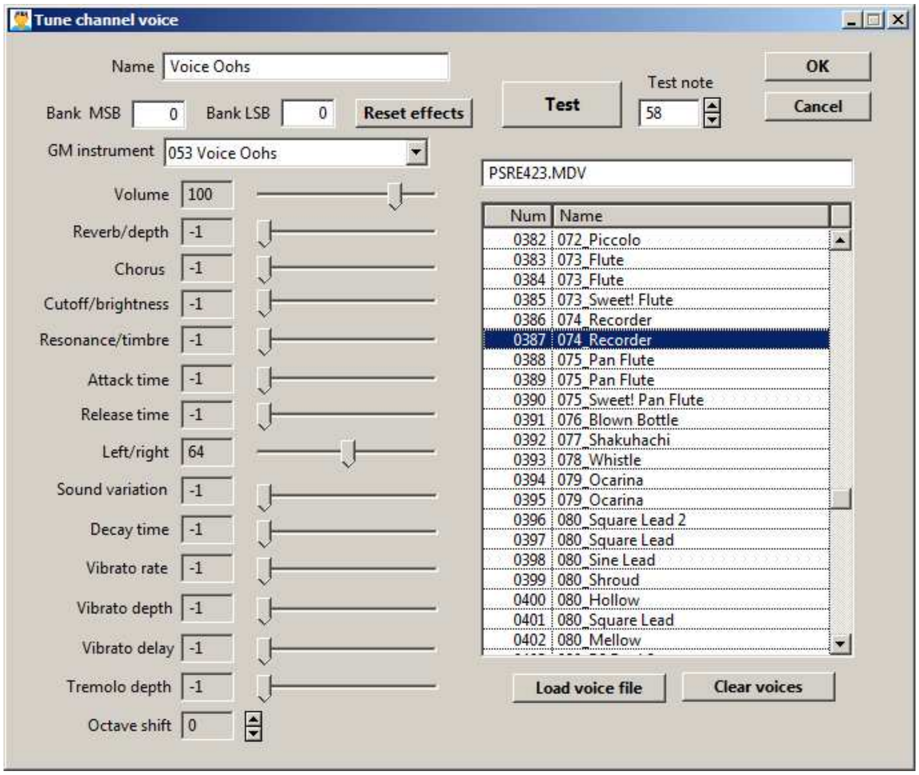
- For a better sound with lower latency, download **CoolSoft VirtualMIDISynth**, available at:

  `https://coolsoft.altervista.org/en/virtualmidisynth`

- 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.

Click the `Play/Stop` button at lower-left to run through the song. Use the checkboxes on the right-hand side of the channel listbox to hear individual channels. In the example, it is clear



Name: Voice Oohs

Bank MSB: 0
Bank LSB: 0

Test note: 58

GM instrument: 053 Voice Oohs

PSRE423.MDV

Volume: 100
Reverb/depth: -1
Chorus: -1
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
Octave shift: 0

Num	Name
0382	072_Piccolo
0383	073_Flute
0384	073_Flute
0385	073_Sweet! Flute
0386	074_Recorder
0387	074_Recorder
0388	075_Pan Flute
0389	075_Pan Flute
0390	075_Sweet! Pan Flute
0391	076_Blown Bottle
0392	077_Shakuhachi
0393	078_Whistle
0394	079_Ocarina
0395	079_Ocarina
0396	080_Square Lead 2
0397	080_Square Lead
0398	080_Sine Lead
0399	080_Shroud
0400	080_Hollow
0401	080_Square Lead
0402	080_Mellow

Figure 3: **MIDI Doctor** voice tuning dialog.

that Channel 0 is the solo part and that Channel 1 is a single instrument accompaniment. The accompaniment is a simple set of chords appropriate for a guitar-like instrument.

