

The Program PipeTune

Why this Program?

The program „[HAUPTWERK](#)“ from Martin Dyde offers the opportunity to play different virtual organs on a Windows-PC. Most of this virtual organs are offered from third parties, sometimes for some charge to cover scanning costs or to support conservation of the real organs. The virtual organs are a collection of wav-files, each containing the sound of a single pipe. The whole is fitted together by an organ-file, describing the manuals, pistons, stops and so on. A medium sized organ with around twenty stops contains around 1000 pipes, so the virtual organ also contains around 1000 wav-files.

The actual version 1.22 of program HAUPTWERK only allows to use the samples in one temperament, but the new version 2.0 will allow to use these samples with different temperaments.

Since the distribution of the new version seems to be delayed up to end of 2004, and since i am very interested in using different old temperaments, i decided to write a tool for retuning the samplesets for HAUPTWERK which i named PipeTune.

How it works

PipeTune takes a WAV-file and modifies the frequency of the sampling data with interpolation of intermediate values. The loop- and queue-points were adapted accordingly.

But the feature of this program is the handling of whole families of WAV-files (stops) with one call.

PipeTune may be called with different modes. In the simplest case one WAV-file is used as source, one directory path is given as destination and a factor for the modification of the frequency (between including 0.5 up to 2.0). The samples will be retuned according the tuning factor, all other informations like comments or copyright messages will be copied without any change.

The following examples here are given with the Ott-Orgel of [Christian Datzko](#), since this organ is small and available without charge. First you should make a copy of the whole Ott-Orgel to another directory, for example “Ott-Tuned”. You can do that with the bat-file described farther on in this document by calling it with the parameter “Equal”, which means a simple copy function.

Here the first example: This example tunes the pipe C1 of the stop „Gedackt 8’“ one quint higher. The tuning factor here is exactly 1.5:

```
PipeTune "Ott-Orgel\Ott-Orgel Gedackt 8'\01-c1.wav" "Ott-Tuned\Ott-Orgel Gedackt 8'" 1.5
```

You may test the result either with loading the Ott-Tuned Organ or by simply playing the resulting wav-file with the Windows Media Player.

In a more complex case, the source is a set of files selected by the wildcard characters `*` and `?`. This example tunes the “Gedackt 8” one octave deeper to the directory Subbass 16’ – the tuning factor is 0.5:

```
mkdir "Ott-Tuned\Ott-Orgel Subbass 16'"
PipeTune "Ott-Orgel\Ott-Orgel Gedackt 8'\*.wav" "Ott-Tuned\Ott-Orgel Subbass 16'" 0.5
```

Instead of the tuning factor you may give a centvalue with leading sign. 100 cent correspond exactly to one equal-spaced half-tone, one octave are exactly 1200 cents. Here the example from before, but the factor is given as cents:

```
mkdir "Ott-Tuned\Ott-Orgel Subbass 16'"
PipeTune "Ott-Orgel\Ott-Orgel Gedackt 8'\*.wav" "Ott-Tuned\Ott-Orgel Subbass 16'" -1200
```

Instead of giving the tuning factor as a constant, you also may give the name of a temperament contained in the file PipeTune.ini. The program has to find the name of the key out of the filename, to get the special tuning factor for this key within the selected temperament. To tune the stop „Gedackt 8” to the temperament of the Gabler-Organ of Weingarten in Germany, which also is a half-tone deeper than our current pitch of 440 Hz(A), you may use the following command:

```
PipeTune "Ott-Organ\Ott-Orgel Gedackt 8'\*.wav" "Ott-Tuned\Ott-Orgel Gedackt 8'" Gabler-100
```

