

A guide to using
SLX Studio

FAQ:

(Revised for version 1.2)

What is SLX Studio? – SLX Studio is a mod program containing tools for creating and editing SLP and DRS files. This program was created by Ryan “Tevious” as a dev tool for the Expanding Fronts mod for *Star Wars: Galactic Battlegrounds*, but can be used in all genie games, such as *Galactic Battlegrounds*, *Age of Empires*, and *Age of Empires II*, including both the AoK HD and the AoE DE versions.

What is a “SLX”? – SLX is a text based file format containing data needed to build a SLP file. The 1st line in the SLX file is the version number, the 2nd line is the number of frames in the animation, and then each 3 lines thereafter is for the data of each frame. Of those 3 lines, the first line is the anchor (or hotspot) point values which marks the center point of the image, the second line is the name of the data graphic, and the third line is the name of the actual graphic/sprite. All graphics need to be located in the same folder as the SLX file. “Version 0.5” is for bitmap (.BMP) files, while “Version 1.0” is for PNG files. The format was created by Ykkrosh for his original mod tools for *Star Wars: Galactic Battlegrounds*.

What is a “SLP”? – SLP is the graphics format used in genie engine games. They contain data that tells the game how to render pixels of each frame in the SLP. X and Y values called anchor points (or sometimes called hotspots) mark the center of the frame. The format was created by Ensemble Studios.

What is the difference between a graphic and a data graphic? – Both graphics are image files in either the .BMP or .PNG image formats. The graphic is the actual sprite of the unit, building, prop, icon, or menu. The data graphic is an identical-sized image of the graphic/sprite that color-codes each pixel in the graphic. **Magenta** is for the background, **white** is for normal colors, **green** is for player colors, **red** is for shadows, **blue** is for outline 1 (player outline), and **yellow** is for outline 2 (SWGB's shield outline). Each color marks the type of data each pixel is in the SLP file. Colors must be exact. Other colors won't work.

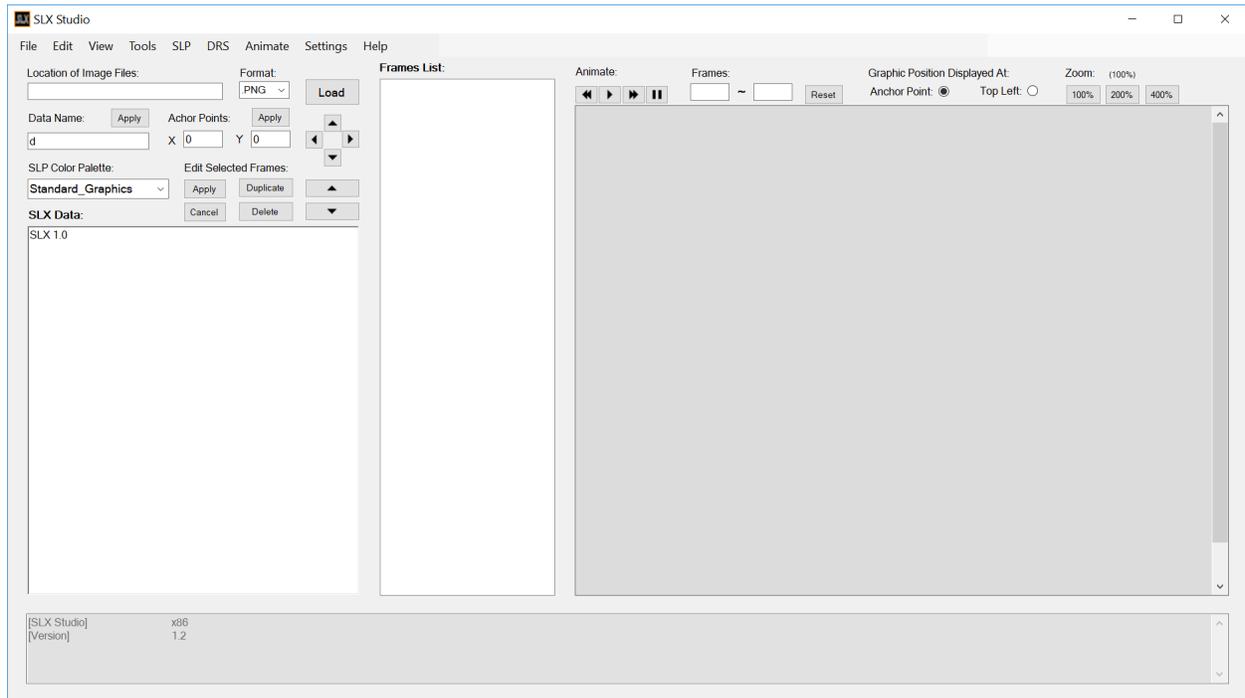
What is a “DRS”? – DRS is a format used in genie engine games. It is essentially a collection of game files. File types include SLP graphic files, WAV sound files, or BIN data files (text, color palettes, or bitmaps).

What is a “CSV”? – CSV is a text based file containing a list of comma separated values. A CSV file containing values for X and Y coordinates can be used in SLX Studio to modify anchor/hotspot point values. CSV files are also used in the Delta Object Positioner tool for listing positions of various objects.

What is a color palette? – A color palette is a collection of color values. Games using the genie engine use palettes of 256 colors. Several commonly used color palettes for these games are provided in the palette list. You can also load a custom color palette. SLX Studio supports .pal (both types), .act, and .gpl palette formats.

The Main Form

The main form contains many controls for editing or viewing a SLX project.



Location of Image Files – This is the directory path for loading images. The Load button will load all bitmap images located in that folder as a new SLX project. If no directory exists, it will prompt you to choose a folder location.

Data Name – This is the suffix tag for all data graphic files. The default is “d”. Use the Apply button to make changes to selected frames in the Frames List.

Anchor Points – These are the X and Y coordinates of the center point of the image; sometimes referred to as the hotspot. The left and right buttons will alter the X value and the up and down buttons will alter the Y value. Holding down these buttons will cause the values to change more quickly. Use the Apply button to make changes to selected frames in the Frames List.

SLP Color Palette – This is the color palette used when importing or exporting SLP files. You can also access it and other options from the SLP Color Settings in the SLP menu.

Edit Selected Frames – Here are buttons to quickly duplicate, delete, or shift up and down all selected frames. The Frames List will turn red until changes are applied or canceled.

SLX Data – Displayed here is all the information contained within the SLX project file.

Frames List – Displayed here is a list of all frames in the SLX. Selecting a frame from the list will display to the right. You can select multiple frames to apply changes to each selected frame at once. You can hover over an item in the list to get additional information (file name, data name, and anchors).

