

QTR Stepwedge Tool

Version 1.0

QTR Stepwedge Tool is a script to be used in Photoshop CS3 or CS4 that analyzes a scanned file containing a reference target and one or more stepwedges to read. The process contains two passes. First, the reference target is analyzed and a correction is applied to the whole image. Second, other stepwedges are analyzed for their Lab values. The values are displayed on the screen and optionally written to a disk file. This data is appropriate for either QTR curve linearization or QTR ICC profile creation.

This tool will work with either Photoshop CS3 or CS4 on either Mac OS X or Windows.

Mac OS X Installation

Drag the "QTR Stepwedge Tool.jsx" file to the appropriate folder:
for CS3:

/Applications/Adobe Photoshop CS3/Preset/Scripts

for CS4:

/Applications/Adobe Photoshop CS4/Preset/Scripts

Windows Installation

Drag the "QTR Stepwedge Tool.jsx" file to the appropriate folder:
for CS3:

\Program Files\Adobe\Adobe Photoshop CS3\Preset\Scripts

for CS4:

\Program Files\Adobe\Adobe Photoshop CS4\Preset\Scripts

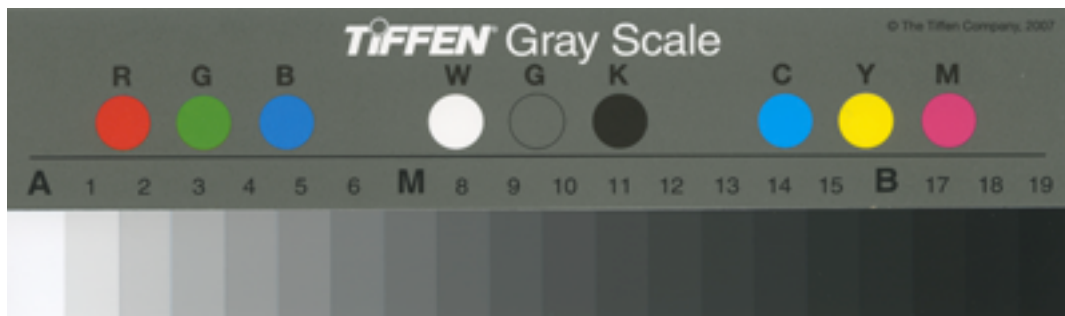
For Windows 7 and/or 64-bit OS you may need to search for the Adobe folder.

Restart Photoshop if it is already running so that the new script is recognized.

Reference Stepwedge

One of the key features of this script is the usage a known standard in order to calibrate the input data. In other words the scanned data is adjusted to match the reference target. This isn't absolutely necessary but does increase the accuracy.

There are several commercially available reference targets. A Kodak Q-13 Grayscale or a Tiffen version of the same is a good choice and the one used in the examples show here. There are two parts - a Color Control and a Gray Scale StepWedge. We only need the Gray Scale Wedge. It has 20 steps numbered 0 to 19 that should be 0.10 density units apart.



Tiffen Q-13 Gray Scale StepWedge

Patch A or 0 is paper white: $d=0.05$ or $L=95$, Patch M or 7 is middle gray: $d=0.73$ or $L=50$ and finally Patch 19 (dMax) is $d=1.95$ or $L=9$. On my sample the dMax is a bit lower $d=1.88$ or $L=11.5$ -- so its a bit weak but the other patches are within nominal values. You can probably purchase one of these for about \$25 from places like Adorama at <http://www.adorama.com> or B&H at <http://www.bhphotovideo.com> -- both are reputable dealers.

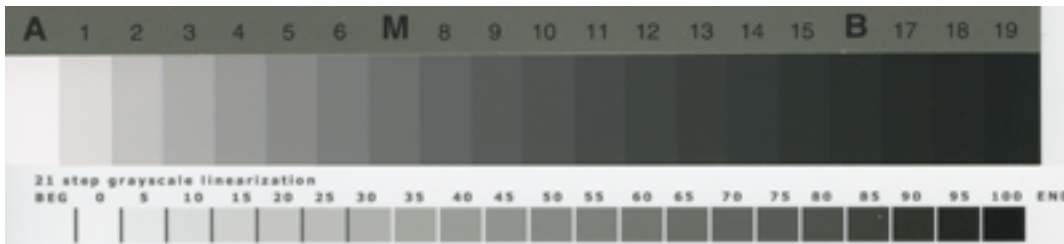
Another major source of stepwedges is Stouffer Industries (no, not the Macaroni & Cheese guys) at <http://www.stouffer.net>. They make a wide range of stepwedges for both transmission and reflection. We want one of the reflective ones. There are three 21 step wedges depending on whether you want calibration, plus small ones with only 5 steps. I haven't used these reflective wedges but the transmissive ones I've used in the past were very good.