The Copyright of the Samples

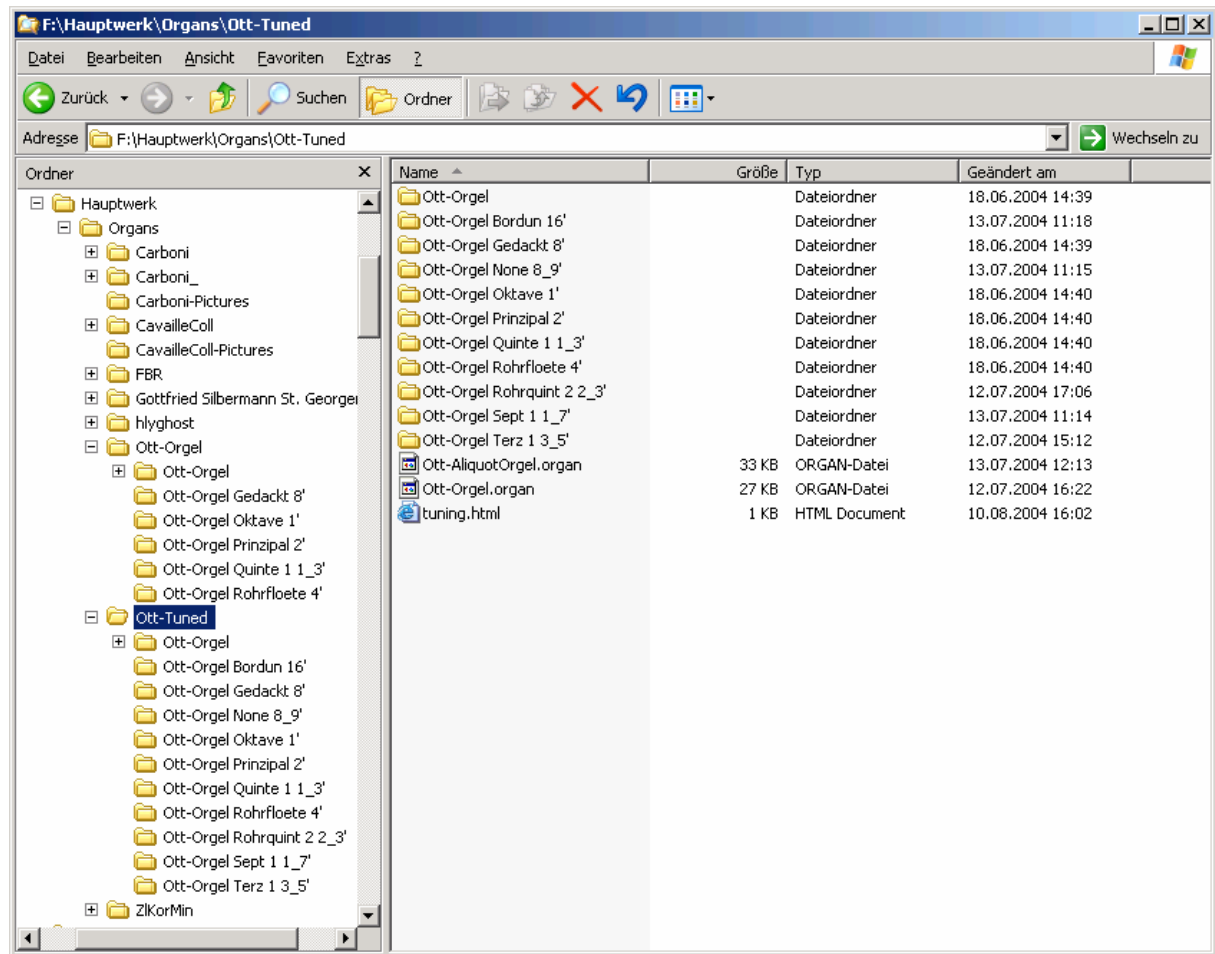
Since the program PipeTune only converts the sample-frequency by a factor, a simple technical computation, the copyright of the files will NOT be CHANGED. The files created by PipeTune keep the same copyright than the source files have! They may not be given to other persons or put on servers or similar, if this wasn't allowed with the original sourcefiles.

Installation

Copy the file PipeTune.exe and PipeTune.ini to the directory HAUPTWERK\ORGANS or put PipeTune.exe to a directory, which is searched by Windows for EXE-files by default.