Animate – Here are buttons to animate the frames in the Frames List. You can play, pause, or alter the speed. Holding down the speed buttons will cause the speeds to change more quickly. Click play twice to reset the speed to default.

Frames – Here you can set the start and end frames to animate between or reset them to default.

Graphic Position Displayed At – Here you can choose where to display the graphic image within the graphic panel. Anchor Point will position the anchor point at the center and display the image in relation to its anchor point. Top Left will position the graphic image in the top left and display the anchor point in relation to the image.

Zoom – Here you can double or quadruple the size of an image. Larger images take longer to load while zoomed and may slow down the animation speed.

Graphic Panel – Here you can view the graphic image of the selected frame. The data graphic image will always display to the right of the graphic image (unless turned off). If there is a separated shadow SLX enabled, it will also be displayed here in relation to the anchor point.

Log – At the bottom of the form, a log is kept of all actions taken within SLX Studio. It is used to confirm the results of an action you took.

File Menu

Here you can open, create, save, or close SLX projects. You can also import a SLP file as a new SLX project, or export your currently opened SLX project as a new SLP file. SLP files can be saved as “8-bit Standard”, “8-bit Terrain”, “8-bit AoE1”, or even “32-bit”. Additionally, there is an “Advanced SLP” option. For convenience, you can drag-drop any SLX file onto the main form to quickly open it or drag-drop a SLP file to quickly import it as a new SLX file. Note that all changes to a SLX project (since v1.1c), including images, are stored in %temp% and are not applied to the actual SLX project files until you save.

Edit Menu

Here you can add new frames or make changes to specified frames.

- **Insert Frames** will insert the chosen images to the end of the Frames List. You can drag-drop a supported image file onto the main form to quickly perform this action.
- **Insert Blank Frames** will insert a chosen number of blank frames to the end of the Frames List.
- **Generate Custom SLX Data** will populate a SLX project with custom named blank frames.
- The **Change Data Name To Selected** and the **Change Anchors To Selected** options work the same as the Apply buttons on the main form.

Rename

Options

Rename:

Padding Size: (Amount of digits for end number.)

Correct Frame Padding Size (ex: 1-9 to 001-009)

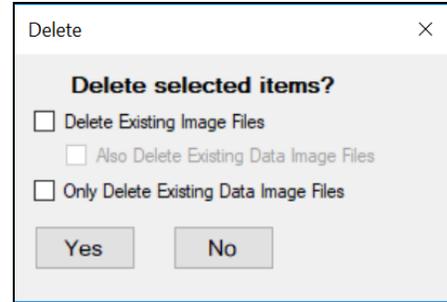
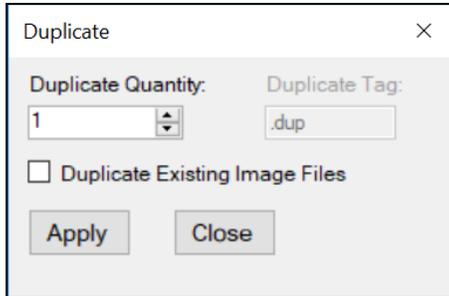
Replace:

With:

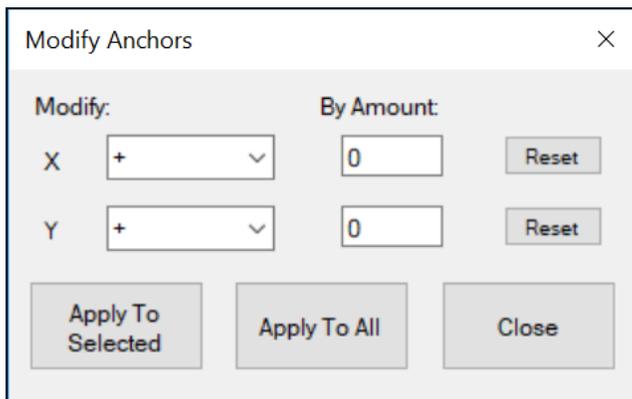
Overwrite Existing Image Files

Apply To Selected Apply To All Close

- The **Rename Selected** tool will either completely rename all selected frames or replace matching text with the new text that you enter. It can also correct the padding size of numbered frames if you have a situation where numbers go from 1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 2, 20, etc. The rename option is especially useful if you had shifted the order of frames or your frame numbers are for whatever reason out of order or nonexistent. It will renumber each selected frame in the Frames List to its new ordered number from top to bottom. There is also a checkbox option to apply the rename changes to the actual image files, rather than just renaming the items listed in the Frames List.



- The **Duplicate Selected** and **Delete Selected** tools offer more advanced options than the buttons on the main form. In the Duplicate tool, you can choose the quantity of the frames that you want to duplicate and you can also choose to create actual new image file copies of the duplicated frames, rather than just referencing the same image file. In the Delete tool, you can choose to just delete the frames from the Frames List, or you can choose a checkbox to delete the actual image files and/or their data graphic image files.
- **Use Specific Data Image For Selected** will allow you to use the same data graphic for multiple frames. This is only useful in situations where each selected frame would end up using identical data graphics, such as icons or terrains, and can keep your SLX project folder free from having multiple identical images.

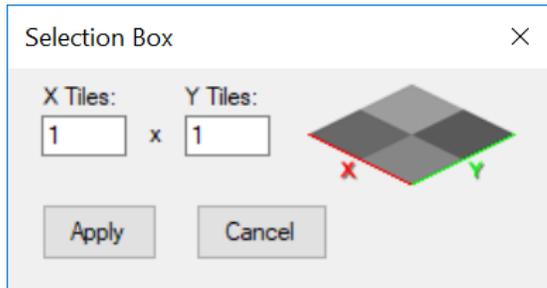


- The **Modify Selected Anchors By Amount** tool will modify the X and/or Y anchor values of each selected frame. You can choose from the add, subtract, multiply, or divide operations.
- **Simulate Aircraft Hover With Anchors** will allow you to create a hovering effect as seen by idle aircraft in Galactic Battlegrounds. This alters the Y anchor value so that the graphic moves up and down. The speed of the hovering is affected by the amount of frames; the more frames, the slower the hover effect. This tool assumes you are using an SLX with 5 directions (S, SW, W, NW, and N). It is recommended that you use 25 frames total to match the default hover effect. Since only the anchor values are changed, you can duplicate each of the 5 directional frames of an aircraft 4 times using the same bitmap file to achieve 25 identical frames, and then use this tool to create the hover effect.