Finally, you only need three known patches to make this work. You have the paper white, print the blackest black you can for dMax, and use an old gray card for middle gray. You need to know the Lab values for the three patches. Typically paper white is about $L=95$, middle gray is $L=50$, and dMax for matte papers is $L=16$ and photo papers is around $L=8$.

Bottom line is don't worry too much about this. Smoothness of the data is really more important than the accuracy of the values. Calibrated data is easier to compare with others data but making curves and profiles is mainly about smoothness.

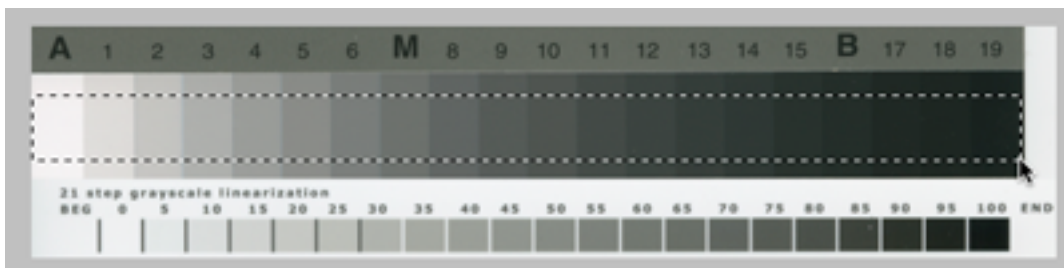
Basic Usage

The concept here is to print a stepwedge with your printer and then scan both the reference and the printed stepwedge together. For this script the printed stepwedge should be N even-sized patches going from white to black. The target Step-21-gray included will work fine. There are many 21step wedges around that have uneven patch sizes -- these will not work. Also one can measure one of the steps in the inkseparation.tif files. Don't use the random patches because the data will be out of order. For scanning, most flatbeds will do just fine with default settings, but check the histogram and make sure nothing is clipped at either end. Scanning is best done in 16-bit (high-bit) mode in either color RGB or grayscale mode at about 300dpi. If there is an option of attaching a profile use AdobeRGB. Save the file in TIFF or PSD format -- JPG works but is only 8-bit. If all you have is 8-bit use that. Make the scan as level as possible, but the software will tolerate some tilt. Another trick that may be a benefit on your scanner is to orient the scans vertically so that all the patches are read with the same sensors. A horizontal scan will read each of the patches with different sensors so if you have some variation that could affect the data.



Scanned Reference and Printed Stepwedge

Open the file using Photoshop. We will be running the Stepwedge script at least two times. First to Calibrate and second to Read the stepwedge. On the first pass select the reference target. This should include the whole reference from white to black.

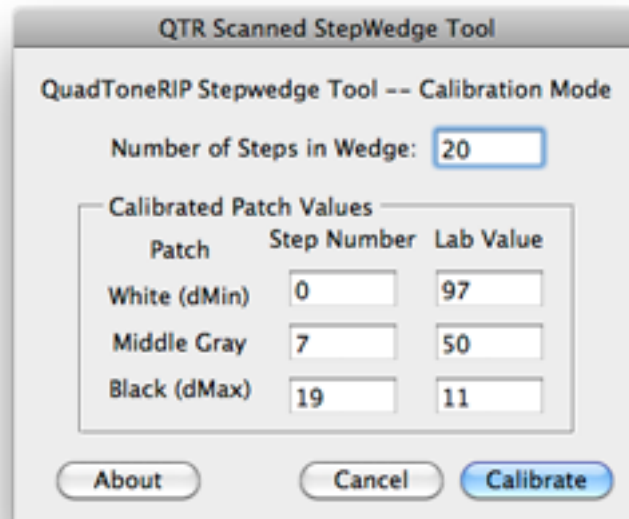


Reference Wedge is Selected

Run the script under the File command > Scripts > QTR Stepwedge Tool...

Tip: If you are going to use this often you can create a Photoshop Action that calls this script and assign a function key so it takes just one key stroke.

The first dialog will ask information about the reference -- number of steps, which are the 3 reference patches and what are their nominal Lab values. It's setup for the Q-13 when you run it first. Enter any changes for your specific reference, and then hit Calibrate.