It's also clear that the `Voice Oohs` must go. Double click on the Channel 0 row in the listbox to open the dialog of Fig. 3. I intend to play the song on a recorder, so I'll make the appropriate settings. This step is not necessary to generate a score, but it's useful to have a reference solo MIDI file for suggestions on how the song should sound. There are two ways to change the voice:

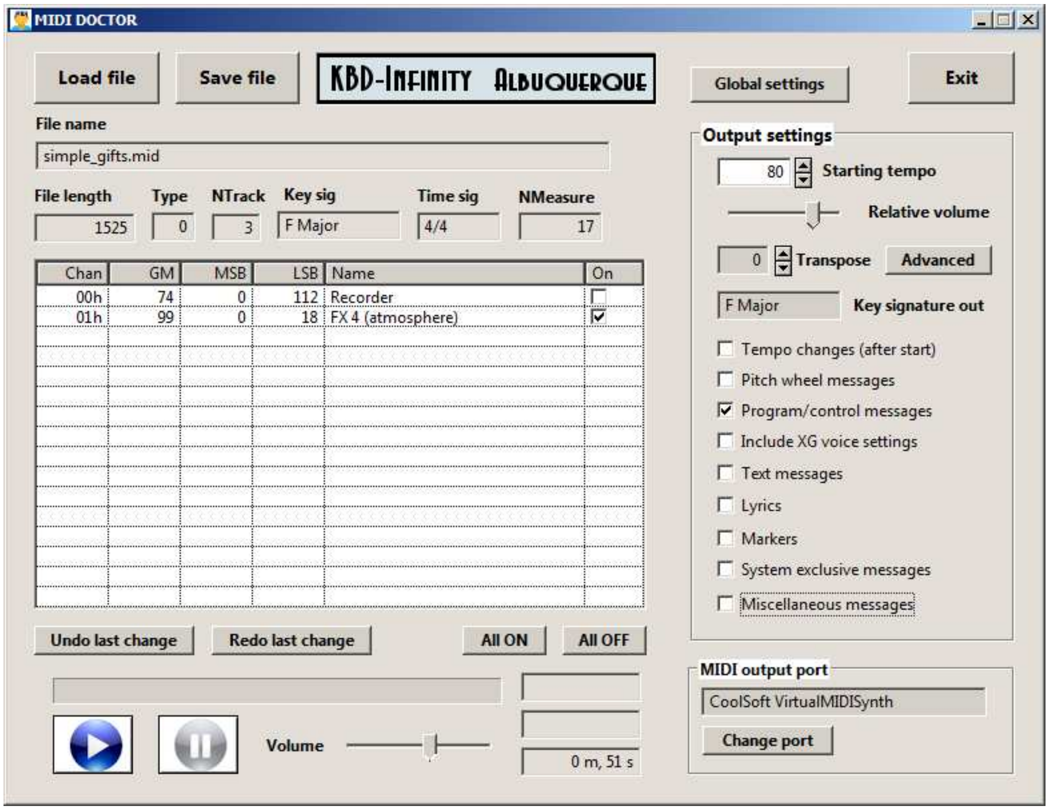
- Use the controls on the left to pick the appropriate MIDI messages to send. The **MIDI Doctor** manual gives a complete description of the options. If you are using a computer soundfont driver, it will probably not recognized alternate voice banks and detailed settings. In this case, simply pick an appropriate GM instrument (Table 1).
- Load a MIDI voice file (`MDV`) of presets optimized for your keyboard. We supply a library of `MDV` files with **MIDI Doctor** covering 50 keyboards.

To use the second option, click the `Load voice file` button and pick the closest equivalent to your keyboard. The voices are arranged in order of GM number (Table 1). It's simply a matter of scrolling through and picking the appropriate voice. Use the `Test` button to check the sound. Click `OK` to update the voice and return to the main window. Use the *Undo last change* button if the voice does not work with the song. Follow the same procedure for the accompaniment channel. If the accompaniment includes multiple channels, you can set each one individually.

