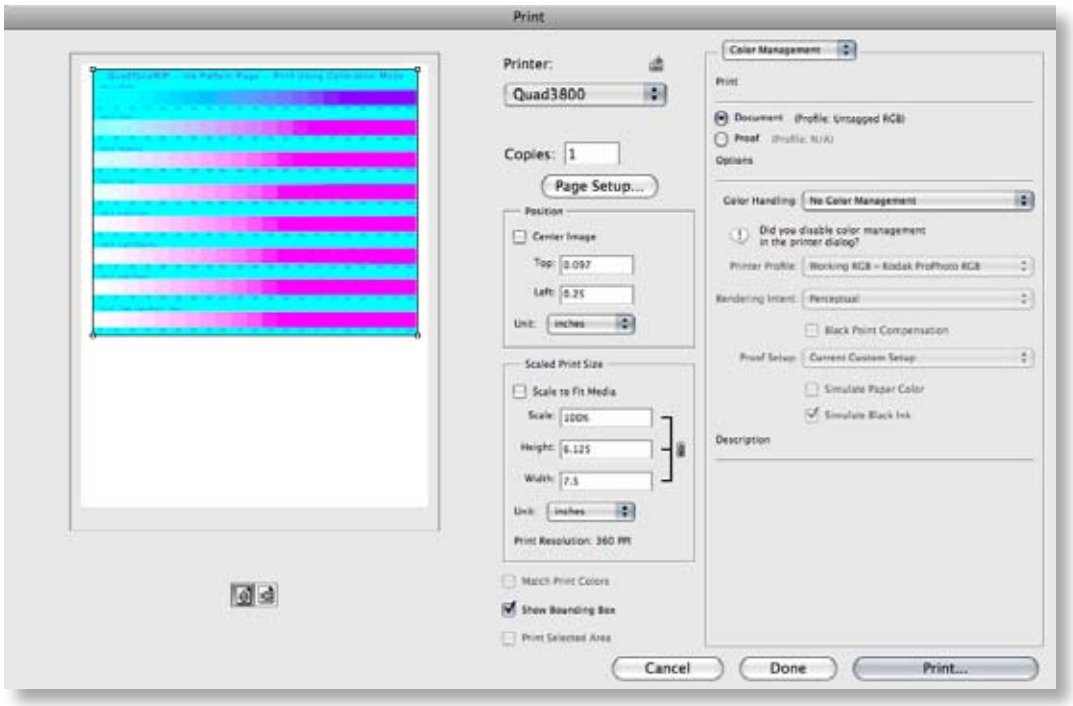
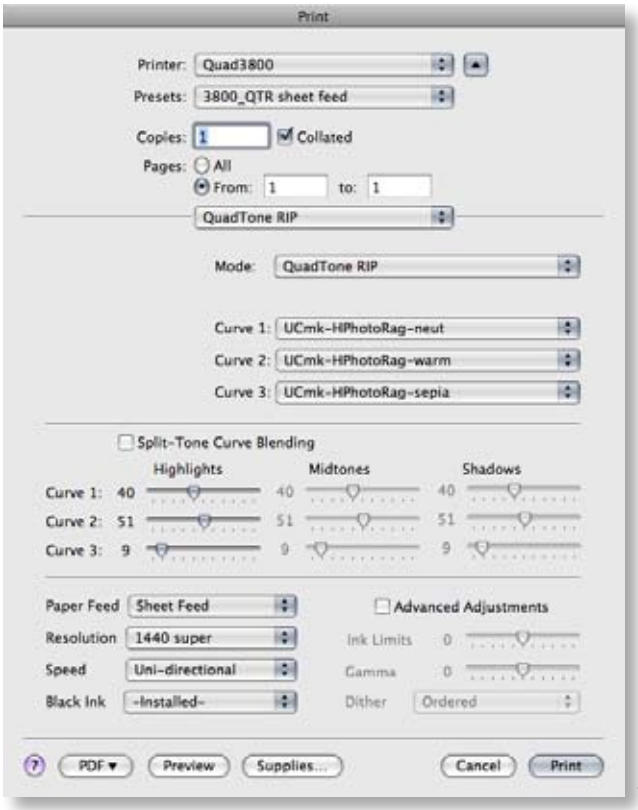


