

# Swings & Tilts for your Digital Camera!

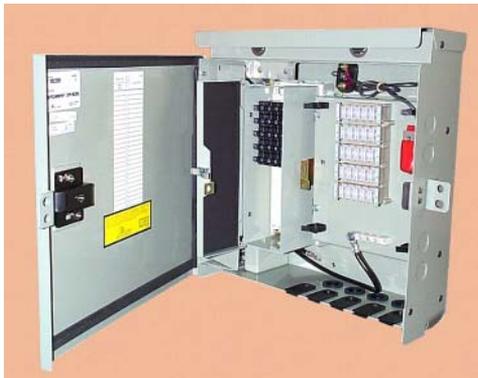
Don Lancaster  
Synergetics, Box 809, Thatcher, AZ 85552  
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<http://www.tinaja.com>  
[don@tinaja.com](mailto:don@tinaja.com)  
(928) 428-4073

Way on back when I was doing [Popular Electronics](#) construction projects, I used a magic beastie called a [4x5 Calumet View Camera](#) to create all of my electronic project images for publication. The really neat thing about view cameras was that you could use [Swings & Tilts](#) to move both the film and lens planes around. The variable path length gave you distortion effects and depth-of-field improvements.

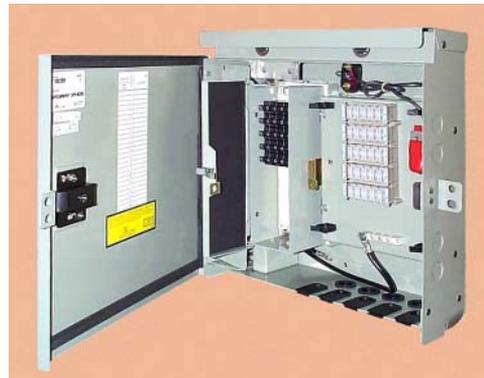
Among many other mind boggling tricks, this let you do such things as create an [Architect Perspective](#) that made the vertical edges of a building or an electronic project truly vertical, rather than leaning in. Swings and tilts are conspicuously absent from most of today's digital cameras. While you can post-process add similar effects using [Adobe Photoshop](#) or other expensive software, I instead wanted to come up with a simple and free stand-alone utility that could let you easily add these and other effects under direct personal control.

The result is [SWINGT01.PSL](#) and typically gives you these [Before](#) and [After](#) JPEG images that started with this typical [.BMP Bitmap](#). Note particularly the correction at the bottom right corner of these examples...

BEFORE



AFTER



My [SWINGT01.PSL](#) utility is a short (14K) and fast (10 seconds) textfile written in [PostScript as Language](#) using my [Gonzo Utilities](#). It works with images in 24-bit uncompressed [.BMP Format](#). This .BMP format has the advantages of having each RGB pixel individually available. The lack of lossy compression also allows many generations of rework without degrading.

It is usually best to do all image acquisition and post-proc in a .BMP or similar format, converting to a lossy JPEG or whatever only [after](#) all your processing is complete. Most image processing software allows quick conversion between .BMP and other formats. My preference here is [ImageView32](#).

At present, the utility works by processing [horizontal](#) rows of a .BMP file, allowing [vertical](#) distortion adjustment. Should you want to do horizontal adjustment instead, simply rotate 90 degrees, correct, and then rotate back. To use, you load the utility in a suitable wp or editor, set two filenames, adjust six values, and then resave the renamed file [as an ordinary ASCII textfile](#). You can then send this file to [Acrobat Distiller](#), and the corrected image arrives a few seconds later.

In operation, each horizontal line gets sequentially scanned and its pixels get moved sideways as needed to reposition, stretch, or squash that portion of the image. An ultra fancy [Bicubic Interpolation](#) gets used to get the best possible sharpness with minimum interpixel blurring.

Six variables control the operation. [topgain](#) and [bottomgain](#) set the amount of squash or expansion. Typically, you might set your topgain to 0.97 and your bottomgain to 1.04 to moderately squash the top of an image and expand its bottom. A gain value of 1.0 is neutral and neither expands nor compresses.

The [topneutralaxis](#) and [bottomneutralaxis](#) set the point at which no gain adjustment is applied. Very often this should be at 0.5 or halfway across the image. The further away you go from the neutral axis, the further a pixel gets moved. If you move these to the left or right of center, one side will get favored over the other. Thus providing more correction to the "more bent" image side.

Note that the gain applies to the [difference](#) distance from the neutral axis. You can also make the top and bottom neutral axis values different. This can add a slight bow or pincushion to correct any unwanted vertical line curvature. Always start with both neutral axes set to 0.5 and work from there.

Two final and lesser used variables are [topoffset](#) and [bottomoffset](#). These simply slide whole portions of the image sideways are normally left at zero. A -0.1 value moves everything to the left by ten percent. Thus, the offsets give you gross position adjustments and "parallelogram" correction. Compared to the "trapezoidal" correction of the earlier variables.

As usual, with some hands-on experiments, you should quickly be able to get these params under your total personal control.

## For Further Help

Additional background along with related utilities and tutorials appears on our [GuruGram](#), [PostScript](#), [Acrobat](#), and [Fonts & Bitmaps](#) library pages.

Consulting assistance on any and all of these and related topics can be found at <http://www.tinaja.com/info01.asp>. As can our image rectification services.

Additional [GuruGrams](#) await your ongoing support as a [Synergetics Partner](#).