Using the Vocal Harmony Vocoder effect in MIDI files
for YAMAHA keyboards

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1. Introduction

With the keyboard function **Vocal Harmony,** a variety of harmony effects, e.g. different types of choirs, can be added to your voice when singing over a connected microphone.

The keyboard uses different methods to control the singing voice, for example

Chordal from the played chords during live playing or from the XF Chord Events in MIDI files or

Vocoder via notes played live or, in the case of MIDI files, using the notes from a specially programmed vocoder channel.

For live playing on the keyboard, the Vocal Harmony is set via the Mixing Console and is conveniently embedded in a registration. Registrations containing Vocal Harmony settings can also be used for playing MIDI files.

In the following, however, we will only deal with embedding MIDI events for the Vocal Harmony method Vocoder in MIDI files using an example.

Vocoder channels and so-called **"optimized melody channels"** have special tasks which are explained below.

Many commercial MIDI files contain one or two specific channels (tracks) that contain notes but are muted during playback because the notes are programmed by the manufacturer with the low velocity (velocity) "1" so that they are muted during playback. In PSRUTI, both channel types are designated by the voice abbreviation "VH". Which channel is the vocoder channel and which is an optimized melody channel cannot be determined at first, but for commercial MIDI files it is specified by the manufacturer.

With "Vocoder" the vocals are generated using the specially programmed notes of the vocoder channel.

Example:

The children's song "A man who calls himself Columbus" ,Extract from the notes

The upper row represents the score of the optimized MIDI channel 15 and the lower row represents the score of the vocoder channel 16. Vocal Harmony is not set up in the present MIDI file.

Why do you need an optimized melody channel?

Based on the notes, the possibly in the existing lyrics and the chords, note-setting programs can be used to create attractive note sheets - see e.g.

https://de.wikipedia.org/wiki/Liste_von_Notensatzprogrammen

In our example, the notes of the vocoder channel differ from the melody channel only by occasional extension by chord notes.

When playing the MIDI file on the keyboard with the vocoder effect switched on, the vocals via the microphone are in unison based on the first three note bars; the following chords of the vocoder channel produce a three-part vocal. The notes of the vocoder channel are not interrupted by pauses, otherwise there is a risk that the vocals will be chopped off prematurely.

The following section describes how to insert the Vocoder effect into a MIDI file For the actions on the keyboard, i.e. connecting a microphone and the necessary settings, I refer to the keyboard manual.

2. Insert and edit the vocoder effect with PSRUTI

If you already know from information provided by the manufacturer that a certain MIDI channel contains notes for the vocoder, you should continue to use this channel, as it has been programmed very well in most cases. But you should also test if the vocal harmony type (e.g. choir, duet, mono...) is suitable, even if the type changes during the song. In these cases you should leave the state as it is.

With PSRUTI - "Midifile Data" you can check whether a vocoder channel is present that is already used as such. In this case the indication "<Channel number>VH" appears at "VH Channel". If the addition "VH" is missing, it is a normal melody channel or a vocoder channel which has not yet been defined.

In most cases the user wishes to program this property into a MIDI file that does not yet use the vocoder effect. What to do with PSRUTI is described below.

The biggest problem is certainly to assign a suitable sequence of notes to a MIDI channel that is still free. If the MIDI file already contains an optimized melody channel as in the example above, you can double it and subsequently extend it with chord notes. This is best done in the score view of a sequencer, but requires that you are familiar with the note display and can operate the sequencer. In the example above I have freely entered the notes of both channels with this method.

Another method is to record the vocoder notes with the Songcreator. This technique is laborious and is described in detail in the keyboard manual.

Many users who do not have this knowledge try to find a channel of the MIDI file that plays the melody. In most cases, however, the search is unsuccessful, because the notes are rarely suitable for a vocoder channel; the melody in the song can also change channels.

A channel with suitable vocoder notes must now be defined as a vocoder channel in the MIDI file. This is a task for PSRUTI.

Change the velocity of the notes of the vocoder channel to 1

PSRUTI - "Velocity Compressor"

Set "Min.new" and "Max. new" to 1 for the vocoder channel. OK.

To check: Select the Velocity Compressors again - the voice short name has changed to VH.