QUADTONE RIP

A Better Black and White



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QTR Workflow

Overview

QuadTone Rip (QTR) is an essential tool for obtaining high quality black and white output from Epson inkjet printers. Developed by Roy Harrington, the QTR download is a collection of print drivers and color management applications. This package has an impressive range of uses for both novice and experienced printmakers. As such, it can be difficult for the new user to grasp and correctly implement all of the advantages QTR has to offer.

There are four broad levels of interaction with QTR depending on your media and ink choices, and the level of precision you require. I'd advise any new user, no matter their ultimate aims, to progress through these levels in sequence. This is the best way to gain a complete understanding of how QTR is to be used and how it can best serve a particular printing need. We'll start with the most basic implementation and add complexity in subsequent scenarios.

The screenshots and measurements that follow are from an Epson 3800 with the standard Ultrachrome K3 inkset. I am using QTR on a Mac running OS 10.5 and Photoshop CS3.

*Note: Due to still-unresolved color management issues in CS4 for the Mac it is necessary to employ a workaround when printing untagged grayscale targets. You can read about this workaround at http://blogfiftygreatestphotos.com/2009/02/20/leopard-cs4-and-printer-profiling. It works for both color and grayscale targets. Use the Generic Gray profile for QTR (and other grayscale) targets. The Generic RGB profile is to be used only for color targets.

Level 1

Using a QTR-supplied curve

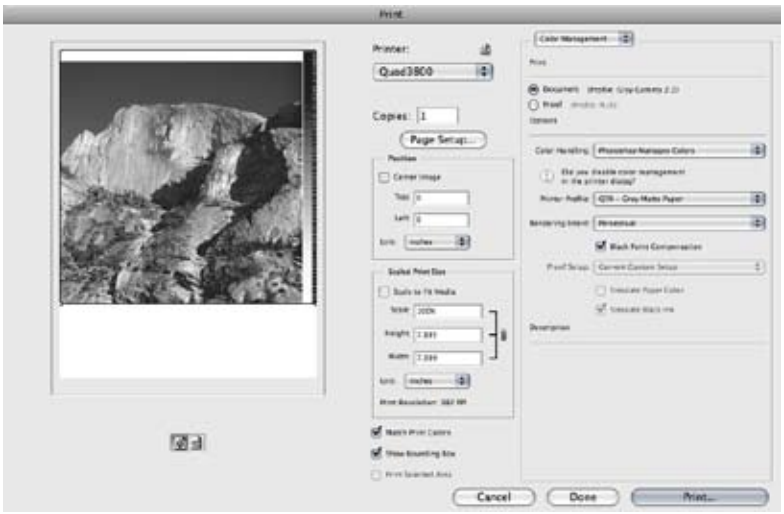
QTR installs a number of folders for a variety of current and older model Epson printers. Within each printer folder are a number of paper presets, referred to as curves in QTR lingo. The easiest way to use QTR is to print on a paper whose preset is already supplied by QTR. To see your available presets, go to Applications/QuadToneRIP/Profiles and open the folder that corresponds to your printer model. You'll see a listing of text files whose names include the inkset, black ink type, paper and tint. This is the same list that will appear in QTR's print driver. With QTR you bypass both the Epson color and ABW driver when printing.

Step 1

Convert your image to grayscale mode with a working space of Gray Gamma 2.2.

Step 2

In Photoshop go to File>Print and set Printer to Quad[*yourprinter model*]. Set Color Handling to Photoshop Manages Color. For Printer Profile choose either QTR Gray Matte or QTR Gray Photo depending on the type of paper loaded. Set Rendering Intent to Perceptual and check the Black Point Compensation box.