Preparation

PipeTune always needs the original sample files. If the bat-file doesn't create a new directory tree for the tuned organ, you must do that by hand. Here is an example regarding the OTT-Orgel from [Christian Datzko](#). If his free available sample set is installed, there is a directory within HAUPTWERK\ORGANS with name OTT-ORGEL. Mark this directory with all its subdirectories and make a complete copy (for example with the Windows-Explorer) to a new directory with name OTT-TUNED. The Directory-Hierarchy should then be as follows:



You should now be able, to play the original OTT-ORGEL and also to play the copy OTT-TUNED.

A sample tuning bat-file

Here is now a sample bat-file for tuning the organ OTT-TUNED. This file also creates the new directory tree, if it doesn't already exist. Copy this file TUNE_OTT.BAT to the directory HAUPTWERK\ORGANS:

```
REM Tune the ott-organ
ECHO OFF
ECHO Tune ott-orgel to %1

mkdir "Ott-Tuned"
mkdir "Ott-Tuned\Ott-Orgel Gedackt 8'"
PipeTune "Ott-Orgel\Ott-Orgel Gedackt 8'\*.wav" "Ott-Tuned\Ott-Orgel Gedackt 8'" %1
mkdir "Ott-Tuned\Ott-Orgel Rohrfloete 4'"
PipeTune "Ott-Orgel\Ott-Orgel Rohrfloete 4'\*.wav" "Ott-Tuned\Ott-Orgel Rohrfloete 4'" %1
mkdir "Ott-Tuned\Ott-Orgel Prinzipal 2'"
PipeTune "Ott-Orgel\Ott-Orgel Prinzipal 2'\*.wav" "Ott-Tuned\Ott-Orgel Prinzipal 2'" %1
mkdir "Ott-Tuned\Ott-Orgel Quinte 1 1_3'"
PipeTune "Ott-Orgel\Ott-Orgel Quinte 1 1_3'\*.wav" "Ott-Tuned\Ott-Orgel Quinte 1 1_3'" %1
mkdir "Ott-Tuned\Ott-Orgel Oktave 1'"
PipeTune "Ott-Orgel\Ott-Orgel Oktave 1'\*.wav" "Ott-Tuned\Ott-Orgel Oktave 1'" %1
PipeTune "Make the file tuning.html" Ott-Tuned\ %1 H
```

Now you open a Console-Window, set the working path to HAUPTWERK\ORGANS with the CD-command, and call the bat-program with a parameter for the temperament of your choice (must be contained in PipeTune.ini):

```
TUNE_OTT MeanTone4
```

tunes the OTT-TUNED-organ to the meantone temperament, which has 8 pure mayor thirds. This takes some computing time (expect half a second per pipe).

The last line in this file creates a file tuning.html in the directory given by the second parameter. It takes the text from the file PipeTune.ini. This is necessary to remember the last tuning done to this directory.

The different temperaments

The file PipeTune.ini contains different temperaments (tuning shemes). The file is in ASCII-format and therefore can be edited and expanded with any normal editor. This file will be read, if a name for a temperament is given to PipeTune. If this name is not found within the file, PipeTune will give an error message and abort. The syntax of this file is given further on.

This functionality will only work correctly, if as a source an equal tempered organ is given or the temperament of the source samples is given with the T-Option, since PipeTune can not measure the frequency of the samples.

I have inserted the following temperaments to the database (will be expanded):