Remove all MIDI events that affect the settings of Vocal Harmony.

For the further Actions you have to make sure that there are no SysEx events in the MIDI file that control Vocal Harmony; if necessary they have to be removed.

With newer PSRUTI versions from 8.20 on all existing MIDI events that affect Vocal Harmony are deleted with PSRUTI - "Extras" - "Vocal Harmony" - "Delete Vocal Harmony". If this function cannot be selected, it is not necessary.

Definition and activation of the vocoder channel

PSRUTI - "Extras" - "Vocal Harmony"

Click, select and activate the number of the vocoder channel that appears in the window.

Attention: Here not only the vocoder channel but also a possibly existing optimized melody channel appears.

If necessary, the notes of the vocoder channel can still be extended - see above. With "OK" the effect "Vocoder" is active in the MIDI file and can be tested on the keyboard.

This was done here:

http://www.heikoplate.de/midis/ein_mann_psruti1.mid

The effects inserted by PSRUTI by default can be read most easily by the inserted SysEx events of type **"(XG) (Spec. Eff.)"** (instructions in section 3), which are exclusively responsible for vocal harmony, for example in the MIDI file "ein_mann_psruti1.mid".

In the initialization clock 1

```
F0 43 10 4C 04 00 00 59 00 F7        (XG) (Spec. Eff.) VH Vocoder XG
F0 43 10 4C 04 00 14 0F F7           ; (XG) (Spec. Eff.) VH Song Harmony Channel 16
F0 43 10 4C 04 00 0C 00 F7           ; (XG) (Spec. Eff.) VH Off
```

In the first event, the voice type "Vocal Harmony Vocoder" is defined and in the next event it is assigned to channel 16. Since we are in initial bar 1, which contains no notes, Vocal Harmony is switched off (deactivated) here.

In the note area

```
002:04:001     F0 43 10 4C 04 00 0C 40 F7        ; (XG) (Spec. Eff.) VH AD (On)
023:01:000     F0 43 10 4C 04 00 0C 00 F7        ; (XG) (Spec. Eff.) VH Off
```

With the first note in bar 2, Vocal Harmony is switched on (activated) and then deactivated again until the end of the MIDI file directly after the last note. This makes sense, because otherwise the VH-effect will not automatically switch off the activation when playing another MIDI-file.

Since the present song is to be sung partly as a solo voice and partly by a choir, it makes sense to extend these SysEx events. For this we proceed according to section 3.

Since the song should not start with the solo voice "Vocoder XG" but with "Vocoder KaraokePich", we replace the SysEx "F0 43 10 4C 04 00 00 59 00 F7" with "F0 43 10 4C 04 00 00 59 1B F7" in the first bar. In addition, another SysEx "Mic Volume/Balance L<H63" is inserted, which suppresses the own singing voice.

Bar one:

[start sysex list]

```
F0 7E 7F 09 01 F7                   ; Turn General Midi System On
F0 43 10 4C 00 00 7E 00 F7          ; (XG) XG System On
F0 43 10 4C 04 00 00 59 1B F7       ; (XG) (Spec. Eff.) VH Vocoder Karaoke Pitch
F0 43 10 4C 04 00 14 0F F7          ; (XG) (Spec. Eff.) VH Song Harmony Channel 16
F0 43 10 4C 04 00 0B 7F F7          ; (XG) (Spec. Eff.) Mic Volume/Balance L<H63
```

```
F0 43 10 4C 04 00 0C 00 F7          ; (XG) (Spec. Eff.) VH Off
```

[end list]

In the song, the solo voice "Karaoke Pitch" is repeatedly interrupted by interjections from the choir "Country Quartet". This is achieved in the note area by the SysEx inserted at the correct MBT positions (bar/beat/tick):

Notes section:

[start sysex list]

```
003:04:001    F0 43 10 4C 04 00 0C 40 F7        ; (XG) (Spec. Eff.) VH AD (On)
005:04:470    F0 43 10 4C 04 00 00 59 6F F7     ; (XG) (Spec. Eff.) VH Vocoder CountryQuartet
007:02:470    F0 43 10 4C 04 00 00 59 1B F7     ; (XG) (Spec. Eff.) VH Vocoder KaraokePich
009:04:470    F0 43 10 4C 04 00 00 59 6F F7     ; (XG) (Spec. Eff.) VH Vocoder CountryQuartet
011:02:470    F0 43 10 4C 04 00 00 59 1B F7     ; (XG) (Spec. Eff.) VH Vocoder KaraokePich
015:04:470    F0 43 10 4C 04 00 00 59 6F F7     ; (XG) (Spec. Eff.) VH Vocoder CountryQuartet
024:01:000    F0 43 10 4C 04 00 0C 00 F7        ; (XG) (Spec. Eff.) VH Off
```

[end list]

The result: http://www.heikoplate.de/midis/ein_mann_psruti2.mid

Hint:

The Vocal Harmony voices (Vocal Harmony types) used in the example are only valid for the keyboards up to and including Tyros 4. Before Tyros 5, the value of the MSB was hex 59 = dec. 89; now hex 0C = dec. 12. You have to orientate yourself on the specifications of the "Vocal Harmony Type List" of the data lists: The LSB value that follows must also be checked. Attention: The specifications in the type lists are decimal numbers!

The following is a corresponding adjustment for Tyros 5 upwards.

Bar one:

[start sysex list]

```
F0 7E 7F 09 01 F7                 ; Turn General Midi System On
F0 43 10 4C 00 00 7E 00 F7        ; (XG) XG System On
F0 43 10 4C 04 00 00 0C 07 F7     ; (XG) (Spec. Eff.) VH VocoderMono
F0 43 10 4C 04 00 14 0F F7        ; (XG) (Spec. Eff.) VH Song Harmony Channel 16
F0 43 10 4C 04 00 0B 7F F7        ; (XG) (Spec. Eff.) Mic Volume/Balance L<H63
F0 43 10 4C 04 00 0C 00 F7        ; (XG) (Spec. Eff.) VH Off
```

[end list]

Notes section:

[start sysex list mbt]

```
003:04:001    F0 43 10 4C 04 00 0C 40 F7        ; (XG) (Spec. Eff.) VH AD (On)
005:04:470    F0 43 10 4C 04 00 00 0C 02 F7     ; (XG) (Spec. Eff.) VH Standard Quartet
007:02:470    F0 43 10 4C 04 00 00 0C 07 F7     ; (XG) (Spec. Eff.) VH VocoderMono
009:04:470    F0 43 10 4C 04 00 00 0C 02 F7     ; (XG) (Spec. Eff.) VH Standard Quartet
011:02:470    F0 43 10 4C 04 00 00 0C 07 F7     ; (XG) (Spec. Eff.) VH VocoderMono
015:04:470    F0 43 10 4C 04 00 00 0C 02 F7     ; (XG) (Spec. Eff.) VH Standard Quartet
024:01:000    F0 43 10 4C 04 00 0C 00 F7        ; (XG) (Spec. Eff.) VH Off
```

[end list]

Result: www.heikoplate.de/midis/ein_mann_psruti2_genos.mid

3. Appendix: Inserting, deleting and editing SysEx events

For this purpose the PSRUTI function "SysEx on/off" is selected.

The following actions are possible here:

"Read SysEx" - "to text file"

The sequence of the SysEx events stored in bar 1 are stored in a text file to be specified, which is then displayed with the editor. With additionally checked "Remove SysEx" the SysEx are removed at the same time. If "from note range" is checked at the same time, the SysEx events from the note range are displayed. It is also possible to remove the SysEx without "in text file" being checked. If you only want to view the SysEx, you will not remove it from the MIDI file. But if you want to edit it, you have to remove it.

With "OK" the text editor defined under Windows opens with the SysEx protocol.

Inserting SysEx events is done in the editor protocol by adding a new line, but you must adhere to the exact structure. To delete a SysEx event, remove the line and to change it, edit the SysEx string. Comments do not need to be changed. The changed text file will be saved and closed.

"Read SysEx" - "from text file"

This function is only necessary if a text file modified in the first step exists. If there is a text file with SysEx from the note range, "from note range" and "with MBT" must be checked. With "OK" the path of the text file is requested and the action is completed.

End