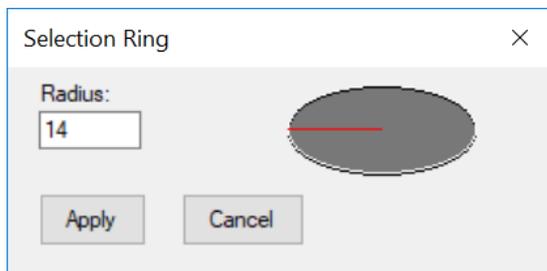
- **Load Anchors From CSV** and can be used to apply a list of X and Y values to the anchors of the SLX project. Anchor values will be overwritten only up until the last entry of the CSV. If there are more frames than there are CSV values, those frames at the end of the list won't be changed. You can drag-drop a CSV file onto the main form to quickly perform this action.
- **Create CSV From Anchors** can be used to write a new CSV file with all the X and Y anchor values.
- **Reset Fields** and **Clear Fields** can be used to reset fields to defaults or clear fields of all data.

View Menu

Here you can toggle on or off what you see in the graphics panel, such as the anchor point, a selection box or selection ring like you would see in the game, the data graphic, or a separated shadow graphic (if one exists).



- The **Selection Box** → **Custom** option opens a form allowing you to set how many tiles in each direction that you want. The X and Y values do not need to match, so irregular sized selection boxes are supported.

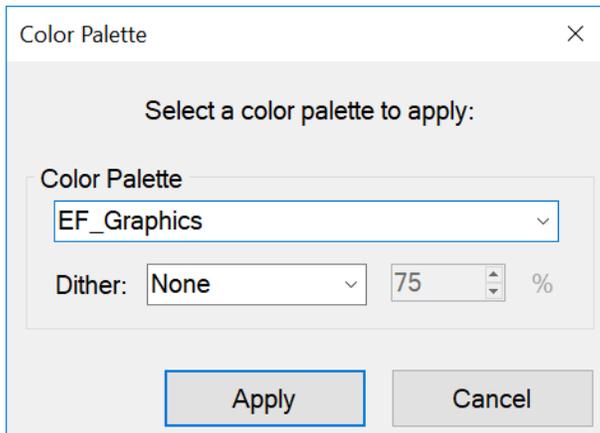


- The **Selection Ring** → **Custom** option opens a form allowing you to set a specific ring radius.

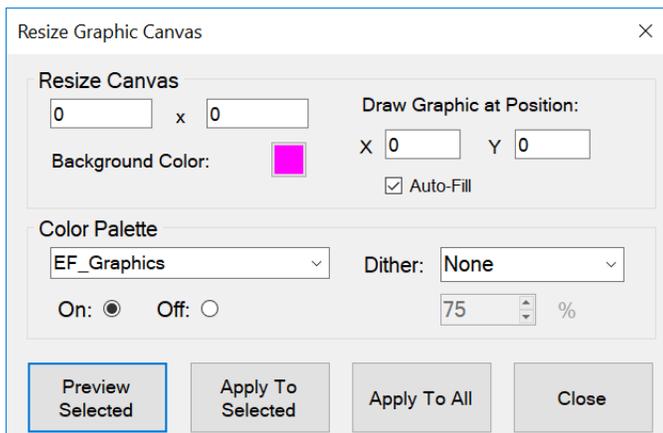
Tools Menu

Here you can access many tools to process images for your SLX project or other images.

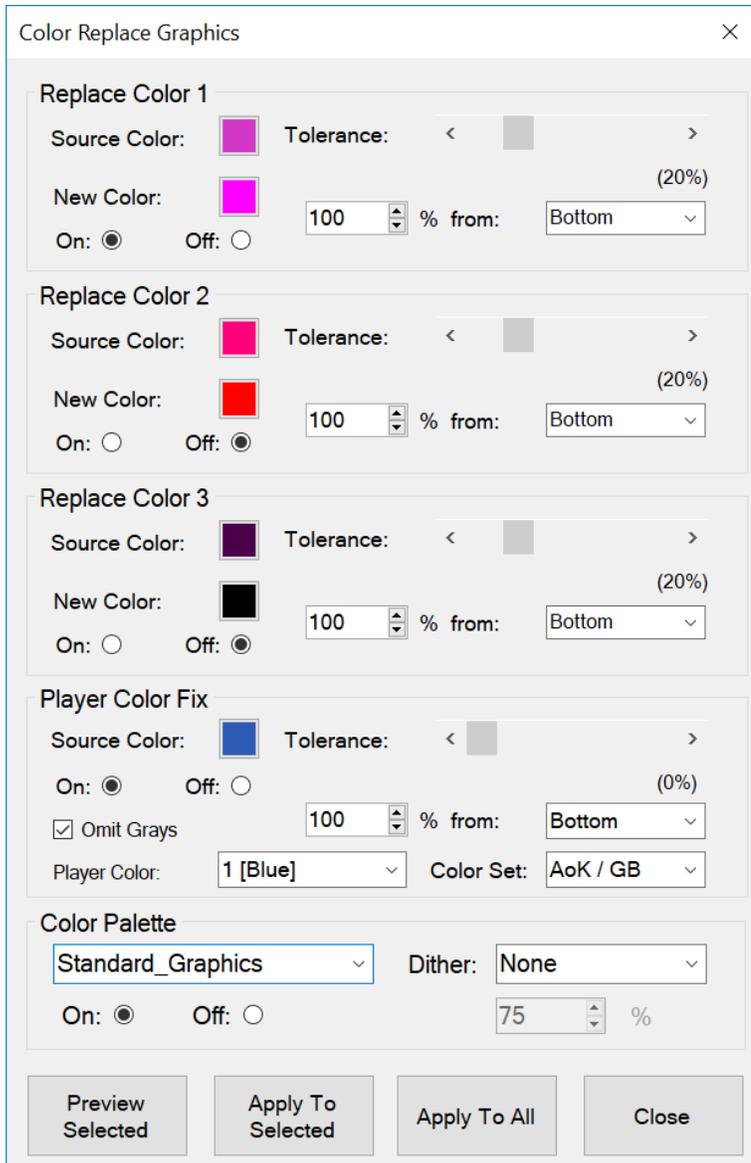
- **Backup Project To Zip** will save all graphic images and the SLX file to a zip file. It is recommended to create backups before running a process that makes changes to your graphic bitmaps in case you make a mistake or don't like the results.



