

# Photosounder Archive Specification

VERSION 1.2.1

## DESCRIPTION

The Photosounder Archive format is a recipe-like language meant for describing and recording data and actions performed in Photosounder and to script, command and automate Photosounder.

Each line either starts with keywords making up the beginning of a command or data that in their context are interpreted as part of a command. A single line can be as long as 2048 characters (to accommodate for long file paths), except Base85 data lines which can contain millions of characters or more.

## COMMANDS

### **Photosounder Archive <version>**

Indicates the version of the specification to be used to interpret the following code. The code may be interpreted differently depending on the version specified.

<version>                   Version of the specification used. The current version is v1.2.1.

Example usage:

```
Photosounder Archive v1.2.1
```

### **Title "<title>"**

Title of the document as displayed in the top area of the window.

<title>                    Title of the document.

Example usage:

```
Title "Example.wav"
```

### **Clear image**

Clears the image in memory and all its layers. Does not clear the lossless data.

### **Dimensions <width> <width unit> x <height> <height unit>**

Changes the dimensions of the image and all its layers and buffers. If none exist it creates one layer and the necessary buffers with the specified dimensions. Otherwise it enlarges the image if the new dimensions are larger than the current dimensions. The original image remains at the same position from the upper left corner.

<width>                    Horizontal dimensions of the image/duration of the sound. If the unit is in seconds then the width can be expressed as a timestamp such as 12:45 to mean 12 minutes 45 seconds.

<width unit>               Either seconds (sec) or pixels (px) or, if an image already exists, percents (%).

<height>                   Vertical dimensions of the image.

<height unit>              pixels (px) or, if an image already exists, percents (%).

Example usage:

```
Dimensions 8.0 sec x 1141 px
```

### **Crop <width> <width unit> x <height> <height unit>**

Just like the *Dimensions* command with the exception that it forces the specified dimensions, even if they are shorter than the current dimensions. The original image remains at the same position from the upper left corner.

<width>	Horizontal dimensions of the image/duration of the sound. If the unit is in seconds then the width can be expressed as a timestamp such as 12:45 to mean 12 minutes 45 seconds.
<width unit>	Either seconds (sec) or pixels (px) or, if an image already exists, percents (%).
<height>	Vertical dimensions of the image.
<height unit>	pixels (px) or, if an image already exists, percents (%).

Example usage:

```
Crop 12.5 % x 100 %
```

### **Frequency range <min. frequency> - <max. frequency>**

Defines the frequency range of the synthesis.

<min. frequency>	Minimum frequency, either in Hertz (Hz) or as a note. The unit must be specified for Hertz.
<max. frequency>	Maximum frequency, either in Hertz (Hz) or as a note. The unit must be specified for Hertz.

Example usage:

```
Frequency range A0 – 20000.0 Hz
```

### **Frequency scale <scale>**

Defines the frequency scaling of the synthesis. Optional, a value of 2 is always assumed.

<scale>	Frequency scaling. A value of 2.0 represents a logarithmic scale while a value of 1.0 represents a linear frequency scale.
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Warning: Only a value of 2 is fully supported and many parameters stop making sense with a value other than 2.

Example usage:

```
Frequency scale 2.0
```

### **Time resolution <resolution> px/s**

Sets the time resolution in pixels/second used for synthesis and to translate parameters set in seconds.

<resolution>	Time resolution in pixels/second.
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Example usage:

```
Time resolution 100.0 px/s
```

## Synthesis <mode>

Sets the synthesis mode.

<mode>                    Either *noise*, *lossless* or *live*.

Example usage:

```
Synthesis noise
```

## Analysis frequency range <min. frequency> - <max. frequency>

Defines the frequency range of the analysis. Must be specified before the *Open* command that opens a sound is called. The values are reset to the program's user-defined defaults after the *Open* command is executed.

<min. frequency>        Minimum frequency, either in Hertz (Hz) or as a note. The unit must be specified for Hertz.

<max. frequency>        Maximum frequency, either in Hertz (Hz) or as a note. The unit must be specified for Hertz.

