

HMCS - Heightmap Conversion Software

User's Guide

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Li'l Chips Systems / LCS Audio Video Studio

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HMCS Web Site: www.lilchips.com/dgunreal/hmcs/

Li'l Chips Systems: www.lilchips.com

DGUNreal Level Design: www.lilchips.com/dgunreal/

Overview

HMCS Heightmap Conversion Software is a full-feature application designed for Windows 2000 Professional and Windows XP Home and Professional that allows conversion and editing of 8-bit and 16-bit heightmaps for use with the Unreal Engine.

HMCS is one of the few available software applications to directly support the Unreal Engine G16 heightmap file format, and provides a full graphical user interface for viewing, converting and editing.

Features include support for multiple file formats, and multiple editing features.

If you are new to heightmaps and are using the Unreal Engine, be sure to see the other tools and tutorials written by this author specifically for this implementation.

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Features

- Preview in Grayscale and Simulated Color
- Undo
- Top, Front, Side and Perspective views
- Zoom In, Zoom Out
- Stitch, Split
- Flip, Rotate
- Invert
- Crop, Trim
- Resample, Interpolate, Scale

Supported File Formats

Native:	HMCS ASCII (.hma) HMCS Binary (.hmb)
Heightmaps:	Unreal G16 Heightmap (.bmp) VistaPro 4 ASCII (.txt) VistaPro 4 Binary DEM (.dem) * RAW 8-bit (.raw) RAW 16-bit (.r16) Terragen Terrain (.ter)
3D:	3D Studio Mesh (.3ds) * 3D Studio ASCII (.asc) * Drawing Interchange (.dxf) *
Raster Image:	GIF 8-bit Grayscale (.gif) TARGA 8-bit Grayscale (.tga) * TARGA 24-bit Color/Grayscale (.tga) * TIFF 8-bit Grayscale (.tif) * TIFF 16-bit Grayscale (.tif) * Windows BMP 8-bit Grayscale (.bmp)

Note: all above listed features are not currently completed.
See the HMCS web site for current build information.

Using HMCS

As mainly a file conversion tool, HMCS is relatively self-explanatory and user-friendly in its operation. Simply open the source file, optionally edit it as desired, and save it to the target file format. In its basic function, HMCS provides a method for converting various heightmap and bitmap file formats to the Unreal G16 heightmap format.

File Tools



New Clear the current heightmap document.



Open Open a heightmap file.



Save Save the current heightmap file.



Save As Save the current heightmap file to a new name or another format.



Stitch Stitch two or four equally sized heightmaps into one.



Split Split the current heightmap into multiple fully seamed heightmaps.

Edit Tools



Undo Undo the last action or series of actions.

View Tools



Top View the heightmap from the top.



Front View the heightmap from the front.



Side View the heightmap from the left side.



Perspective View the heightmap from a 3D orthogonal perspective.















Zoom In Zoom in on the heightmap display.



Zoom Out Zoom out on the heightmap display.

Map Tools

	Flip Horiz	Flip the heightmap horizontally.
	Flip Vert	Flip the heightmap vertically.
	Rotate CCW	Rotate the heightmap counter-clockwise.
	Rotate CW	Rotate the heightmap clockwise.
	Invert	Invert the heightmap.
	Crop	Crop the heightmap.
	Trim	Trim the heightmap.
	Resample	Resample the heightmap to a smaller width/height dimension.
	Interpolate	Interpolate the heightmap to a larger width/height dimension.
	Scale	Scale the heightmap altitude data.
	Options	Display the Options dialog.
	Help	Display the help file.

Map Editing Functions

Invert

This function inverts the heightmap data by flipping the altitude values around a midpoint altitude value. High altitudes will become low, and low altitudes will become high.

Choose the inversion midpoint method from three settings:

1. Midpoint of the current heightmap altitude range. This may result in the entire heightmap being shifted up or down along the altitude range to prevent clipping of the altitude data.
2. Midpoint of 16-bits, equal to an altitude of 32768.
3. Midpoint of 8-bits, equal to an altitude of 128. This method can only be chosen for 8-bit heightmaps. A heightmap that contains altitude values greater than 255 will not be inverted.

Crop

This function crops the heightmap to a drag-rectangle size.

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Trim

This function trims the heightmap to a power-of-two dimension.

It is useful for trimming heightmaps saved from certain applications, which are power-of-two +1, to standard power-of-two size. For example, a 257x257 heightmap can quickly be trimmed to 256x256.