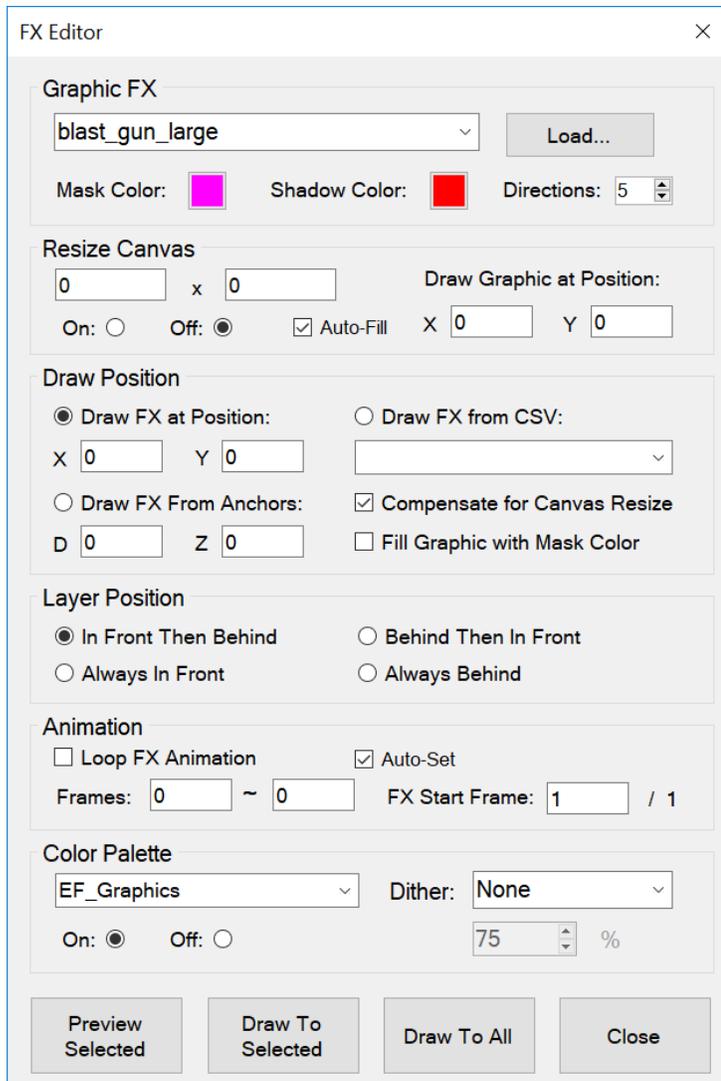
- **Apply Color Palette to Selected** is a tool to convert selected frames to 8bpp indexed images with the color palette of your choosing. “Standard_Graphics” is the palette you should use for units, buildings, props, icons, and civ UI for both *Age of Empires II* and *Star Wars: Galactic Battlegrounds*. You can choose from the list of available palettes or load a custom one from any of the JASC .pal, Microsoft .pal, Adobe Photoshop .act, or GIMP .gpl palette formats. Additionally, there are “Diffusion” and “Noise” dither options.



- **Resize Graphic Canvas** is a tool for changing the canvas size of the selected graphics. It will automatically round up the width and height to the nearest 100 by default and it guesstimates where to draw the graphics at from the anchor points, but this can be turned off by unchecking the “Auto-Fill” box. There is also an option to apply a color palette to each selected frame.



- **Color Replace Graphics** is a tool for correcting pixels in your graphics. This is useful if your rendered graphics have anomalies or pixels that turned out anti-aliased. There are 3 color replace controls plus a player color fix control. For more precision, you can select an area of an image in which the matching colored pixels will be replaced.



- **FX Editor** is a tool for drawing various special effects onto frames, effects such as gunfire, various sparks, lightning, flamethrower fires, even relics, holocrons, transparency, and more!

First, you should choose the **Graphic FX** that you want to draw on the frames. You can also load a SLX file to use a customized FX. Ensure that you match the Mask (background) color and Shadow color of the SLX when you load a custom FX. If the FX graphic you select from the list contains a shadow, you can use the Shadow color to set the color you want the shadow to be; for example, you can get black Holocron shadows by changing the Shadow color to black. Most FX graphics only support 5 directions (S, SW, W, NW, N), but some FX can support more directions such as 9 (S, SSW, SW, SWW, W, NWW, NW, NNW, N) and some don't have directions.

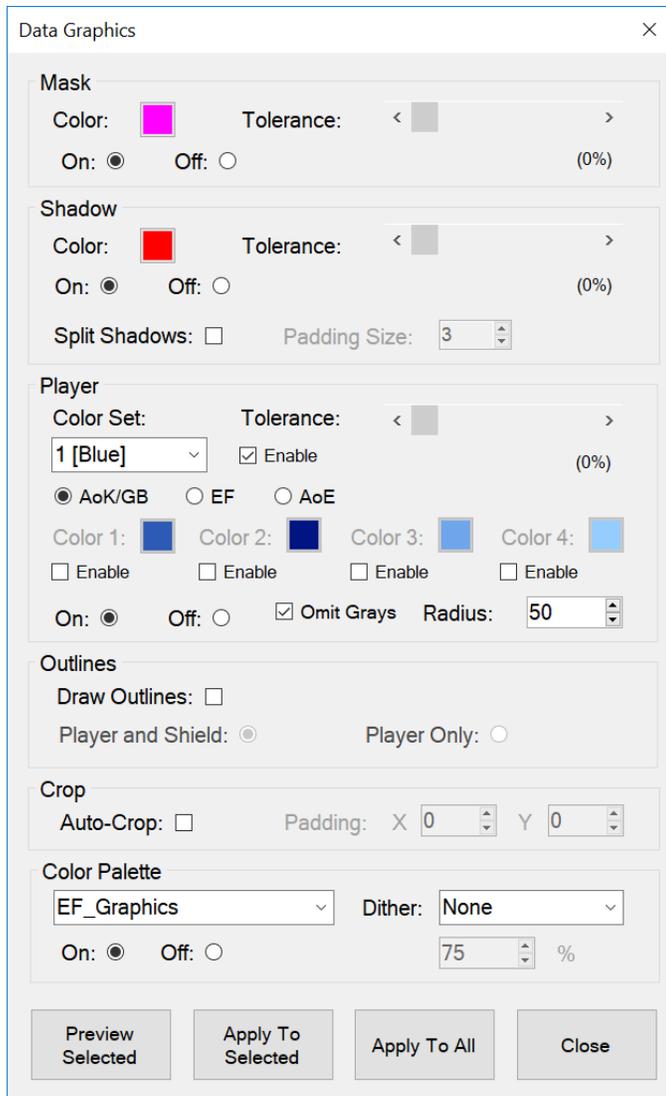
There is a **Resize Canvas** option should you need more background space for the FX. It will automatically round up the width and height to the nearest 100 by default and it guesstimates where to draw the graphics at from the anchor points, but this can be turned off by unchecking the "Auto-Fill" box.