Example usage:

```
Analysis frequency range 300 Hz – D#7+30.05
```

## Analysis frequency scale <scale>

Defines the frequency scaling of the analysis. Optional, a value of 2 is always assumed. Must be specified before the *Open* command that opens a sound is called. The values are reset to the program's user-defined defaults after the *Open* command is executed.

<scale>                    Frequency scaling. A value of 2.0 represents a logarithmic scale while a value of 1.0 represents a linear frequency scale.

Warning: Only a value of 2 is fully supported and the parameters of *Analysis pitch resolution* and *Analysis minimum pitch resolution* stop making sense with a value other than 2.

Example usage:

```
Analysis frequency scale 1.41
```

## Analysis time resolution <resolution> px/s

Sets the time resolution in pixels/second used for analysis. Must be specified before the *Open* command that opens a sound is called. The values are reset to the program's user-defined defaults after the *Open* command is executed.

<resolution>              Time resolution in pixels/second.

Example usage:

```
Analysis time resolution 300.0 px/s
```

## Analysis pitch resolution <resolution> px/octave

Sets the vertical resolution in pixels/octave used for analysis. This, combined with *Analysis frequency range*, defines the vertical dimensions of the image analysed from a sound. Must be specified before the *Open* command that opens a sound is called. The values are reset to the program's user-defined defaults after the *Open* command is executed.

<resolution>            Resolution in pixels/octave.

Example usage:

```
Analysis pitch resolution 144.0 px/octave
```

### **Analysis minimum pitch resolution <resolution> px/octave**

Sets the minimum vertical resolution in pixels/octave used for analysis. Must be specified before the *Open* command that opens a sound is called. The values are reset to the program's user-defined defaults after the *Open* command is executed.

<resolution>            Minimum resolution in pixels/octave.

Example usage:

```
Analysis minimum pitch resolution 6.0 px/octave
```

### **Analysis transition time resolution <resolution> px/s**

Sets the transition time resolution in pixels/second used for analysis. Must be specified before the *Open* command that opens a sound is called. The values are reset to the program's user-defined defaults after the *Open* command is executed.

<resolution>            Transition time resolution in pixels/second.

Example usage:

```
Analysis transition time resolution 100.0 px/s
```

### **Analysis <side> channel only**

Specifies which track of a stereo input sound is analysed. When not specified a mono mix of both channels is used.

<side>                    *left* or *right*.

Example usage:

```
Analysis left channel only
```

### **Open "<file path>"**

Opens a file.

<file path>            Path of the file to be opened. The file can be an image file, a sound file or a PHA file. The path can be either absolute or relative. In the case of a relative path the file is looked for in the directory of the last opened file. In case the file cannot be found at the absolute path the absolute path is removed and the remaining file name is treated as a relative path.

Example usage:

```
Open "C:\music\Track 01.mp3"
```

### **Import "<file path>" <horizontal mode> <vertical mode>**

Opens a file to a new layer without destroying the current project.

<b>&lt;file path&gt;</b>	Path of the file to be opened. The file can be an image file or a sound file and not a PHA file. The path can be either absolute or relative. In the case of a relative path the file is looked for in the directory of the last opened file. In case the file cannot be found at the absolute path the absolute path is removed and the remaining file name is treated as a relative path.
<b>&lt;horizontal mode&gt; &lt;vertical mode&gt;</b>	These modes define how the imported layer is treated. Each mode starts either with the letter <i>v</i> or <i>h</i> followed with either the word <i>crop</i> , <i>fit</i> or <i>extend</i> . The first, <i>crop</i> , keeps the original project dimensions and if the image being imported is larger then it is cropped. The second, <i>fit</i> , also keeps the original dimensions but resizes the image being imported to make it fit. And finally <i>extend</i> changes the dimensions if the imported image is larger, otherwise it behaves as <i>crop</i> does. If those modes aren't specified then they're assumed to be <i>hextend</i> and <i>vfit</i> , these being the most suitable modes in most cases.

Example usage:

```
Import "C:\music\Track 01.mp3" hextend vfit
```

### **Save "<file path>"**

Saves a file.