Step 3

Hit Print to bring up the OS X print dialog. Click on the pulldown tab showing Layout and select QuadTone RIP. Choose a curve matching the paper on which you'll print. Note that each set of paper curves comes in four flavors; cool, neutral, warm and sepia. As the names suggest, each curve imparts a different tint to the printed image. Your physical image file remains unchanged. It is still a single channel grayscale file. This toning is applied on the fly as data is being processed to print.

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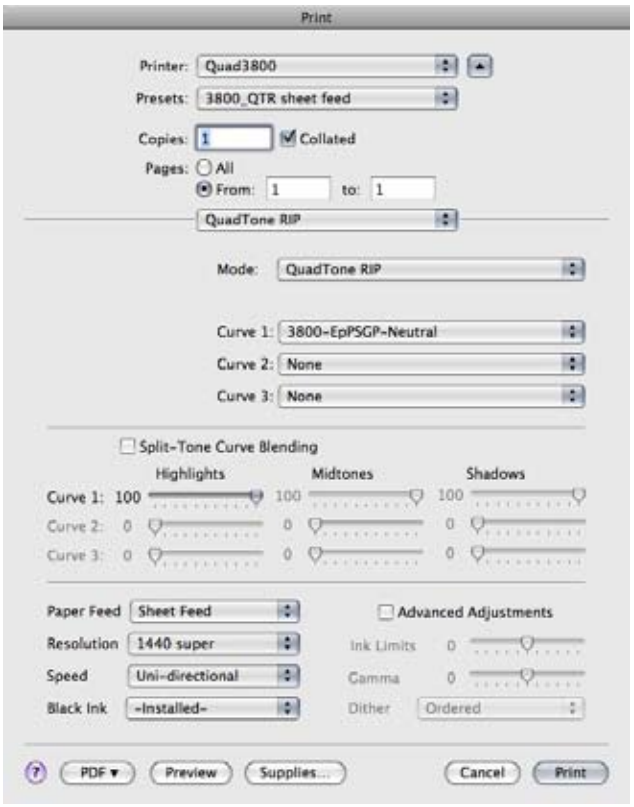
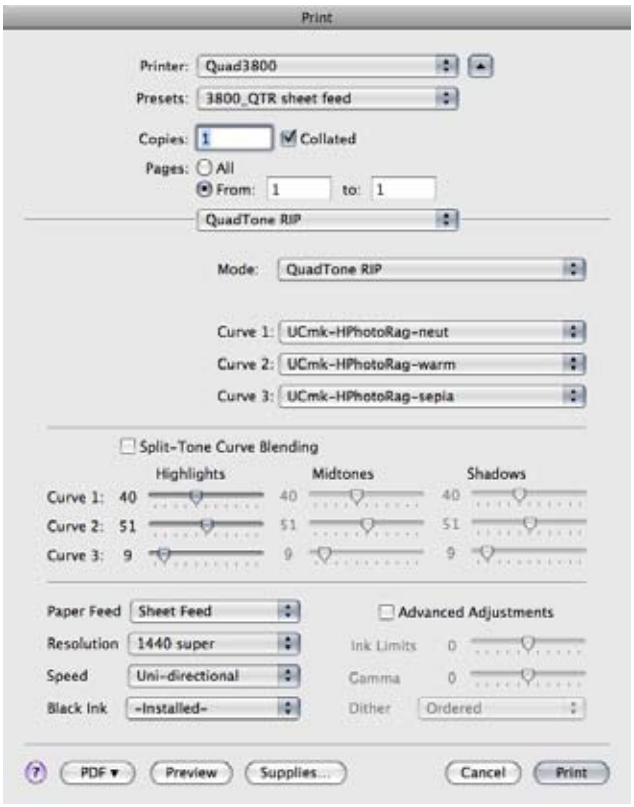
Step 4

Set your desired options for paper feed, print resolution and speed. Hit Print.