Next, you need to set the **Draw Position** of the FX graphics. There are 3 options; you can choose to draw at a specific coordinate, you can choose to draw at a list of coordinates from a CSV file, or you can draw at the anchor point. Drawing from the anchor point has the additional options to draw at a set distance (D) in front of the anchor point for each direction and/or to draw at a set height (Z) from the anchor point. The “Compensate for Canvas Resize” checkbox will adjust the draw position accordingly if you chose to resize the canvas. The “Fill Graphic With Mask Color” checkbox will paint the graphic with the background Mask color, leaving only the FX graphic; this is useful for engine fire FX graphics that are meant to be separated into their own SLP.

Next, you should choose the **Layer Position**. There are 4 options; “In Front Then Behind” is for when you want the fx graphic to appear in front of the unit and when the unit turns northward, the FX graphic is layered behind the unit. “Behind Then In Front” is for when you want the fx graphic to appear behind the unit and when the unit turns northward, the FX graphic is layered in front of the unit. “Always In Front” will always have the FX graphic layered in front of the unit. And “Always Behind” will always have the FX graphic layered behind the unit.

In **Animation**, you can set the start and end frames that you want the FX graphics to be drawn. The FX graphics will continue to be drawn until the end frame, even duplicating the FX graphic should the number of frames be larger than the number of FX graphics, or dropping frames of the FX graphic should the number of frames be less. If the “Loop FX Animation” checkbox is checked, the FX graphics will then continue to be drawn as a looped animation until the last frame. You also have the option to choose which FX graphic frame to start the animation with. For each FX graphic option in the Graphic FX list, these animation settings will be automatically set by default, but this can be turned off by unchecking the “Auto-Set” box.

Lastly, there is also an option to apply a color palette to each selected frame.



- Generate Data Graphics** is an important tool in SLX Studio. All graphic images in the SLX project need to have their own data graphics in order to be converted to SLP format. This tool will create data graphics for each selected frame based on the settings you input. It should be used before you convert to SLP and after completing any other processes that would alter the graphic images. To use this tool, first you need to select the colors within your graphics that represent the different types of data. The **Mask** color is the background color, or the color that should appear invisible in the game; the default color for this is **magenta** (pink/purple). The **Shadow** color is the color that should represent all shadows that appear on the ground as transparent in the game; the default color for this is **red**. The **Player** colors are the colors that best represent the pixels that marks what player the unit or building belongs to; the default for this is **blue**. You can use a player color set or enable up to 4 additional colors. Each color can be changed by clicking the color button and selecting another color. Each color group also has a tolerance bar that allows you to adjust how closely colors can be matched to it; a tolerance of 0% would have to be identical, whereas a tolerance of 100% would match to nearly any color. There are also On or Off options for cases where there is no mask, or no shadow, or no player color.

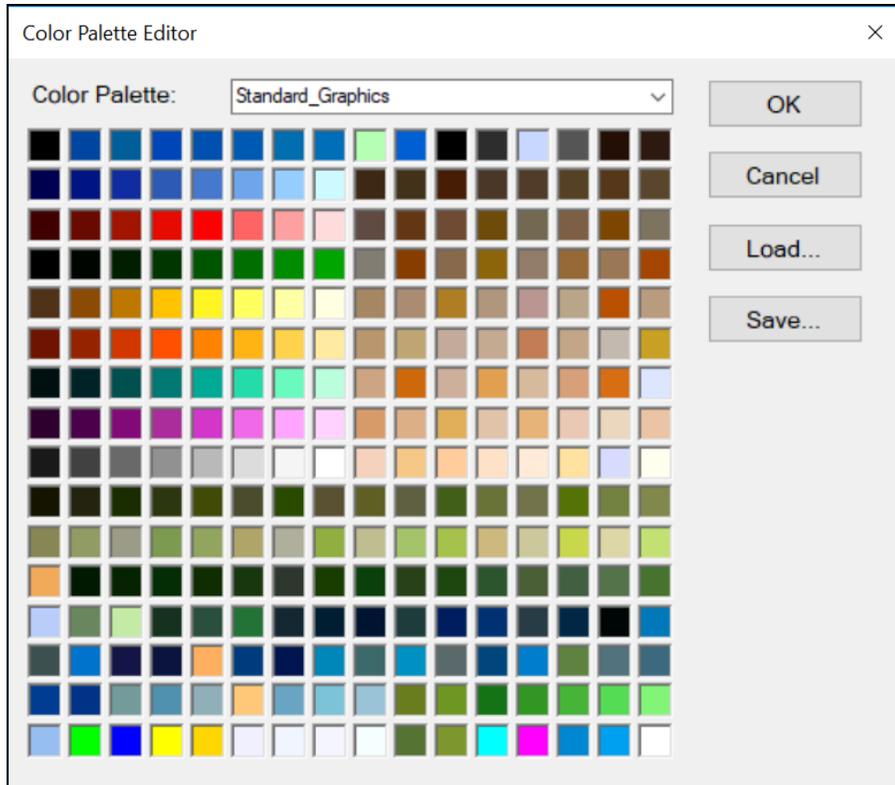
The shadow color has an additional option called **Separate Shadow** that will split all matching shadow colored pixels into separate images and creates a new SLX project file with these shadow graphic images. This options is useful in cases where you have a rendered image of a model containing shadows, but need the shadows to be their own SLPs, as is the case with most buildings. In genie engine games, shadows that belong to aircraft or that extend beyond the selection box of a building are made into separate shadow-only SLPs so that they can be correctly layered on the ground level.

The player color also has an additional option to **Omit Grays**. This option will ignore any color tolerance matches that are considered shades of gray. Radius adjusts the range for this.