<b>&lt;file path&gt;</b>	Path of the file to be saved. The file can be an image file, a sound file or a PHA file. A PHA file will be saved as a status file. The path should be absolute.
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Example usage:

```
Save "D:\Documents\result.wav"
```

### **Base85 <word count> words**

#### **<data line>**

This command announces a large chunk of data in Base85/Ascii85 in the next line. The data line contains as many words as specified, each word representing a 32-bit word in Little Endian order using 5 ASCII characters, also in Little Endian order, and each data line ending with a 'z' character. This Base85 encoding uses every ASCII character in order from character '%' (ASCII value 37) to character 'y' (ASCII value 121). If the 'z' character is encountered sooner than expected the reading of the line ends. After the reading ends the end of the line is read-through and ignored.

The Base85 fills a different buffer depending on the context. In the layer context, which is after a *New layer* or *Selected layer* is called or an operation on the current layer, it replaces the data in the current layer. In the context after a *New original sound* and *New original image* it fills respectively the original sound buffer used for lossless processing and the original image buffer used for reference during the lossless processing.

<b>&lt;word count&gt;</b>	Number of 32-bit words being represented on the line below in the form of groups of five ASCII characters.
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**<data line>** Base85 data. The length of that line has no absolute upper limit and can be extremely large.

Example usage:

```
Base85 138753 words
4nSd8arue8jCBf84Yjf8aM\g85**h8Gf<h8TO-i8m`*j8nvcj8Mu4k8Jcnj8jNdi8 ... N:cx7*VMx7(B8x7z
```

### **New original sound (<sample count> samples)**

**Samplerate <rate> Hz**

**Base85 ...**

Sets the original sound used for lossless processing. The data is filled in using a Base85 command.

**<sample count>** Number of samples for the original sound.

**<rate>** Sample rate of the original sound. If it differs from Photosounder's current sample rate the original sound will be resampled to the current rate.

Example usage:

```
New original sound (107258 samples)
Samplerate 44100 Hz
Base85 107258 words
vi2y7?Nc@a)vQP\?9Xa&Ks09FA639&%X59Z_389 ... X9gl8ugAH8VW'E8aC0=8z
```

### **New original image (<width> x <height>)**

Sets the original image used as a reference for lossless processing. The data is filled in using a Base85 command.

**<width>** Width of the image. The lossless mode can only be turned on if this original image has the same dimensions as the current image.

**<height>** Height of the image.

Example usage:

```
New original image (243 x 571)
Base85 138753 words
X[nh62J&i64 ^iX76)nD7/c=d6<DEa6qP&g6F[qf6.h7b6 ... %:&c6]+qh6%bcm6VBjb6XUOd6>lk_6z
```

### **New layer "<name>"**

Creates a new layer above the current layer.

**<name>** Name of the new layer.

Example usage:

```
New layer "Layer 1"
```

### **New separator "<name>"**

Creates a new separator above the current layer.

<name>                    Name of the new separator.

Example usage:

```
New separator "----"
```

### **Rename layer "<name>"**

Renames the current layer.

<name>                    New name of the current layer.

Example usage:

```
Rename layer "EQ layer"
```

### **Selected layer <index>**

Selects the indicated layer.

<index>                    Absolute index of the layer to select (starting from 0 for the bottom layer) or, if preceded with either a + or – sign, the relative index from the current layer.

Example usage:

```
Selected layer +1
```

### **Duplicate layer**

Creates a duplicate layer of the current layer. Works both on layers and separators.

### **Merge down layer**

Merges the current layer down with the layer below. Only works if both layers are layers and not separators.

### **Delete layer**

Deletes the current layer or separator.

### **Merge all to new layer**

Creates a new layer above all layers that contains the combination of all layers present.

### **Move layer <direction>**

Moves the current layer in position up or down.

<direction>                up or down.

Example usage:

```
Move layer up
```



### Turn layer *<state>*

Enables or disables the current layer. If the current layer is a separator every layer above itself until the next separator are also effectively disabled if the state is off.