QTR driver settings for a single curve.



QTR driver settings for a three-curve blend.

Option 1

Instead of a straight print of cool, neutral, warm or sepia, you can create a unique blend of these tints. QTR allows you to select up to three tints simultaneously. You then move the Curve sliders to assign percentages of each tint. This global tint is applied equally to all pixels in the image. Think of this as you would a custom paint mix at the hardware store; an easy way to arrive at any number of monochrome hues. With just a bit of trial and error you can find a favorite and repeatable hue for a specific paper.

Option 2

With up to three tints selected you can also use QTR to produce a split-toned print. As opposed to Option 1, split-toning allows you to relegate a tint to specific tonal regions, defined as highlights, midtones and shadows. Check the Split-Tone Curve Blending box to activate the split-toning feature. You now can assign for example, a cool tint to the highlights, add warmth to the midtones and apply sepia to shadow regions. You can even choose custom blends for each tonal range by mixing among curves as described in Option 1. There are almost endless permutations.

QTR driver settings for a three-curve split-tone.

QTR Workflow

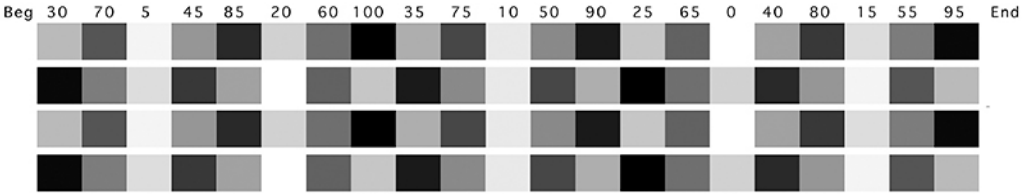
Level 2

Creating a custom grayscale ICC-compatible profile

QTR's paper curves produce accurate output but because they are not ICC profiles, you cannot call them up in Photoshop to softproof your results onscreen. Not to worry. Inside the main QTR folder you'll find a QTR-Create-ICC droplet application that can be used to create a custom grayscale profiles for softproofing. You can even print with them. And while the QTR print driver works exclusively with Epson printers, this profiling application allows you to create grayscale ICC-compatible profiles for any black and white print process that is not already color-managed, like Epson's ABW driver. To create profiles you'll need a spectrophotometer and a demo version of ProfileMaker Pro.

Step 1

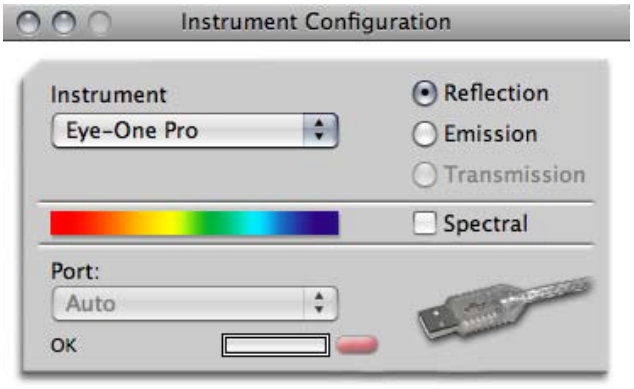
Open the Step-21x4-random file located in the QuadTone Rip/Eye-One folder. The grayscale image is untagged and must remain that way. Print this image with all the settings you normally use for the particular bw workflow you wish to profile. If you're creating a profile for a QTR workflow, set Photoshop's Color Handling to No Color Management and proceed to use all of your normal settings in the QTR print dialog. For non-QTR workflows, use the same Photoshop color management and print driver settings you choose when making a bw print.