Choose the trimmed width and height, and the trim method from the five trim styles:

1. Trim off the left and top edges.
2. Trim off the left and bottom edges.
3. Trim off the right and top edges.
4. Trim off the right and bottom edges.
5. Trim off all edges. This style is only relative if the trimmed width and height is more than one unit smaller than the current heightmap dimensions. For example, trimming a 513x513 heightmap to 512x256. If the current heightmap is only one unit larger than the selected trimmed width and height, this function trims the same as the right and bottom trim style.

Resample

This function reduces the size of the heightmap by a power-of two.

It is most useful for circumstances where the heightmap dimensions must be decreased in order to decrease the terrain polygons in-game, at a loss in overall terrain detail.

The resample function simply retains every odd-numbered line in the heightmap (1, 3, 5, ...) and removes every even-numbered line in the heightmap (2, 4, 6, ...).

Choose the resample factor from the dialog combobox.

The available resample factors depends on the dimensions of the current heightmap, with the smallest final heightmap dimension being 16 units. For example, a 256x256 heightmap will have resample factors of $\div 2 = 128 \times 128$, $\div 4 = 64 \times 64$, $\div 8 = 32 \times 32$, $\div 16 = 16 \times 16$.

Interpolate

This function increases the size of the heightmap by a power-of-two.

The interpolate function adds intermediate altitude values between existing heightmap altitude points. A random variation can also be applied to the altitude points that are added between the existing heightmap points.

Choose the interpolation factor from the dialog combobox.

The available interpolation factors depends on the dimensions of the current heightmap, with the largest final heightmap dimension being 512x512 units. For example, a 128x128 heightmap will have interpolation factors of 2x = 256x256 and 4x = 512x512.

The Variance parameter provides a random variation in the new interpolated value that is placed between the current heightmap altitude points.

A variance value of 0 will always be mid-point between the two current heightmap altitudes, for example, if the two altitudes points were 100 and 120, the interpolated value would be 110.

A variance value of 0.5 will be mid-point \pm 50%. If the two altitudes points were 100 and 120, the interpolated value would be a random value between 105 and 115.

A variance value of 1.0 will be mid-point \pm 100%. If the two altitudes points were 100 and 120, the interpolated value would be a random value between 100 and 120.

Scale

This function scales the heightmap altitude values to fit within the specified range.

The end result can be either an increase between the distance of mountains to valleys, or a decrease of the heightmap range to merely small rolling hills.

Choose the Scale Type from the dialog combobox.

Scale to 8-bit extents will scale the current heightmap altitudes to fill the entire range between 0 and 255.

Scale to 16-bit extents will scale the current heightmap altitudes to fill the entire range between 0 and 65536.

Scale to specified values will scale the current heightmap altitudes to the the entire user defined range.

Application Options

File Dialog

Sort file type filter by file type	Sorts the File Open dialog filter by file type in this order: native, heightmap, 3d, raster.
Sort file type filter by file extension	Sorts the File Open dialog filter by the file extension.

Preview

Background Color	Choose a solid color for the preview background.
Preview Location	Heightmap can be upper-left justified or centered.

Recent File List

Recent File List Settings	Change the RFL settings. Specifies how each file is listed on the File menu.
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Scale Function

Scale all map files to 16-bit on open	Forces all Heightmap files to 16-bit when opened.
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Undo

Undo memory buffer	Specifies a single memory buffer type undo.
Undo stack	Specifies a multiple operation stack type undo.

Stitching and Splitting

To be completed...

HMCS Native File Formats

HMCS ASCII .hma

The .hma file format is a pure ASCII text format that is a simple header followed by the numerical altitude values.

The header consists of the following lines of text:

```
ID      =  HMCS ASCII Heightmap
Version =  Version 1.00
Width   =  Width 512
Height  =  Height 512
```

The altitude data is written as text values, starting from the top-left sample point, moving across each row to the right, then continuing on the next row.

```
.....→
.....→
.....→
```

HMCS Binary .hmb

The .hmb file format is a pure binary format that is a simple mixed header followed by the altitude values written as 16-bit integers. It is effectively the RAW-16 format with a 32 byte header.

The header consists of the following data:

zID	String * 22	id string "HMCS Binary Heightmap",0
IFileSize	Long	file size in bytes
iVersion	Integer	version, 100 = 1.00
iWidth	Integer	heightmap width (number of columns) eg: 256
iHeight	Integer	heightmap height (number of rows), eg: 256

The altitude data is written as Intel-format 16-bit integers, starting from the top-left sample point, moving across each row to the right, then continuing on the next row.

```
.....→
.....→
.....→
```