- Equal – This is a 1:1 copyfunction of the original WAV-file. Equal temperament (used widely now) means, that all intervals are the same, all kind of clays sound the same, fifths are a bit too small, large thirds are rather too wide, small thirds are rather too small.
- Pythagorean – the Pythagoräan temperament consisting of 11 pure fifths and one wolf-fifth. This tuning was used in the early Rennaissance. It is easy to tune by ear, since you only have to tune pure fifths. The position of the wolf-fifth, which takes the whole of the Pythagorean comma (24 cent), also defines the location of the four nearly pure large thirds. If the wolf-fifth is at D-A, the thirds are at F-A, G-B, C-E and D-Gb. The third D-Gb of less usability, since the fifth D-A is so bad. This tuning is of academic interest only.
- MeanTone4 – eight pure major thirds – THE temperament for organs before the 16th century. The pure thirds are payed by some kind of clays which couldn't be used, since there is on very bad fifth and four very bad large thirds. But the pieces of the old composers take this in account. The syntonic comma, which is the difference between four pure fifths to one pure third, is divided by four and taken from the four fifths. So the reduced four fifths C-G-D-A-E give a perfect third C-E.
- MeanTone5 – a somehow modified and smoothed version of MeanTone4. The eleven fifths are only reduced by 1/5 of a syntonic comma. So the four fifths C-G-D-A-E no more give a perfect, but a bit too wide third C-E. This results in a not so bad wolf-fifth G#-Eb.
- MeanTone6 – the same as MeanTone5, but the fifths are only reduced by 1/6 of the syntonic comma.
- Kirnberger3
- Werkmeister3 – a well tempered tuning, which should it make possible to play in all modes. It also had the opportunity, that it is be relatively easy to retune MeanTone4 to Werkmeister3.

- Vallotti
- Young
- Kellner – a welltempered tuning with the same sweeping for the maior third and fifth of c-maior.
- Silbermann_Erfurt_Dom – Present tuning of the Gottfried Silbermann-Organ at the Dom of Erfurt, Germany.
- Gabler – Reconstructed tuning (not the present one) of the Gabler-Organ at Weingarten, Germany.

Parameterdescription (Referenz)

PipeTune source destpath tuning [options]

source: Name of the sourcefile(s) (with path). Wildcard characters '*' and '?' supported.

destpath: Directory for destination of recomputed files. The name of the sourcefile will be preserved.

tuning:

a) a fixed factor for retuning between 0.5 and 2.0

b) a centvalue with sign as prefix (to distinguish from case a) between -1200 and +1200 or

c) the name of a tuning scheme (temperament) described in file PipeTune.ini.

options:

V=n Verbose mode. The integer n gives the talkativity. V=4 for example shows all the tokens found in the wav-file. V=0 – no messages, V=1 - (default) tell about tuning, V=2 - some remarks about chunks in wav-file, V=3 - more messages, V=4 - add dumps of unknown parts of the wav-file.

O=n In the sampleset of the Georgenkirche Rötha of [Milan Digital Audio](#) the names of the keys have an offset of n halftone, since this organ is tuned half a tone higher than usual today. The key C uses samples with name C#, key C# uses samples named D and so on. To be able to tune this organ too, there is this parameter for keyoffset. For Milans sampleset, you have to use the option O=-1. This option may also be used to center another temperament to another kind of clay. To play in D-major with the Pythagorean temperament, you have to give the parameter O=-2.

T=original_tuning Here you can give the name (and offset) of the tuningscheme of the original sampleset. When this is not given, Equal temperament is assumed. If the setting here is not correct, the result of the tuning will also not be correct.

H This option creates the file "tuned.html" in the directory given as second parameter to the program PipeTune (the first parameter is ignored in this case). The text is taken from the file PipeTune.ini – the lines following the tuning-line up to the next tuning line. This file is used by me to remember the last tuning i did to the organ. You also may create a link from the html-file describing the organ to this file.

L=samples Add a dummy loop of “samples” samples and a release part of “samples” samples at the end of the original recording. All added samples are 0. This is for percussive samples, which should be damped to 0 when the key is released. This option was build in on request of a sample producer.

X Remove unknown chunks within the sample. This chunks will not be used by HAUPTWERK and may be removed for saving space.

U Do NOT remove the unused samples between the loop-part and the release part. This samples are removed by default, but you may avoid this behaviour by this switch.

The Temperaments in PipeTune.ini

This file is a normal textfile and may be changed or viewed with every normal texteditor. The file will be read by PipeTune, if the name of a tuning sheme is given as third parameter. If the tuning sheme is not found, an errormessage will be given and PipeTune terminates. The case of the letters is important!

If a line does not start with a letter in this file, it will be read over as a comment. This comment comes into play if you use the Option H to PipeTune.