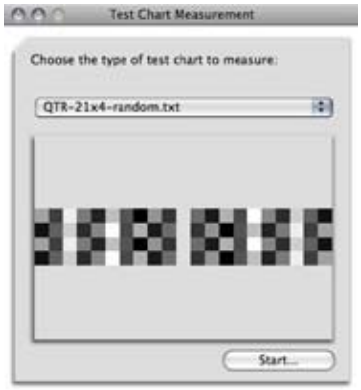
The QTR 21x4 target.

Step 2

Allow the printed target to dry overnight. Open ProfileMaker's MeasureTool application. In the Configuring window, choose your spectrophotometer model, select Reflection and uncheck the Spectral box.



MeasureTool's configuration window.



MeasureTool's measurement window.

QTR Workflow

Step 3
Click the Measuring tab, then choose Open from the pulldown menu and navigate to the QTR-21x4-random.txt file located in the QuadTone Rip/Eye-One folder.

Step 4
Press Start to begin measuring. For Mode select Strip without gaps.

Step 5
When all four lines have been measured hit the Close button. Go to File>Save As and name the file accordingly.

Step 6
In the Finder, select the file created in Step 5 and drop it onto the QTR-Create-ICC droplet. In the same location as the text file you will now have an ICC profile with the same name. QTR also creates a second text file appended with "–out". You can throw this away.
The profile can then be used in Photoshop to softproof the print result onscreen. Go to View>Proof Setup>Custom. Select the Icc profile. Make sure both Simulate Paper Color and Simulate Black Ink are checked. Set the Rendering Intent to Perceptual. You can now preview the density, hue (including any toning you applied) and paper white of any image file, making final edit adjustments accordingly.
You can use this same profile to print, through any ICC-aware application and print driver. Note that if you intend to print through the QTR driver, this profile-creation is optional. It offers the advantage of softproofing, but you can print using nothing else but the appropriate QTR curves.

Level 3

Creating a custom QTR curve
If your paper choices extend beyond QTR-supplied curves, you can easily do a custom linearization, creating your own curves. This requires a spectrophotometer and a demo version of ProfileMaker Pro. In addition to the paper-specific curves for the Epson 3800, QTR includes a set of raw curves, to be used as a starting point when creating your own.

Step 1
Use TextEdit to open up the appropriate raw curve from the QuadTone Rip/Profiles/[*yourprintermodel*] path. Two sets are provided; one for matte papers (mk) and one for glossy media (pk). Each set contains four tints: cool, neutral, warm and sepia. It does not matter which one you begin with, as you will create a separate custom curve for each tint.
*If your printer model contains no raw curves, choose a curve for an existing paper that is similar in characteristics to the paper you wish to linearize, taking care that the appropriate ink type (pk or mk) is chosen.

Step 2
Go to File>Save As to automatically create a copy of the starting curve. Rename it so you can identify the printer/paper/ink combination being used. Make sure the file is saved to the same folder as the one you just opened.

Step 3
Scroll to the end of the text file. If a line titled Linearize exists, delete it including all of the numbers.

Step 4
Save this file. Go to the QuadTone Rip/Profiles/[yourprintermodel] folder and doubleclick the Install[printername].command file. This step imports your new curve into the QTR print driver.

Step 5
Open the Step-21x4-random.tif file located in the QuadTone Rip/Eye-One folder. The grayscale image is untagged and must remain that way. Go to File>Print and set Photoshop to No Color Management. In QTR select the newly

QTR Workflow

created curve as Curve 1. Set the your desired resolution, paper feed and speed settings.

Step 6
Allow the printed target to dry overnight.

Step 7
Open ProfileMaker's MeasureTool application. In the Configuration window, choose your spectrophotometer model, select Reflection and uncheck the Spectral box.

Step 8
In the Measuring window, click Open from the pulldown menu and navigate to the QTR-21x4-random.txt file located in the QuadTone Rip/Eye-One folder.

Step 9
Press Start to begin measuring. For Mode select Strip without gaps.