Once the voices are set, all that remains is to write modified MIDI files. Figure 4 shows the program settings I'll use to create the accompaniment file. I made no change to the tempo

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



File name: simple_gifts.mid

File length	Type	NTrack	Key sig	Time sig	NMeasure
1525	0	3	F Major	4/4	17

Chan	GM	MSB	LSB	Name	On
00h	74	0	112	Recorder	□
01h	99	0	18	FX 4 (atmosphere)	☑

Output settings

80 Starting tempo

Relative volume

0 Transpose

F Major Key signature out

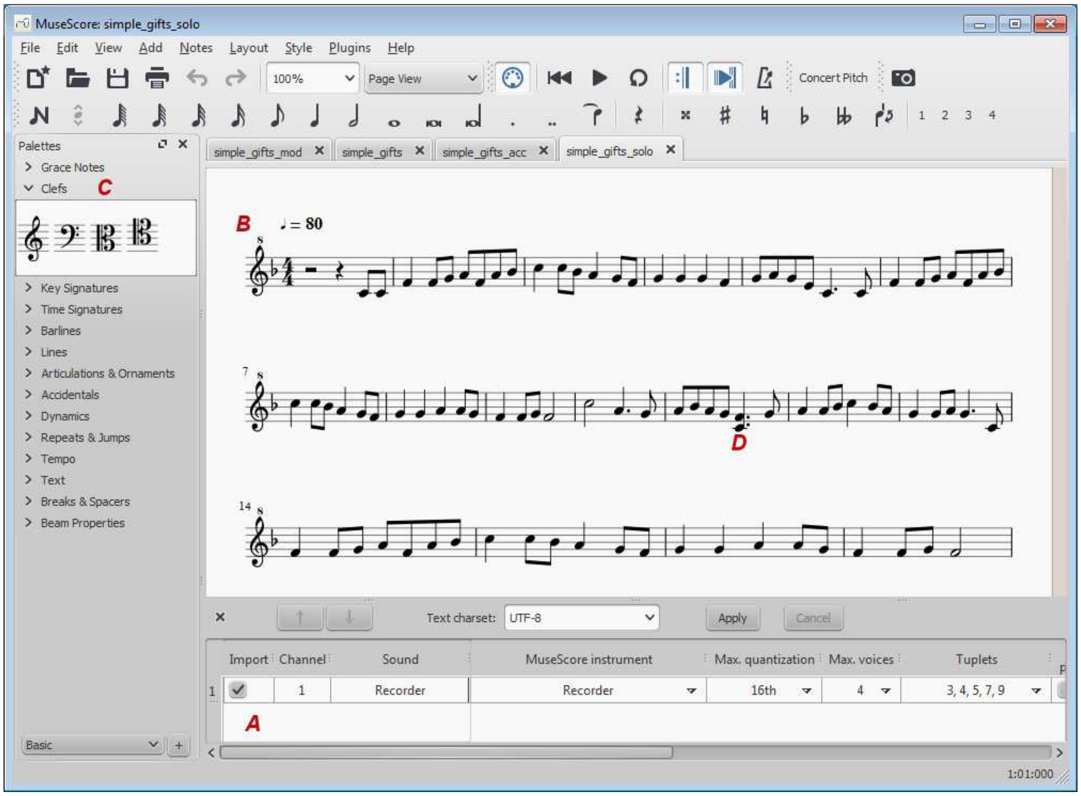
□ Tempo changes (after start)
□ Pitch wheel messages
☑ Program/control messages
□ Include XG voice settings
□ Text messages
□ Lyrics
□ Markers
□ System exclusive messages
□ Miscellaneous messages

MIDI output port: CoolSoft VirtualMIDISynth

0 m, 51 s

Figure 4: Program status for writing the accompaniment file.

(`Starting tempo`). The key signature of F Major was appropriate for an alto recorder. Most of the boxes on the right are unchecked because the associated information is often superfluous. I did check the `Include XG voice settings` box because the accompaniment voice used special settings for my keyboard. To create the accompaniment, uncheck the solo channel, click the `Save file` button and pick a name like `simple_gifts_acc.mid`. Use the same procedure to make the solo file, `simple_gifts_solo.mid`. The range of the solo part was too low for an alto recorder, so I used a value `Transpose = 12` (octave displacement of 12 semitones).



