

DRAFT

BUILDING QuadToneRip (QTR) PROFILES WITH MAC'S

For novices by a novice

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FOR USE WITH MATTE PAPER AND HEXTONE INKS (matte black and 5 shades of gray)

EQUIPMENT USED: Mac Pro, Epson 4880 printer, Color Vision #1005 colorimeter.

Software: Leopard 10.5 or Snow Leopard 10.6, Photo Shop CS3, Spyder 3 Print software (4.0.1), QuadTone RIP driver (2.6.2 with 2.6.2dmg.gz patch and Snow Leopard patch).

Assumptions: The hextone inks have been loaded in the printer and enough cleaning cycles have been done to flush the previous inks. (The ink set I am using from Owens Valley Inks (www.ovimaging.com) has matte black and seven shades of gray. Inks 3 and 5 are used for a warm tone print and inks 4 and 6 are used for a cool tone print. This makes the cross over data slightly more complex.)

Hopefully this workflow will be a guide even if you are using other equipment and other software versions.

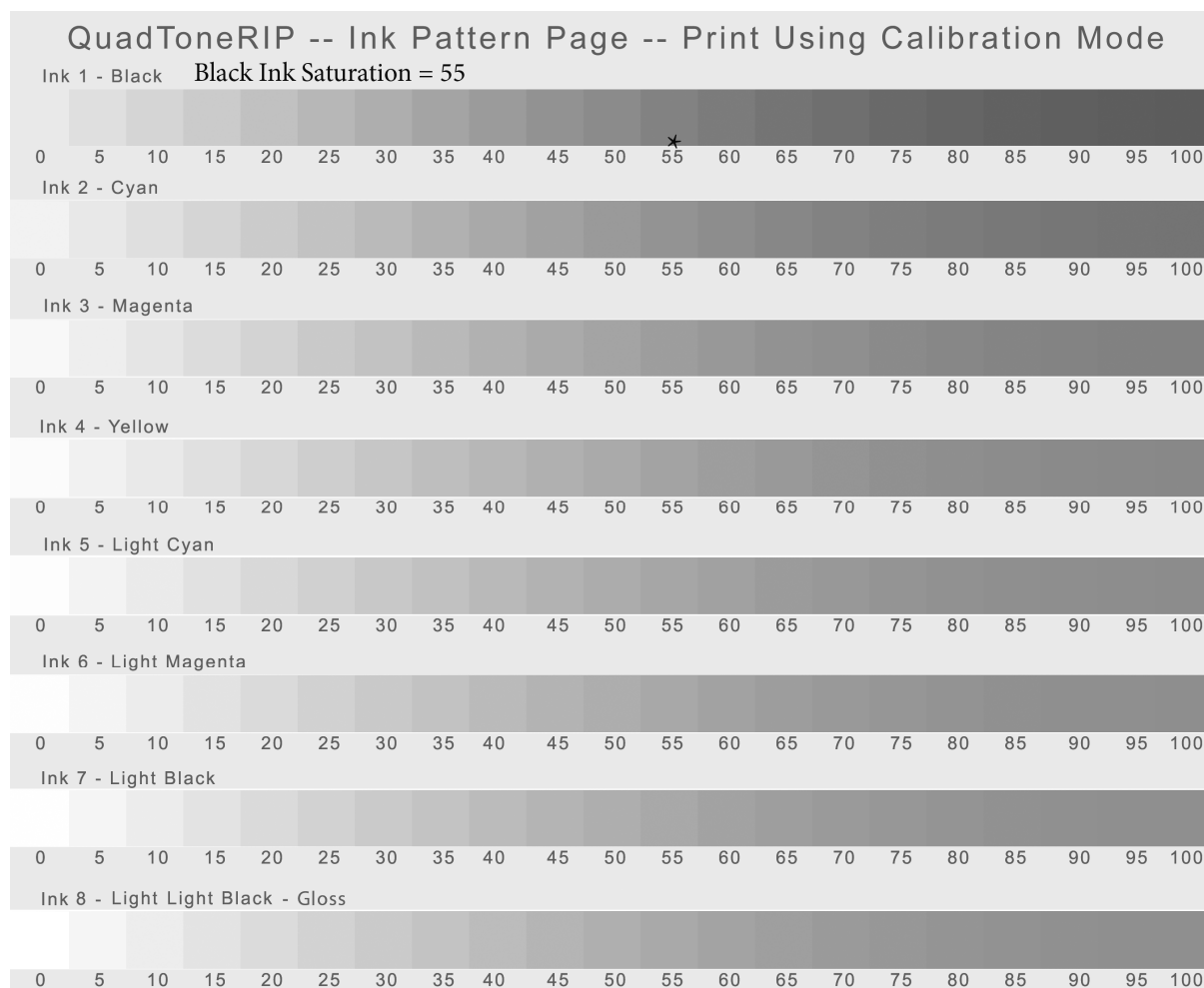
The profile you create will be specific for that printer, that ink set and that paper. To get the best prints a separate profile is needed each paper and ink combination you use.