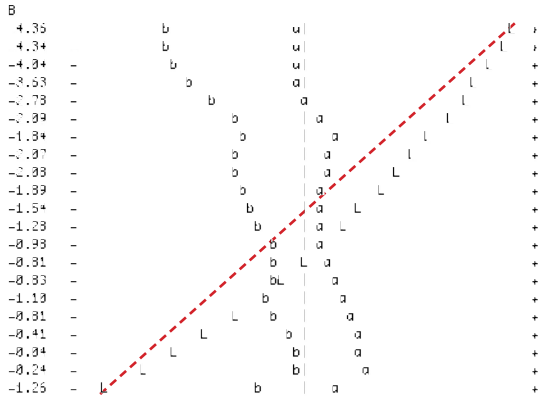
Step 10
When all four lines have been measured hit the Close button. Go to File>Save As and name the file accordingly.

Step 11
In the Finder, select the file created in Step 10 and drop it onto the QTR-Linearize-Data droplet. A new file named [*yourfilename*]-out.txt should automatically open in TextEdit. Scroll to the end of this file and copy the line which begins with Linearize, including all of the numbers.

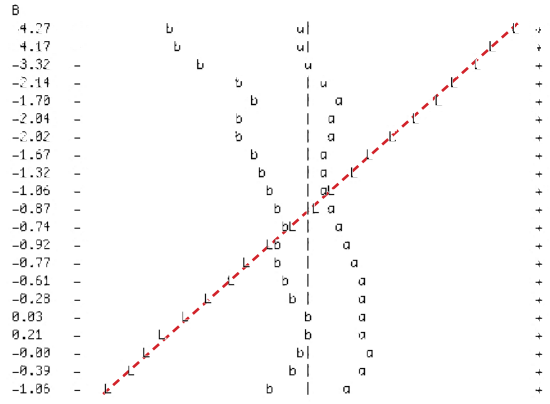
Step 12
Open the curve you created in Step 2. Paste the content from Step 11 at the end of this file. Save this file.

Step 13
Go to the QuadTone Rip/Profiles/[yourprintermodel] folder and double-click the Install[*printername*].command file. This step imports your newly updated curve into the QTR print driver.

Option 1
To verify that your newly created linearization values are doing their job, ie creating linear output, repeat Steps 4-11. But this time don't copy the linearization values. Just look at the L values in the ".out" file's graphical display (shown below). They should now follow a diagonal line with no dips or bows; the smoothest possible gradation from white to black.



Printed with no linearization data. The 21-Step target's L values dip from black (bottom left) to white (top right).



Printed with the linearization data obtained in Step 11. The 21-Step target's L values are now linear from black to white.

QTR Workflow

Step 14
The curve you updated in the driver (Step 13) is the one you will select in the QTR driver when printing. You have created a single curve; either neutral, cool, warm or sepia. Repeat Steps 1-13 three more times so that you end up with all four tint options.

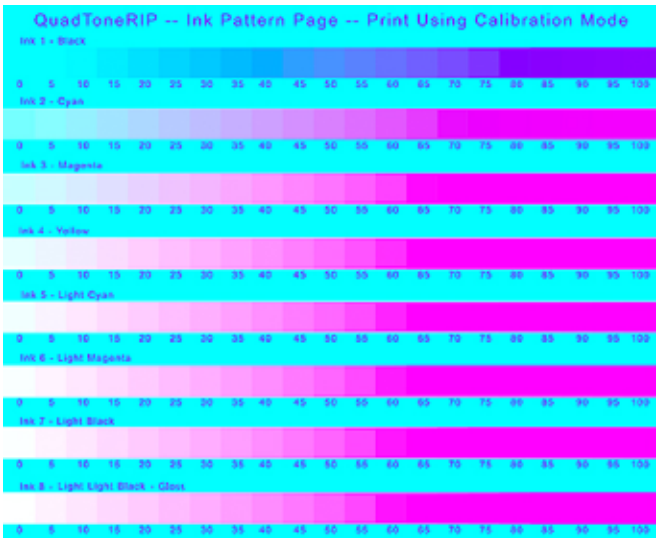
Step 15
Print your images through QTR as detailed in Level 1.