Text charset: UTF-8

	Import	Channel	Sound	MuseScore instrument	Max. quantization	Max. voices	Tuplets
1	☑	1	Recorder	Recorder	16th	4	3, 4, 5, 7, 9

Figure 5: **MuseScore** display of the file `simple_gifts_solo.mid`. Red letters are keyed to the discussion.

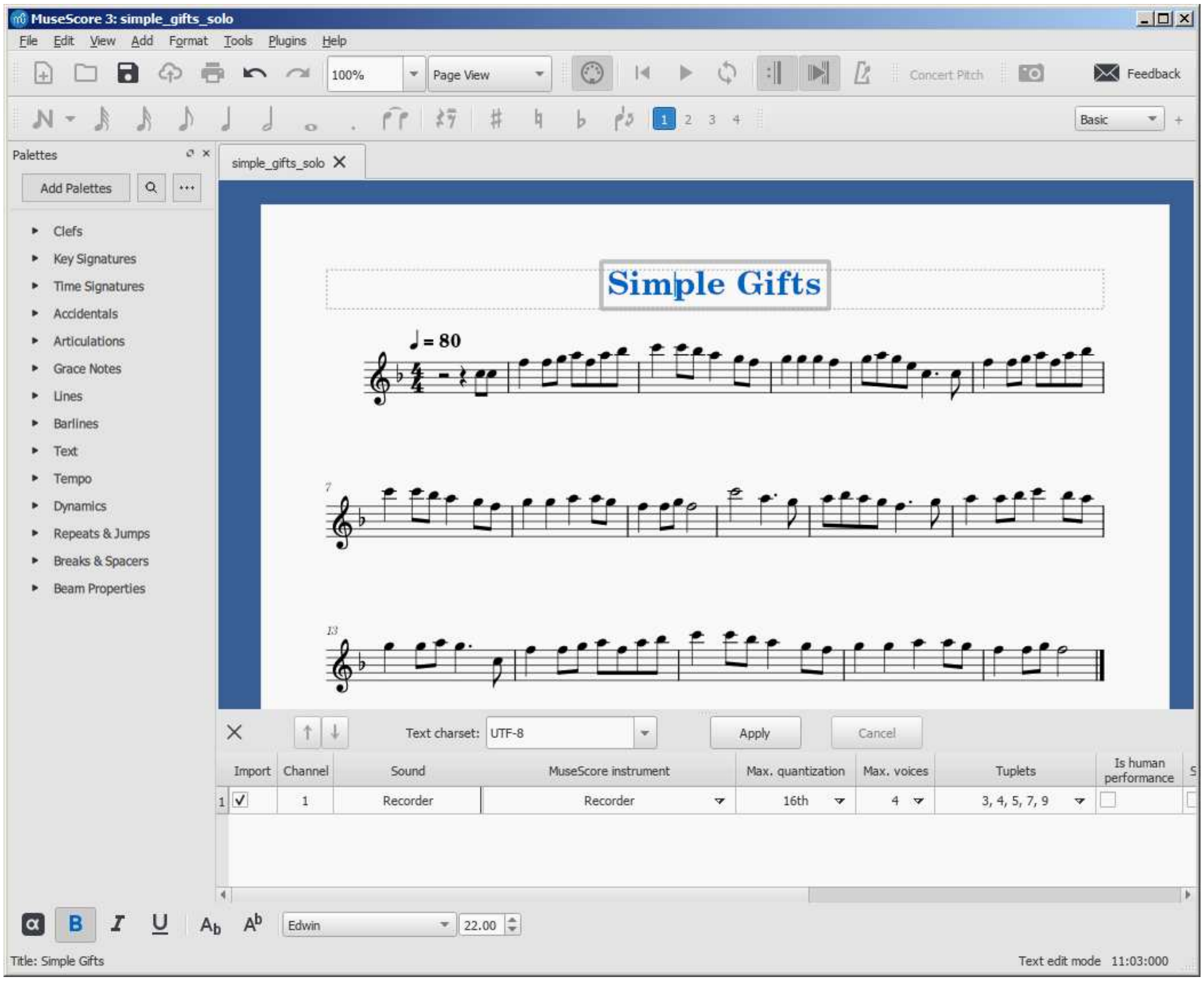
3 Writing the score

If you haven't already done so, download and install **MuseScore**. The program is an essential resource for anyone working with music on computers. With it, you can create, edit and print scores. In this tutorial, we'll use **Musescore** to make a printed or PDF score from the numerical values recorded in the MIDI file we created, `simple_gifts_solo.mid`. Note that this application involves only a small fraction of the program's capabilities.