QTR Scanned StepWedge Tool

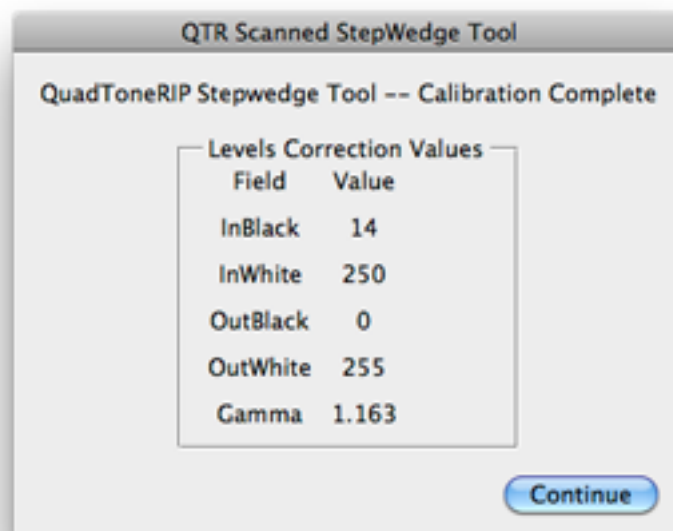
QuadToneRIP Stepwedge Tool -- Calibration Mode

Number of Steps in Wedge:

Calibrated Patch Values

Patch	Step Number	Lab Value
White (dMin)	<input type="text" value="0"/>	<input type="text" value="97"/>
Middle Gray	<input type="text" value="7"/>	<input type="text" value="50"/>
Black (dMax)	<input type="text" value="19"/>	<input type="text" value="11"/>

The script will analyze the reference and then correct the whole file. The following info panel shows you what Levels command parameters were used in the adjustment. Just hit Continue.



QTR Scanned StepWedge Tool

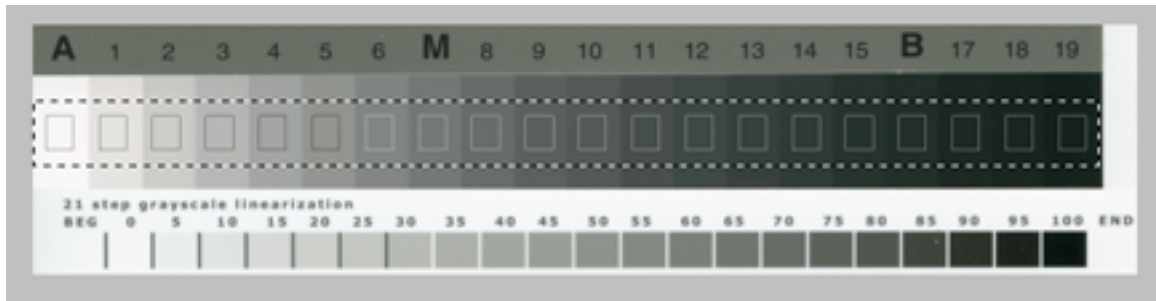
QuadToneRIP Stepwedge Tool -- Calibration Complete

Levels Correction Values

Field	Value
InBlack	14
InWhite	250
OutBlack	0
OutWhite	255
Gamma	1.163

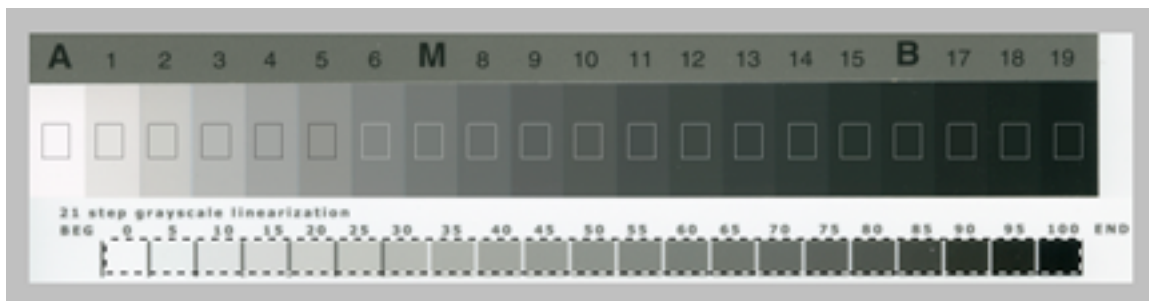
This was all done on a new layer called "QTR Stepwedge Sample Data" so the original data has not been altered. If you make a mistake or want to try different values you can always delete the layer and start over again.