The first word in a line not starting with whitespace is the name of the tuning sheme. Please avoid the characters '+' and '-' from the name, since this characters are taken as separators for offsets in cents by PipeTune.

After the name, the line contains 12 constants (with fractal component) seperated by commata, which give the cent-value in reference to C. For the Equal tuning, this line reads:

```
Equal      0.0, 100.0, 200.0, 300.0, 400.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0, 1100.0
```

I found this specification of a tuning sheme often in secondary literature and find it rather intuitive, so decided to use it here too. All values have to follow in one line! If the example later breaks the lines, this is caused by the limited with of lines in this document.

I am interested in further tuning shemes, if you have one.

```
[TUNINGS]
Equal      0.0, 100.0, 200.0, 300.0, 400.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0, 1100.0
    This one is a simple copy function or may be used to tune up or down an organ by a
    fixed amount. For tuning up about 15 cent use the following line:
    PipeTune source dest Equal+15

Pythagorean 0.0,  90.2, 203.9, 294.1, 384.4, 498.0, 588.3, 702.0, 792.2, 882.4,  996.1, 1086.3

MeanTone4   0.0,  76.0, 193.2, 310.3, 386.3, 503.4, 579.5, 696.6, 772.6, 889.7, 1006.8, 1082.9
    The normal mean tone temperament with 7
    Many sources;

MeanTone5   0.0,  80.4, 194.4, 308.4, 388.3, 502.8, 583.2, 697.2, 777.6, 891.6, 1005.6, 1086.0

MeanTone5_Jacobi      0.0,  87.9, 195.3, 296.1, 390.6, 502.4, 585.9, 697.6, 789.8, 893.0,
1000.4, 1088.3
    This is the current tuning of the Arp Schnitger organ at St. Jacobi at Hamburg (Germany)
    Source: Heimo Reinitzer: "Die Arp Schnitger-Orgel der Hauptkirche St.Jacobi in Hamburg"
    Hamburg 1995, ISBN 3-7672-1187-4

Kirnberger3 0.0,  90.0, 193.0, 294.0, 386.0, 498.0, 590.0, 696.5, 792.0, 889.5,  996.0, 1088.0

Werckmeister3 0.0,  92.0, 193.0, 294.0, 391.5, 498.0, 590.0, 696.5, 793.0, 889.5,  996.0,
1093.5

Vallotti    0.0,  94.0, 196.0, 298.0, 392.0, 502.0, 592.0, 698.0, 796.0, 894.0, 1000.0, 1090.0

Young       0.0,  90.0, 196.0, 294.0, 392.0, 498.0, 588.0, 698.0, 792.0, 894.0,  996.0, 1090.0

Kellner     0.0,  90.0, 194.4, 294.0, 388.8, 498.0, 588.0, 697.2, 792.0, 891.6,  996.0, 1090.8

Silbermann_Erfurt_Dom 0.0,  90.0, 196.0, 298.0, 394.0, 500.0, 590.0, 698.0, 790.0, 896.0,
1000.0, 1092.0

Gabler      0.0,  85.0, 195.0, 305.0, 391.0, 501.0, 588.0, 698.0, 785.0, 893.0, 1003.0, 1088.0
    This is the orginal tuning of Gabler at the famous Organ in Weingarten, Germany. It
    was found by Orgelbau Kuhn, Männedorf CH at the restauration of the organ by measuring
    the old pipes after removing later additions. Now the organ is tuned in a somewhat
    smoothed temperament, since this one seemed not to fit for Bach's organworks.
```

The tuning was taken from "Weingarten - Gabler Orgel" 1986 Männedorf Schweiz.

Generating new Aliquot-Stops for the Ott-Orgel from [Christian Datzko](#)

Since PipeTune is able to retune the pipes up and down by an octave, there is the possibility to generate some „new“ stops how i will show with the following example.