*<state>*                    *off or on.*

Example usage:

Turn layer off

### Blending *<mode>*

Sets the blending mode of the current layer or separator.

*<mode>*                    *Either addition, multiplication, division, reverse division, subtraction, reverse subtraction, difference, minimum, maximum, vertical propagation, horizontal propagation, horizontal propagation looped, convolution, convolution looped.*

Example usage:

Blending addition

### Central convolution point *<x position> <x unit> , <y position> <y unit>*

Sets the central convolution point of the current layer.

*<x position>*            *X-axis position of the point.*

*<x unit>*                    *X-axis unit of the point's X-axis coordinate. Can be either pixels (px), percents (%) or seconds (sec).*

*<y position>*            *Y-axis position of the point. Can be a note.*

*<y unit>*                    *Y-axis unit of the point's Y-axis coordinate. Can be either pixels (px), percents (%), Hertz (Hz) or a note. If the Y-axis position is a note no unit is to be specified.*

Example usage:

Central convolution point 50 % , A4

### Move layer *<x offset> <x unit> x <y offset> <y unit>*

Displaces the layer in its 2D space.

*<x offset>*                *X-axis offset. Is always signed.*

*<x unit>*                    *X-axis unit of the offset. Can be either pixels (px), percents (%) or seconds (sec).*

*<y offset>*                *Y-axis offset. Is always signed.*

*<y unit>*                    *Y-axis unit of the offset. Can be either pixels (px), percents (%) or semitones (st).*

Example usage:

Move layer +0.32 sec x +12.0 st

### Multiply layer by *<ratio>*

Multiplies every pixel value of the current layer by a ratio.

`<ratio>` Ratio by which every pixel of the current layer is multiplied.

Example usage:

**Multiply layer by 4.0**

### **Gamma `<gamma>`**

Changes the gamma of the current layer.

`<gamma>` New gamma of the current layer.

Example usage:

**Gamma 2.0**

**Operation erase**

**Operation invert**

**Operation mask invert**

**Operation horizontal flip**

**Operation vertical flip**

**Operation horizontal average**

**Operation vertical average**

**Operation horizontal curves**

**Operation vertical curves**

**Operation fill to left**

**Operation fill to bottom**

**Operation normalisation**

**Operation set sum to 1**

**Operation horizontal normalisation**

**Operation vertical normalisation**

**Operation 1/x**

**Operation square**

**Operation square root**

**Operation fill white**

**Operation fill pink**

**Operation fill brown**

**Operation group to semitone**

**Operation rotation by 90**

**Operation rotation by 180**

**Operation rotation by 270**

Various single-line argumentless operations. Each operates only on the currently selected layer.

## Undo

Swaps the pixel contents between the current layer buffer and the internal undo buffer.

## Draw <tool name>

**Point size** <point width> <point width unit> x <point height> <point height unit>

**Units** <x drawing unit>,<y drawing unit>

**Point intensity** <intensity>

**Harmonics** <harmonics count>

## Lines

<x point> <y point> T+<time offset>s

<x point> <y point> T+<time offset>s

Draws lines using the specified drawing tool. The *Lines* command indicates that the following lines will be the coordinates of points used to draw interconnected lines. If *Lines* occurs after drawing lines it will end the current line at the last coordinates and start a new unconnected line at the next coordinates.

<tool name>	Name of the drawing tool to be used. Either <i>rectangle</i> , <i>erase spray</i> , <i>dark spray</i> , <i>white spray</i> , <i>brighten spray</i> , <i>smart erase spray</i> .
<point width>	Point width of the drawing tool. Will always be drawn to be at least 2 pixels.
<point width unit>	Unit of the point width. Can be either pixels (px), percents (%) or seconds (sec).
<point height>	Point height of the drawing tool. Will always be drawn to be at least 2 pixels.
<point height unit>	Unit of the point height. Can be either pixels (px), percents (%) or semitones (st).
<x drawing unit>	X-axis unit for the coordinates of the points. Can be either pixels (px), percents (%) or seconds (sec).
<y drawing unit> (%),	Y-axis unit for the coordinates of the points. Can be either pixels (px), percents Hertz (Hz) or notes (note).
<intensity>	Intensity of the points in a 0.0 to 1.0 range.
<harmonics count>	Number of harmonics to be drawn. 0 draws only a single line. This value rarely needs to be above the ratio between the maximum and the minimum synthesis frequency (728 by default).
<x point>	X-axis position of the new point.
<y point>	Y-axis position of the new point.
<time offset>	Time since last action. Used to record the timing of drawing. The entire <i>T+&lt;time offset&gt;s</i> part is optional as it has no effect on the final result.