Run **MuseScore** and load `simple_gifts_solo.mid`. Figure 5 shows the program display. The box below the score area (A) contains options that can be applied when importing a MIDI file. In this case, the file loads with no problems, but some of the options may be important with other files[1]

The are some corrections we need to make before printing and saving the score. First, the notes appear to be in the same range as the original file even though we used a transposition displacement of +12. Note the small 8 above the G clef (B). By default, **MuseScore** has included an *8va* to keep most of the notes within the stave. It's easy to change this to make

[1] For instance, consider a MIDI file created by transcribing a performance. In this case, there are inevitable small errors in timing. In a literal rendition of every note duration and break, the score may be unreadable. Unchecking the box *Is human performance* corrects this problem.



Text charset: UTF-8

	Import	Channel	Sound	MuseScore instrument	Max. quantization	Max. voices	Tuplets	Is human performance
1	☑	1	Recorder	Recorder	16th	4	3, 4, 5, 7, 9	□

Title: Simple Gifts

Text edit mode 11:03:000

Figure 6: Score of simple_gifts_solo.mid with the correct range and with the double note removed.

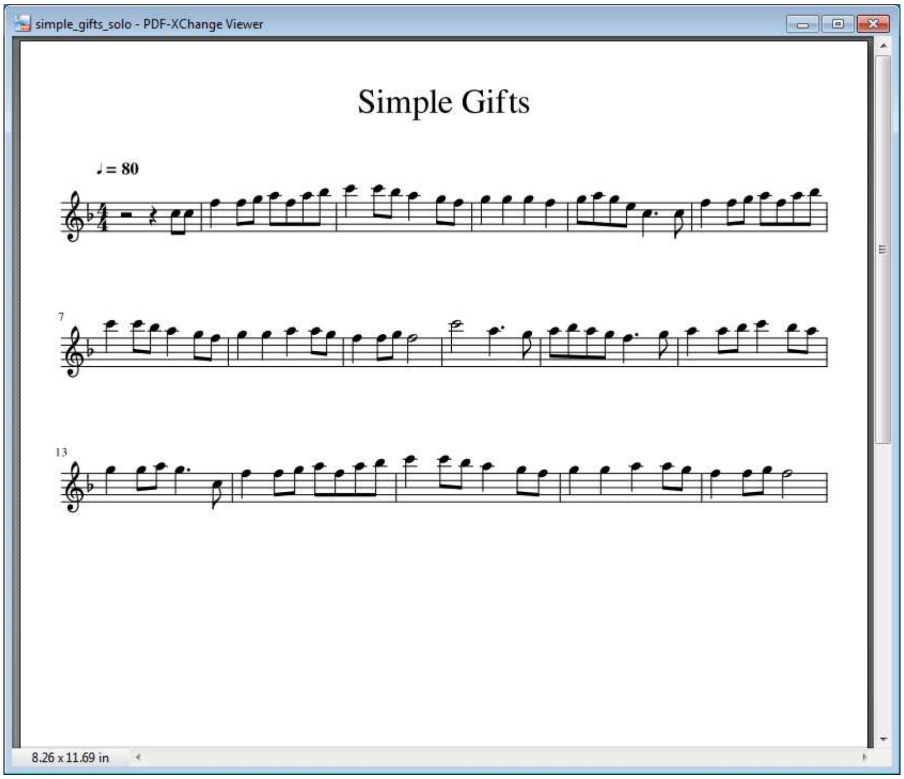
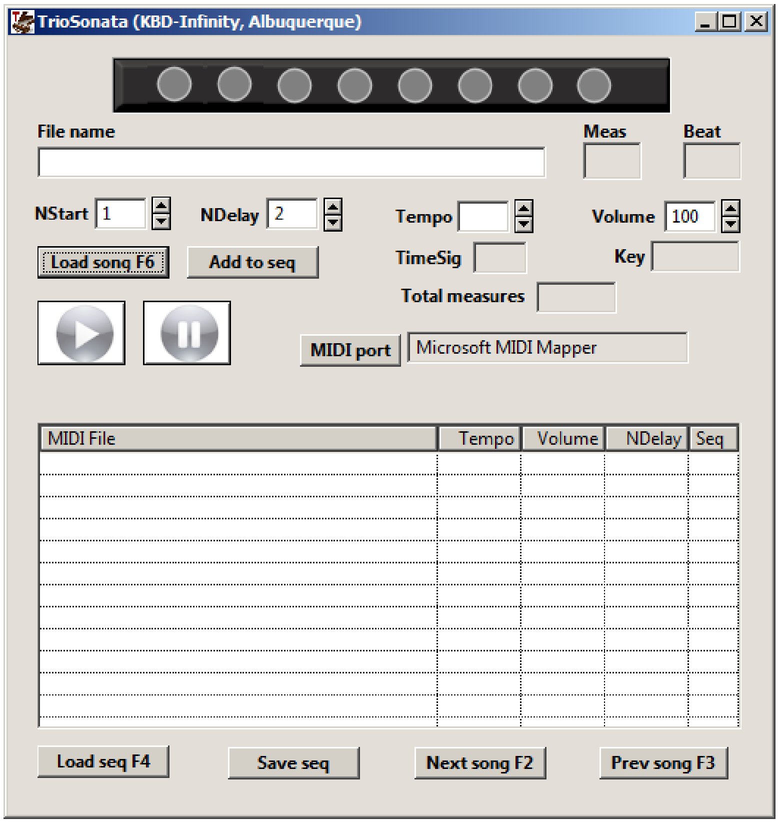