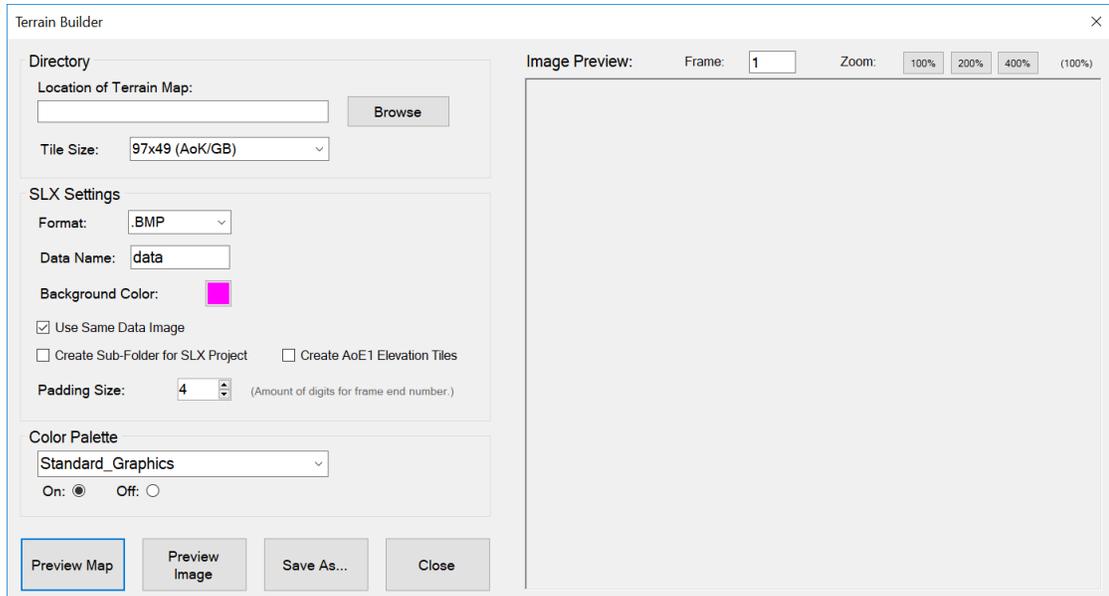
The **Draw Outlines** option will generate outlines around the graphic. Outlines are colored lines that surround a unit. The player outline is the player colored outline that you see in the game when a unit goes behind a building or some object like a tree. The shield outline is the yellow outline that you see in *Galactic Battlegrounds* when an energy shielded unit takes a hit. These outlines should be used only for units that are intended to be controllable in the game; they are not intended for buildings, props, icons, or menu SLPs. Additionally, since *Age of Empires* does not use energy shields like *Galactic Battlegrounds* does, you should only use the "Player Only" option when creating SLPs for those games.

The **Auto-Crop** option will automatically remove any excess background space from each image and re-adjust the anchor point values to match. It also has the option of adding image padding if you want to have a minimum amount of background space on either the left and right sides (X) or the top and bottom sides (Y).

There is also an option to apply a color palette to each selected frame.

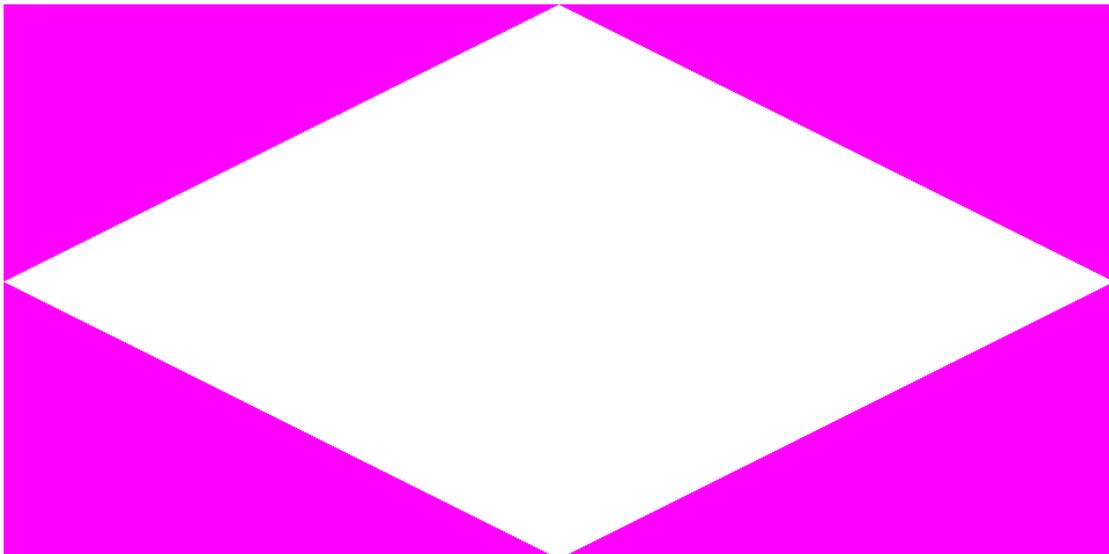


- **Color Palette Editor** is a tool for viewing, loading, or creating color palettes. Here you can view all color palettes within SLX Studio, including those in the palette swap list. For convenience, you can drag-drop a color palette file onto the form to quickly load it.
- **Extract Palette From Bitmap** is a tool that will extract the color palette table from an image file (.BMP or .PNG) should one exists and save the palette in the format of your choosing.
- **Resize Image** is a tool to resize an image to a new width and height in pixels. Selecting multiple files will overwrite the selected images.
- **Mirror Image** is a tool to flip an image horizontally. Selecting multiple files will overwrite the selected images.
- **Rotate Image** is a tool to rotate an image 45°, 90°, or 180° either left or right. Selecting multiple files will overwrite the selected images.



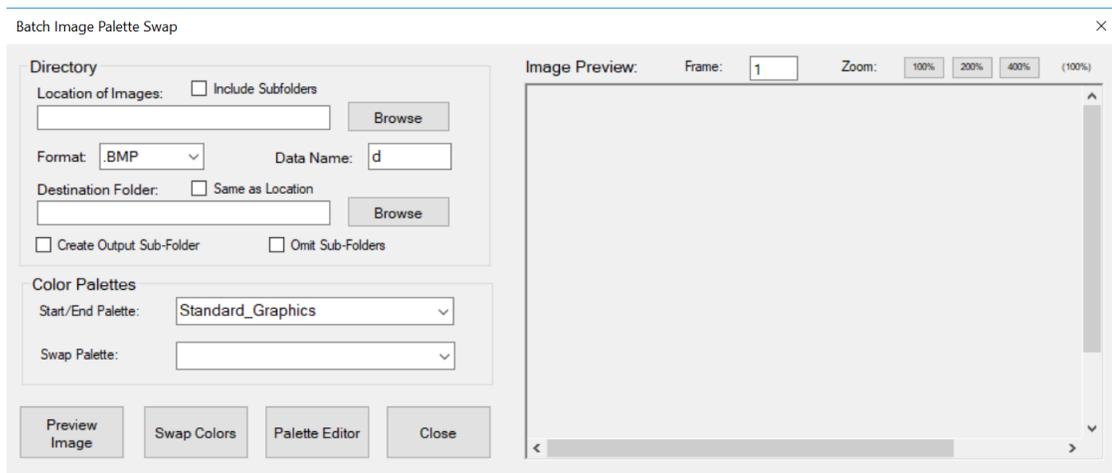
- **Terrain Builder** is a tool to create a terrain SLP or SLX from a terrain map image. First, select the terrain map image to be converted; you can drag-drop an image directly into the location box for convenience. If you intend to directly create a SLP file, you can skip over the SLX Settings. Otherwise, you should choose the settings you want for your SLX project.