Example usage:

```
Draw white spray
Point size 2 px x 2 px
Units sec,note
Point intensity 1
Harmonics 0
Lines
0.0          G1          T+0.000s
2.0          G1          T+0.006s
Lines
```

2.0	G2	T+0.664s
4.0	G2	T+0.013s
Lines		
4.0	G1+600	T+0.685s
7.2	G1+600	T+0.007s

## Draw rectangle

**Intensity** *<ratio>*

**Rectangle start** *<x start position>* *<x unit>* x *<y start position>* *<y unit>*

**Rectangle end** *<x end position>* *<x unit>* x *<y end position>* *<y unit>*

Multiplies the pixels of the current layer of a rectangular area by a ratio.

<i>&lt;ratio&gt;</i>	Ratio by which pixels in the rectangle area are multiplied. Can be any positive value, 0 included.
<i>&lt;x start position&gt;</i>	X-axis position of the starting corner of the rectangle area.
<i>&lt;x unit&gt;</i>	Unit of the X-axis positions. Can be either pixels (px), percents (%) or seconds (sec).
<i>&lt;y start position&gt;</i>	Y-axis position of the starting corner of the rectangle area. Can be a note.
<i>&lt;y unit&gt;</i>	Unit of the Y-axis positions. Can be either pixels (px), percents (%), Hertz (Hz) or notes. If the Y-axis position is a note no unit is to be specified.
<i>&lt;x end position&gt;</i>	X-axis position of the corner of the rectangle area opposite to the starting corner.
<i>&lt;y end position&gt;</i>	Y-axis position of the corner of the rectangle area opposite to the starting corner. Can be a note.

Example usage:

```
Draw rectangle
Intensity 2.53
Rectangle start 11.3 % x 125 Hz
Rectangle end 327 px x F7-14.39
```

## *<state>* long block duration

Enables/disables the long block duration option. If enabled then synthesis uses a 30-second long looping noise instead of a 2-second long looping noise.

*<state>*                    *Enable or Disable.*

Example usage:

```
Disable long block duration
```

## *<state>* loop playback

Enables/disables loop playback.

*<state>*                    *Enable or Disable.*

Example usage:

```
Enable loop playback
```

## **Time <time>**

Indicates the time at which an action was recorded or the time since the time was previously recorded.

<time>                    Either a time in seconds since the last *Time* command or the full UTC time and date in year-month-day hour:minute:second format.

Example usage:

```
Time 2011-04-13 17:42:08
```

```
Time +2.74 s
```

## **Quit**

Quits Photosounder.

# VERSION HISTORY

Below are listed changes in the Photosounder Archive specification that affect forward-compatibility, i.e. the capability of an older document to comply with later versions of the specification. A parser should take into account those differences to be able to interpret old documents correctly and documents should specify the version of the specification they use to be future-proof.

## Version 1.0 to 1.1:

- In v1.0 the *Dimensions* command implied a *Clear image* command before itself. There a *Dimensions* command in a document using version 1.0 of the specification should be interpreted as a *Clear image* command followed by the *Dimensions* command.
- In v1.0 an *End of archive* command terminated all documents. This command was removed entirely and should be ignored.

## Version 1.1 to 1.2:

- The operation called *Operation fill brown* in v1.2 is the same operation as v1.1's *Operation fill pink*, due to an earlier misconception about what constitutes brown noise and pink noise. What is called *Operation fill pink* in v1.2 fills every pixel of a layer with the same value.