Figure 7: Score of the example solo displayed in a PDF viewer.

a score in the conventional notation used for alto recorders. Open the clef signs palette (C). Highlight the current clef sign (B) and then double click the standard G clef sign in the palette (C). **MuseScore** replaces the sign and shifts all notes in the score. The second problem is the double note in measure 10, unplayable on a solo recorder. To remove the lower note (which is not part of the melody), left-click to highlight it. Then press the delete key. Finally, it would be nice to add the name of the song as a title. From the menu, choose `Add/Text` and type in *Simple Gifts*. Figure 6 shows the final state of the score.

All that remains is to save the work and create the printed score. Click the file save tool or press `Ctrl-S` to create a file in compressed XML format (`mscz`). This file can be reloaded for additional editing. You can print the score directly from the program with the menu entry `File/Print` or press `Ctrl-P`. Alternatively, click `File/Export` and save a file in PDF format for screen viewing or later printing. Figure 7 shows a screen display of the score in a PDF viewer.



NStart 1

NDelay 2

Volume 100

MIDI port: Microsoft MIDI Mapper

Figure 8: **TrioSonata** interface at startup.

4 TrioSonata playback

The function of **TrioSonata** is to play accompaniments. For the application, the program has many useful features to help in your practice sessions and performances. Figure 8 shows the interface, designed for real-time interaction:

- The compact footprint leaves room on your screen to display a PDF score.
- The main controls are buttons backed up with keyboard shortcuts. There is no need to search through a menu to control the program.

The topmost area is a visual metronome. The command group immediately below controls loading and playing individual accompaniment files. We'll use the term *song* to refer to a single MIDI file, whether it is a popular song or a movement of a classical work. The listbox and controls at the bottom of the window apply to *sequences*, lists of songs and their performance parameters that can be played automatically. Press `F1` at any time to display this instruction manual.