This batchfile will create five new stops for the Ott-Tuned-Organ created in the example above. An expanded organ-file is included with this distribution.

```
REM Generate Aliquot registers for the ott-organ
ECHO OFF

ECHO Generate Register Rohrquint 2 2/3' from Rohrflöte 4'
mkdir                                "Ott-Tuned\Ott-Orgel Rohrquint 2 2_3'"
PipeTune "Ott-Orgel\Ott-Orgel Rohrflöte 4'\*.wav" "Ott-Tuned\Ott-Orgel Rohrquint 2 2_3'" %1+701.95

ECHO Generate Register Terz 1 3/5' from Quinte 1 1/3'
mkdir                                "Ott-Tuned\Ott-Orgel Terz 1 3_5'"
PipeTune "Ott-Orgel\Ott-Orgel Quinte 1 1_3'\*.wav" "Ott-Tuned\Ott-Orgel Terz 1 3_5'" %1-315.6

ECHO Generate Register Sept 1 1/7' from Quinte 1 1/3'
mkdir                                "Ott-Tuned\Ott-Orgel Sept 1 1_7'"
PipeTune "Ott-Orgel\Ott-Orgel Quinte 1 1_3'\*.wav" "Ott-Tuned\Ott-Orgel Sept 1 1_7'" %1+266.9

ECHO Generate Register None 8/9' from Quinte 1 1/3'
mkdir                                "Ott-Tuned\Ott-Orgel None 8_9'"
PipeTune "Ott-Orgel\Ott-Orgel Quinte 1 1_3'\*.wav" "Ott-Tuned\Ott-Orgel None 8_9'" %1+701.95

ECHO Generate Bordun 16' from Gedackt 8'
mkdir                                "Ott-Tuned\Ott-Orgel Bordun 16'"
PipeTune "Ott-Orgel\Ott-Orgel Gedackt 8'\*.wav" "Ott-Tuned\Ott-Orgel Bordun 16'" %1-1200
```

As with the tuning of the organ, here may be given the name of the tuning-scheme as a parameter. If you want to use the equal temperament, no parameter should be given.

But you should use the same temperament for all stops, since otherways it will sound awful.

Other bat-files for tuning

I have created some other batchfiles for tuning of the following organs:

1. [1677 Carboni Principal Organ at Valsolda/Como, Italy](#) von Prof. Helmut Maier
2. [1722 Gottfried Silbermann organ of St. Marienkirche, Rötha, Germany](#) von Brett Milan
3. The Mini-Sampleset of Zlata Koruna from [Jiri Zurek's Sonus Paradisi Project](#)

They will be included in the distribution of this tool, if i get the approval from the sample set producers, or will be offered by the sample set producers themselves.

Postludium

I am exited by the program Hauptwerk and its possibilities. You could try different organs with different temperaments at home in your secret camber, which you couldnt touch all your life. As you have seen, you even could experiment with new aliquot registers, which in reality would be too expensive to build (for their usage). When i have some time left, i will make some experiments with some other organs.

I will give this tool for free to the Hauptwerk community, so everybody could do his own experiments. Even the sources will be available on request.

I will be happy for suggestions on improvements or other temperaments.

Martin@duemig-neufahrn.de

ToDo

The documentation of the different Temperaments is not very well done. Also, more temperaments like the Neidhard-family have to be added.

I expect many wav-file-formats, which could not be worked on correctly. If anyone gets such a file, please send it to me as an example for the enhancement of PipeTune.

History

- 1.01 First distributed release.
- 1.02 Added Option T= for definition of the Tuning scheme of the source samples. Also a correction of the selection of the Tunin scheme.
- 1.03 Learned reading of wav-files containing extended fmt-chunk. The file PipeTune.ini is now searched for at the current directory first, and if not found there, then at the place PipeTune.exe was taken from. So PipeTune.ini may reside in the same place as PipeTune.exe.
- 1.04 Fix for wav-files from Marcussen Organ Moerdijk.
- 1.05 Additional functionality: removing the part on not used samples (by HAUPTWERK) between the looping-area and the release. You may add a dummy loop and release to percussive samples not having a loop and release (This is a option for sample producers). New options: L=samples X U