Note that 8-bit Terrain SLP files are different from 8-bit Standard SLP files. Attempting to save a terrain as an 8-bit Standard SLP will not correctly display elevation or blend with other terrains. Also, 8-bit AoE1 Terrain SLPs will generate 16 additional elevation frames.



- **Create Terrain Map from Texture** is a tool to convert a texture image into an isometric terrain map image at the size specified. Sizes are based on the number of rows and columns chosen, plus the terrain tile size. Terrain map images can be used to create terrain SLPs. If you want a blank (white) terrain map, just cancel the first prompt to open an image and then save.

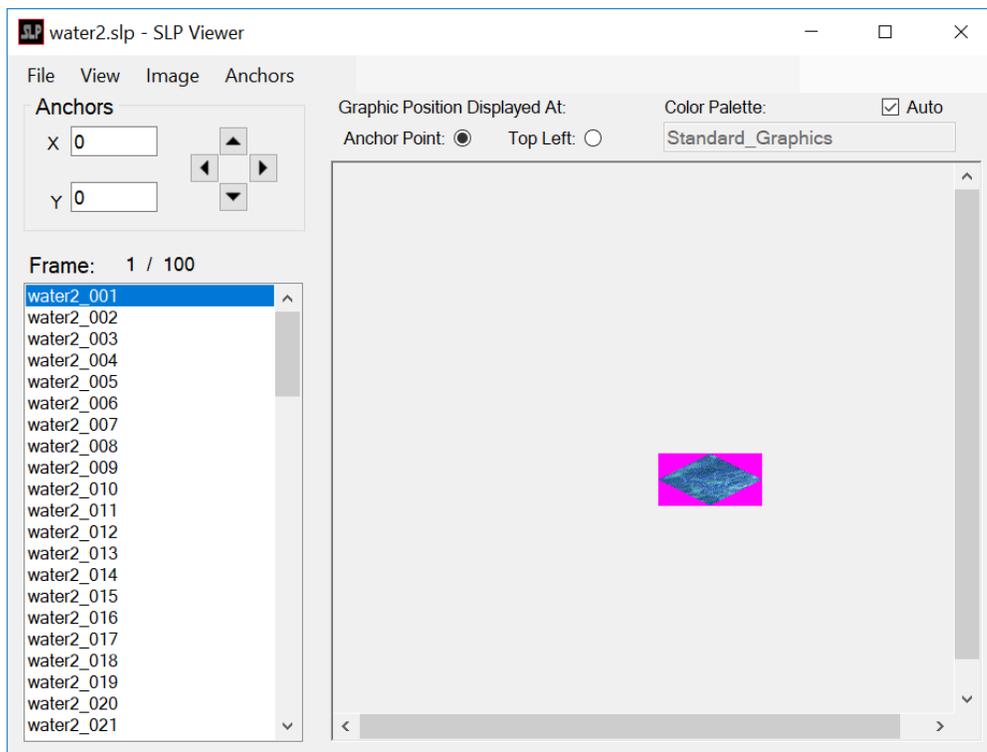
- **Convert Terrain Map to Texture** is a tool to convert an isometric terrain map image to a texture image. This tool should only be used if the original texture image is needed and it is lost. Because of the loss of pixels in the conversion process, the quality will not remain intact. It may be necessary to clean the texture up further in Photoshop or another graphic editing program.
- **Terrain Tile Size** is where you can set the size of a single tile. Changing the tile size will also affect the size of a Selection Box from the View menu. A terrain tile size of “97x49” is for Age of Kings and Galactic Battlegrounds, a tile size of “65x33” is for Age of Empires 1, and a tile size of “81x41” is for Age of Empires: Definitive Edition (x1 size).



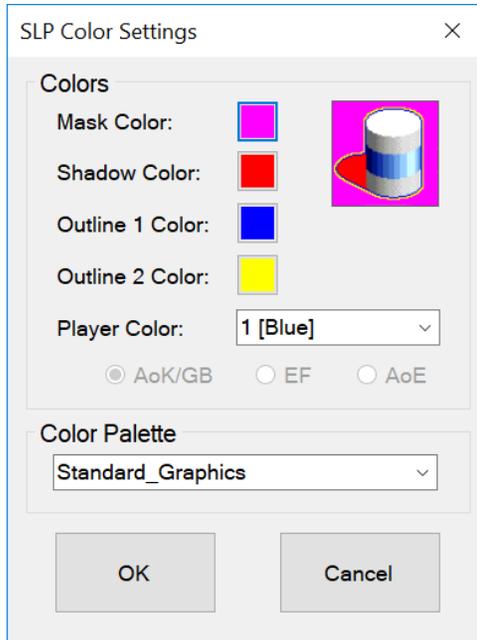
- **Batch Image Palette Swap** is a tool for recoloring multiple pixels by swapping color palettes. It works by first applying the start color palette, then switching the color palette to the swap color palette which changes each indexed color to the matching indexed color in the swap palette, and then re-applies the start palette again without altering the colors. It is useful for quickly creating different colored variants of graphics.
- **Batch Image Color Replace** is a tool for replacing up to 3 colors at a time for multiple image files within a folder. For more precision, you can select an area of an image in which the matching colored pixels will be replaced.
- **Batch Convert Image Format** is a tool for converting image formats for multiple image files within a folder. This tool could be used directly after rendering frames from a 3D modeling program. It includes options to make corrections to shadow colors and player colors. For more precision, you can select an area of an image in which the matching colored pixels will be replaced.
- **Batch Generate Data Graphics** is a tool for generating data graphics for multiple SLX projects or image files within a folder. It functions the same as the Generate Data Graphics tool.

SLP Menu

Here you can view SLP files, set the color settings of SLPs, and batch extract or batch create SLPs.