The first step is to set the MIDI output port. The same considerations apply as with **MIDI Doctor** (Sect. 2). Use the `MIDI port` button if you need to make a change. Next, click the `Load song` button or press the `F6` key to load a file. Figure 8 shows values for `simple_gifts_acc.mid`. In a first-time run, the load dialog starts in a default directory where we have placed several resources. Thereafter, **TrioSonata** remembers the last folder you opened.

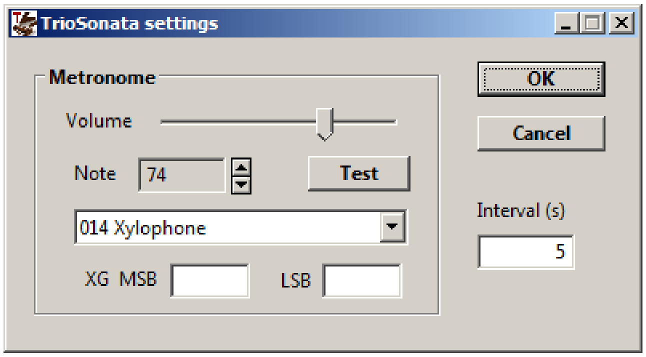
The text fields below the metronome show playback options and information about the file:

- The value $NStart = 1$ signals that playback should start at measure number 1, the beginning of the song. When practicing, you can set $NStart$ to any measure in the song.
- The parameter $NDelay$ is the number of silent measures to add before starting playback. This option gives you a chance to get ready. In the example, the song starts with a pickup on beat 4. Therefore, if we set $NDelay = 0$, there will be three beats before we start playing.
- $Temp$ is the starting tempo as recorded in the file in units of quarter notes per minute.
- Vol is the relative playback volume (0-100).
- $TimeSig$ is the starting time signature as recorded in the MIDI file.
- Key is the initial key signature recorded in the file.
- $Total\ measures$ is the number of measures in the song.

TrioSonata responds to changes of volume, tempo and time signature as the corresponding messages occur in the MIDI file.

Use the `Start/Stop` button (middle left) to control playback. You can also press the `F11`, `Esc` or `Enter` key to start or stop playback. The button to the right or the `F12` key pauses and resumes playback. The visual metronome always operates when a file is playing. The flasher steps are separated by an interval determined by the denominator of the time signature. It moves a number of steps equal to the numerator of the time signature. For example, if a piece is in 6/8 time, the beat advances each eighth note. The flasher moves six places and then starts over. Note that the metronome responds to any change of time signature that may occur in the MIDI file. For practice, **TrioSonata** includes an audio metronome. Press the `F8` key to toggle it on and off. There is also a toggle switch in the popup menu (right-click in any empty area of the program window to display the menu). The metronome makes a louder sound at the first beat of each measure. To adjust the audio metronome sound, right-click to open the popup menu and pick `Program settings`. **TrioSonata** shows the dialog of Fig. 9. Here, you can adjust the volume, instrument sound (`GM` and `XG` bank numbers) and pitch of the metronome beat. Use the `Test` button to check the current setting. Metronome settings are recorded in the **TrioSonata** configuration file and restored the next time you run the program. The quantity `Interval` is the delay time between songs in a program (Sect. 5) in auto-advance mode.

The `Meas` and `Beat` displays give a running report when an accompaniment is playing. The `Meas` box shows the total number of measures elapsed and correlates with the number in scores created from the MIDI file (Sect. 3). The `Beat` box counts up to the number of beats given by the numerator of the time signature and then resets. If there are initial silent measures ($NDelay > 0$), **TrioSonata** displays negative values or zero in the `Meas` box. The value zero, corresponding to the silent measure just before the first measure of the MIDI file, is a good



Note 74

014 Xylophone

Interval (s) 5

Figure 9: Dialog to adjust the audio metronome and the interval betwween songs in a sequence.

performance cue. Use the up-down arrows to change values in the `Temp` and `Vol` boxes. The settings will affect the tempo and volume on the next playback. Finally, note that many of the controls are deactivated when an accompaniment is playing.