Level 4

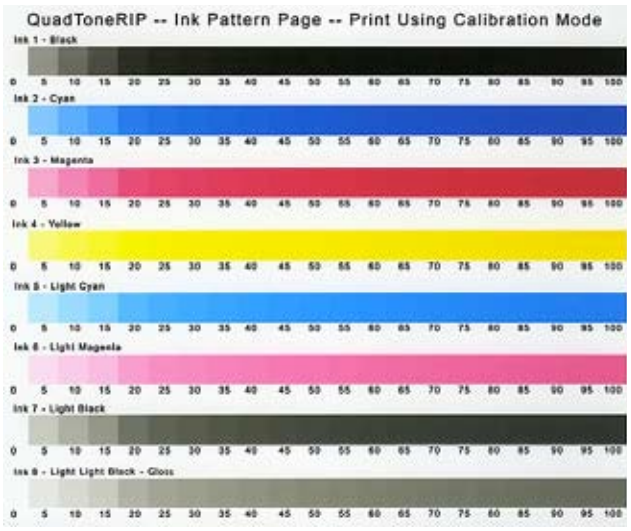
Set custom ink limits and crossovers

In the Level 3 instructions we used the default settings in the raw curve. This works well in many cases. But if you suspect your paper could benefit from the most individualized treatment possible, you can use QTR to set ink limits and determine precisely how the 3 black inks overlap to create all the tones from paper white to maximum black. The following steps must precede the linearization that was detailed in Level 3. To create set limits and crossovers you'll need a spectrophotometer and a demo version of ProfileMaker Pro.

Step 1
In the Finder go to the QuadTone Rip/CurveDesign/Images folder and open the inkseparation8.tif file in Photoshop. This RGB image is untagged and must remain that way. Hit Print and set Photoshop to No Color Management.



QTR's Ink Separation file and…



The resulting print.

Step 2
In the QTR print dialog set the mode to QuadTone RIP Calibration. This disables all curve selections. Set the Calibration Ink Limit to 100. Set the your desired resolution, paper feed and speed settings. Print the target.

Step 3
Allow the printed target to dry overnight.

QTR Workflow

Step 4
Once the target is dry, measure the patches for the Black (K) channel with a spectrophotometer. Mark the first patch beyond which you see a density increase smaller than 1.0 L unit. Depending on your paper type and resolution settings this will be anywhere between the 50% and 80% patches. This patch signifies your ink limit. Some unique and thin papers may fall below 50% but you should not be ink limiting much above 80% if at all. Be conservative here.

Step 5
Print the inkseparation8.tif file again using the same Photoshop print setting. But this time set the Calibration Ink Limit in the QTR dialog to the number you arrived at in Step 4. All other print settings remain the same.

Step 6
Allow the printed target to dry overnight. With the ink limit set, you should see much more easily into the midtone and shadow patches.

Step 7
Now it's time to determine the ink crossovers. Measure the Light Black (LK)100% patch with a spectrophotometer and note the density value. Find the patch in the K channel that matches this value. If the LK100% patch value falls between two K patches, say between K50% and K55% you can pick a value in the middle, like 53%. This is your LK crossover value. To determine this value with mathematical precision, see page 4 of the QTR pdf titled Calibration in the CurveDesign folder.

Step 8
Measure the LLK100% patch with a spectrophotometer. Find the patch in the LK channel that matches this value. If the LLK100% patch value falls between two LK patches, say between LK25% and LK30% you can pick a value in the middle, like 28%. To determine this value with mathematical precision, see page 4 of the QTR pdf titled Calibration in the CurveDesign folder.

Step 9
Take the LLK value from Step 8 and multiply it by the LK value from Step 7. Hint: Convert from percents to decimals first. This is your LLK crossover value. For an explanation of the math, see page 4 of the QTR pdf titled Calibration.