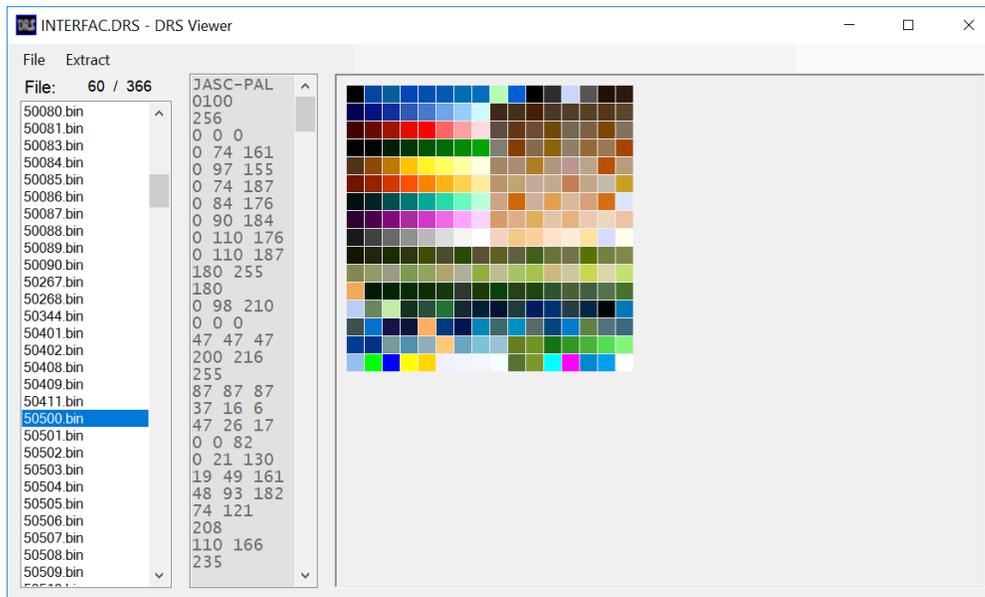
- **SLP Viewer** is a tool for viewing each frame of a SLP file. Opening SLP files directly with SLX Studio will automatically load the SLP Viewer. You can also view the anchor/hotspot point, a selection box/ring, or turn on/off different aspects of an SLP file, such as the background mask, shadows, or outlines. Additionally, the SLP Viewer allows you to extract frames as images and save anchor/hotspot changes. If frames appear to be discolored or pixelated, you may need to change the color palette in “SLP Color Settings” from the View menu. There is an “Auto” checkbox that will automatically guess the best color palette to display based on information contained in the SLP file. If you want to change the color palette, you should turn this off.



- **SLP Color Settings** is where you can select which colors to display for the background mask, shadows, both outlines, and player colors. Additionally, you can choose the color palette to use. Player colors will change based on the palette selected.
- **Decode Voobly SLP** will remove the encryption on “Voobly” SLP files. Selecting multiple SLP files will have a “_decoded” suffix in the filename.
- **Batch Extract SLP to SLX** is a tool for converting multiple SLP files to SLX projects.
- **Batch Convert SLX to SLP** is a tool for converting multiple SLX projects to SLP files. You can choose to convert to 8-bit Standard, 8-bit Terrain, 8-bit AoE, or 32-bit SLPs.
- **Batch Replace SLP Colors** is a tool for changing multiple color indices to another index in multiple SLP files. This is useful if you’re creating a custom color palette and need to reassign colors of existing SLPs.

DRS Menu

Here you can view DRS files, build or extract DRS files, or create or edit a DRX list file.



- **DRS Viewer** is a tool for viewing resource files contained within a DRS file. Opening DRS files directly with SLX Studio will automatically load the DRS Viewer. The DRS Viewer can also load the contents of a folder, which is useful for viewing AoK: HD or AoE: DE resource files. DRS supported files include SLP graphic files, WAV audio files, and BIN data files. Viewing SLP files works the same as the SLP Viewer. WAV files will automatically play the selected sound file. As for BIN files, if the file is text-based, the viewer will display said text, if the file is a bitmap image, the viewer will display the image, and if the file is a color palette, the viewer will display both the text and a color table image of the palette. Should you want the ID list to display custom names, you can do so using a CSV file. The CSV file must have the same name and be in the same location as the DRS file. The format of the CSV file must be as follows (without brackets):
[ID Number], [Extension], [Custom Name]
- **Build DRS** is where you can create a DRS file. You can choose to build a DRS from a folder (recommended), from a CSV file, or from a DRX list file. You can also set up a “Quick DRS” file in the .ini configuration file to quickly build that DRS file. All files within your selected folder must have SLP, WAV, or BIN (or BINA) extensions and be named with an ID number. CSV files can be used to assign alphanumeric named files with ID numbers using the “Build DRS From CSV List” option. The format of the CSV file must be as follows (without brackets):
[ID Number], [Extension], [File Name], [Directory Path (Optional)]
- **Extract DRS** is where you can extract all the contents of a DRS file.
- **DRX Text Editor** is where you can create custom DRX list files. DRX files are lists of file IDs (with extensions) to be included when building a DRS file. (Not particularly useful.)

Settings Menu

Here you can create an INI configuration file to customize default settings of SLX Studio or set up file associations for SLX, SLP, and DRS formats to SLX Studio.

Help Menu

Here you can find out information about SLX Studio.

Project Workflow

Generally, your workflow in using SLX Studio should work as follows: After creating and/or editing your graphics in a 3D modeling program or a 2D graphics editor, you should group all frames of an animation (or at least all frames of a unit) into its own folder. Using SLX Studio, you should then add all frames of the animation into SLX Studio to begin a SLX project. Next, set the anchor positions, make any graphical changes such as applying a color palette, color replacing, or FX graphics, then generate the data graphics. When everything looks good, export the SLX project to SLP format.

For adding graphics to a DRS file, you should begin by extracting the DRS contents to a folder. You should only need to do this once. Then continue to add (or replace) files in that folder throughout your project. Files kept within that folder should all be named with an ID number; files that are not numerically named will not compile, unless you're using a CSV file to build your DRS. It may be advantageous to maintain a spreadsheet of what each ID number is. Whenever you want to view changes made to the DRS folder in the game, then build a new DRS file from the folder and save as the DRS file in your game installation data folder.

As a general rule, be sure to keep backups of files you replace in case you make a mistake and need to revert changes. You may also want to use a Batch Rename tool for naming ID numbers for DRS files.

Video Tutorials

You can view video tutorials on how to use SLX Studio here:

1. [Creating Aircraft SLPs](#) (Beta version 0.8.4.5)
2. [Creating Building SLPs](#) (Beta version 0.8.5.6)