Here is a summary of commands in the popup menu

- **Metronome On/Off**. Toggle the audio metronome.
- **Downbeat On/Off**. Toggle the audio downbeat. When the downbeat is on, the audio metronome is active during the *NDelay* introductory measures, but is not active during the song. There is no downbeat if $NDelay = 0$.
- **Program settings**. Set the characteristics of the audio metronome and the interval between songs in a sequence.
- **TrioSonata manual**. Open this manual in your default PDF viewer.
- **Clear the program list**. Remove all entries from the program listbox in the lower part of the screen. The following section discusses programs.
- **About TrioSonata**.
- **KBD-Infinity home page**. Open our home web page in your default browser to learn more about **TrioSonata**, other products and educational materials.

5 TrioSonata programs

If your practice session or performance includes multiple songs, it would be tedious to reload individual songs and reset parameters every time. Therefore, **TrioSonata** has provisions to record the order of songs and all settings for collections of any number of songs. The key is the program list box in the lower part of the window. Figure 1 shows the program interface with a program loaded (in this case the three movements of a sonata). Each row represents a song. The columns have the following functions:

- **MIDI file**: the name of the song file.
- **Tempo**: the desired starting tempo.
- **Volume**: the desired starting volume.
- **NDelay**: the number of initial silent measures (`NDelay`).
- **Seq**: if checked, the following song starts automatically.

There is also a hidden column that stores the full path of the song file.

You can build programs interactively. Load a song file and experiment with different settings (`NDelay`, `Tempo`, `Volume`). When you are satisfied, click the `Add to program` button. The song and its settings are added to the list. If the song file is already on the list, **TrioSonata** updates its settings. You can continue adding any number of songs. When finished, click the `Save program` button to save the results in a **TrioSonata** program file (`TPG`).

In the `Default` mode, the program plays the currently loaded file rather than files in the listbox. **TrioSonata** program enters the `Program` mode when you reload the program you just created or load any other program using the `Load program` button (F4). In this case, the program plays the currently-selected file in the listbox. Change the selection by double-clicking an entry. In the program mode, you can load and add more songs to the list. The order of songs in the list can be changed by dragging rows up and down. Highlight the row and move it by holding down the left mouse button. To delete a row, highlight it and press the `Del` key. Save the program to record any changes,

You can also build programs manually using a text editor. Here's the content of the file for the program of Fig. 1:

```
* TrioSonata program file
* File path      Tempo   Volume   AutoSeq
* =======================================
C:\MusicResources\Recorder\Vivaldi\VivaldiOboeConcertoAMin01Acc.mid,90,70,1,ON
C:\MusicResources\Recorder\Vivaldi\VivaldiOboeConcertoAMin02Acc.mid,65,70,1,ON
C:\MusicResources\Recorder\Vivaldi\VivaldiOboeConcertoAMin03Acc.mid,100,70,1,OFF
```

Lines beginning with an asterisk are comments. The first comment line that identifies the file type is mandatory. Each data line has five entries separated by commas:

- The full path of the song file.
- The starting tempo in quarter notes per minute.
- The relative volume in the range 0 to 100.
- The number of initial silent measures.
- The status of auto-sequencing, `ON` or `OFF`.

It is important to note that if you move song files to different folders, the paths in the program file must be updated. **TrioSonata** reports an error if it cannot locate a song in a `Load program` operation.

When a program is loaded, **TrioSonata** opens the first song in the listbox. Use the `Start/Stop` button to initiate the accompaniment. Thereafter, you can advance through the songs of a program manually or automatically.

- **Manual operation** (the `Seq` box of the current song is unchecked). Click the `Next song` button (`F2`) to load the next entry in the program. Then click the `Start/Stop` button to initiate playback. To load the previous song in the list, click the `Prev song` button (`F3`).
- **Automatic operation** (the `Seq` box of the current song is checked). At the end of the song, **TrioSonata** loads and starts the next song in the program. You can control the delay between songs in the *Settings* dialog.If all the `Seq` boxes are checked, `TrioSonata` will run through a complete program with no user intervention required.

TrioSonata returns to the `Default` mode if you press the `Clear prog` button.