Step 9
Use TextEdit to open up the appropriate raw curve from the QuadTone Rip/Profiles/[yourprintermodel] folder. Two sets are provided; one for matte papers and one for glossy media. Each set contains four tints: cool, neutral, warm and sepia. Begin with the neutral curve. Later you will create a separate custom curve for each remaining tint.
*If your printer model contains no raw curves, choose a neutral curve for an existing paper that is similar in characteristics to the paper you wish to calibrate, taking care that the appropriate ink type (pk or mk) is chosen.

Step 10
Scroll to the end of the text file. If a line titled Linearize exists, delete it including all of the numbers. Go to File>Save As to automatically create a copy of the starting curve. Rename it so you can identify the printer/paper/ink combination being used. Make sure the file is saved to the same folder as the one you just opened.

Step 11
It's time to update values in the newly saved curve file. Use the ink limit you determined in Step 4 to replace both the DEFAULT_INK_LIMIT=xx value and the LIMIT_K=xx value. Set the BOOST_K=xx value 5 points higher than the ink limit value.

QTR Workflow

Step 12
Use the LK crossover value you determined in Step 7 to replace the GRAY_VAL_2=xx number in your curve file.

Step 13
Use the LLK crossover value you determined in Step 9 to replace the GRAY_VAL_3=xx number in your curve file.

Option 1
You can use the method outlined in Step 7 to determine ink crossovers for LM and LC. These inks come into play only as toners to achieve the neutral, cool, and sepia tints. In most cases your numbers will be only slightly off from the default values in those curves. Note that the warm curves do not use any color inks at all.

Step 14
With ink limiting and crossover values completed, you are now ready to linearize by following the steps in Level 3. Of course, you will be pasting data into the curve file with which you just finished working. The ink limiting and crossover values you made can be applied to all four tints. But for the cool and sepia curves I suggest reducing the LIMIT_K and BOOST_K values by 5 to accomodate the increased amount of toning inks.

QTR Workflow

UCpk-IlfordSmooth-neut.txt

```
#  QuadToneRIP curve descriptor file
#
#  for ultrachrome k3 inks

N_OF_INKS=8
DEFAULT_INK_LIMIT=50

LIMIT_K=55
BOOST_K=60
LIMIT_C=4
LIMIT_M=5
LIMIT_Y=0
LIMIT_LC=4
LIMIT_LM=6
LIMIT_LK=42
LIMIT_LLK=42

#
#  Describe Usage of each Ink: K,C,M,Y,LC,LM,LK
#    All Inks of Printer must be listed
#

#
# Gray Partitioning Information
#
N_OF_GRAY_PARTS=3
GRAY_INK_1=K
GRAY_VAL_1=100

GRAY_INK_2=LK
GRAY_VAL_2=52

GRAY_INK_3=LLK
GRAY_VAL_3=15

GRAY_INK_4=
GRAY_VAL_4=

GRAY_HIGHLIGHT=6
GRAY_SHADOW=6

GRAY_GAMMA=1
GRAY_CURVE=

#
# Toner Partition Information
#
N_OF_TONER_PARTS=2
TONER_INK_1=C
TONER_VAL_1=100
TONER_INK_2=LC
TONER_VAL_2=30

TONER_HIGHLIGHT=6
TONER_SHADOW=6

TONER_GAMMA=1

N_OF_TONER_2_PARTS=2
TONER_2_INK_1=M
TONER_2_VAL_1=100
TONER_2_INK_2=LM
TONER_2_VAL_2=25

TONER_2_HIGHLIGHT=6
TONER_2_SHADOW=6

TONER_2_GAMMA=1

LINEARIZE="95.93 93.21 90.12 86.92 83.59 80.3 76.08 72.38 68.55 64.79 60.76 56.81 52.75 48.89
44.8 40.91 35.64 29.15 21.86 15.01 6.68"
```

A QTR curve text file.