The existence of this layer is how you can see that the calibration was done. You'll also see boxes on the image indicating where all the samples were done. Check that they line up on the reference wedge as you expected. If you want to redo it just delete the layer and re-run the script with another selection.

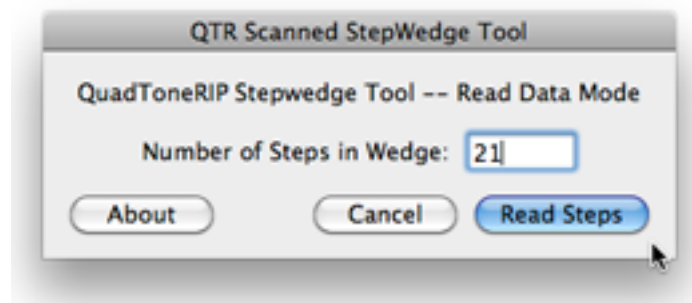


Result of Reference Calibration

Now select the printed stepwedge, and run QTR Stepwedge Tool again.



This time it will just ask how many steps you have in the wedge. Typically it's 21 but you can set it for other number of patches. Hit Read Steps and the script will analyze the stepwedge.



At the end it will display the values. You can just Select and Copy the table data or Save the table to a text file.

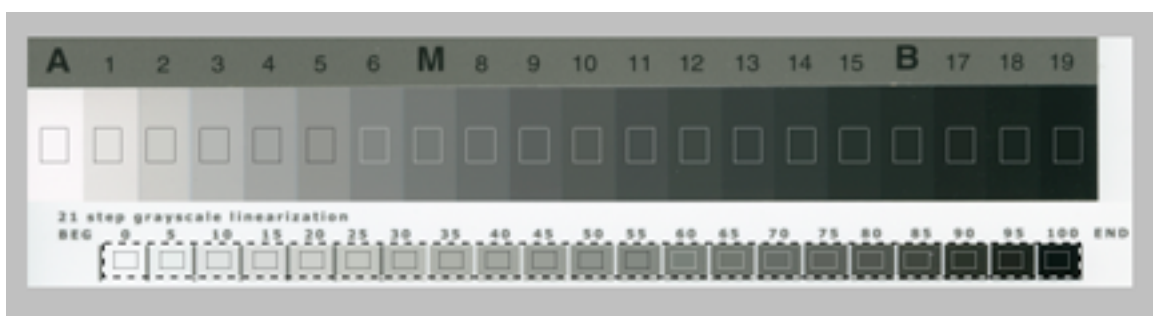
QTR Scanned StepWedge Tool

QuadToneRIP Stepwedge Tool -- StepWedge Data

StepWedge Data:

Patch	Gray	Lab	A	B
0	0.00	96.60	-0.23	-0.53
1	5.00	93.56	-1.28	-0.23
2	10.00	90.05	-1.17	0.16
3	15.00	86.54	-1.09	0.74
4	20.00	83.00	-0.96	1.49
5	25.00	79.94	-1.69	2.35
6	30.00	75.53	-2.05	2.49
7	35.00	71.73	-2.21	2.76
8	40.00	67.90	-2.31	2.61
9	45.00	64.31	-2.61	2.61
10	50.00	60.51	-2.95	2.75
11	55.00	56.62	-2.98	2.82
12	60.00	52.81	-3.49	3.04
13	65.00	48.78	-3.34	3.10
14	70.00	44.82	-3.08	2.27
15	75.00	40.61	-3.28	3.01
16	80.00	35.79	-3.55	3.18
17	85.00	28.66	-4.11	3.89
18	90.00	20.24	-4.93	4.54
19	95.00	13.10	-4.95	3.27
20	100.00	5.56	-3.94	0.31

Again check the image boxes to make sure you are matching the patches in the scanned file. You can repeat this second step for other stepwedges in the same scanned image.



Check Sampled Patches in the Printed Stepwedge

The resultant text file can be used in a variety of ways.

- 1) Linearize a QTR curve/profile
 - drop the text onto QTR-Linearize-Data to extract the specific values needed.
- 2) Create a grayscale based ICC profile
 - drop the text onto QTR-Create-ICC or QTR-Create-ICC-RGB
- 3) The Text file is a <tab separated> data file and can easily be read into a spreadsheet to graph the data.