Be warned that this exercise is not for the faint of heart and for those who lose their patience easily. Be prepared to spend some hours do this. Do not try it when you are tired or distracted.

PART I: CUSTOM INK LIMITS & CROSSOVERS

1. In PhotoShop (PS) open MacHD/Applications/QuadToneRIP/CurveDesign/Images/inkseparation8.tif. If the printer you are using has only 6 ink cartridges uses "inkseparation6.tif".
2. Print the "Ink Pattern Page" in PhotoShop (PS). Select Print from the File menu. In the pop up window select no color management. In the first print dialog box select QTR4880 as the printer and choose no color management. Click Print. In the second print dialog window in the Layout drop down menu select QuadTone RIP. In the mode box select QTR calibration. Set the Calibration Ink Limit to 100%. Select the proper paper feed. Set resolution to 2880 and speed to bidirectional. Print.
3. Allow the print to dry over night or dry with a hair drier for several minutes.
4. Now we want to establish the black (K) ink limit. This is the percentage of ink needed to produce a maximum black that no longer gets significantly darker when more ink is applied. This is when the L value (luminosity) decreases by less than a value of one. Use the colorimeter to measure the luminosity. Before opening Spyder 3 Print have the colorimeter plugged in. On the top tool bar of the Spyder 3 Print program, select Tools. Select Calibrate, hit enter. Back to Tools again, select Measurements. Use the colorimeter to read the luminance values (L) of Ink 1 Black. Note the first patch at which the L values decreases by less than one unit. This is the ink saturation for K. Convert the percentage below this patch to a whole number. This patch will be the black ink limit for this printer/paper/ink set combination you are using. The ink limit might be between 50 and 80%.

On the next page is the result with my setup.



5. Go back to Step 2. Reprint the "inkseparation8" file but after you select QTR calibration set the Calibration Ink Limit to the limit you have just determined. Allow it to dry.

6. Now we will determine the ink cross over limits for each ink channel. These calculations are all based on a percentage of ink channel 1, Black (K). Read the L value of the 100% patch of ink channel 2 which is in the cyan cartridge slot. This ink will not be quite as dense as Ink 1 - Black. Let's say the value (L) is 40. Now find the patch with the same luminosity on the black ink channel 1. Note the percentage that is printed below that patch. If the 100% luminosity of ink channel 2 falls between two patches on ink channel 1, just estimate where it falls between the two nearest patches. In the example below the L value is between 30% and 35% patch. The estimated value is put at 31%. Convert this to the whole number 31. This is the ink limit for ink channel 2 (cyan slot). This will be gray Value 2 in the profile you are going to create.

7. Now measure the 100% patch of ink channel 3 (magenta). Find the patch with the same luminosity on ink channel 2. Note the percentage. Say the L of the 100% patch on ink channel 3 is 51. Then find the patch with that luminosity on ink channel 2. Say it is the 55% patch. Convert it to a decimal, 0.55. Now since all the luminosities are related to ink channel 1 luminosities, multiple the ink limit determined for ink channel 2 by percentage that you determined. So 31 (ink channel 2 ink limit) \times 0.55 (the percentage of the patch found to equal the 100% patch for ink channel 3) = 17 which will be the ink limit for ink channel 3.

Continue this same calculation for each ink channel that is going to be used for that profile.

With the Owen Valley Inks that I am using in the Epson 4880 the warm tone ink set is comprised of the following ink channels: 1 (K), 2 (cyan), 3 (magenta), 5 (light cyan), 7 (light black) and 8 (light light black). The cool tone ink set channels are: 1 (K), 2 (cyan), 4 (yellow), 6 (light magenta), 7 (light black) and 8 (light light black). I had to determine two ink limit sets, one for the warm tone and one for the cool tone ink set. Note that two different channels are not used in each ink set. I made two profiles with this data, one for warm tone prints and one profile for color tone prints.

The ink limit numbers generated will give data that will be plugged into profile we are going to generate.

The next page shows the results I got with my setup.

QuadToneRIP -- Ink Pattern Page -- Print Using Calibration Mode																						
Ink 1 - Black = K										Gray Value K=55												
										40.6 35.8												L=55
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		
Ink 2 - Cyan = LB1										*31		Gray Value LB1=31										
										53.1 51.8												L=40.1
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		
Ink 3 - Magenta = LB2 - warm										0.55 X 31=17		Gray Value LB2=17										
										67.9 65.8												L=51.2
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		
Ink 4 - Yellow Not used																						
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		
Ink 5 - Light Cyan =LB3 - warm										0.42 x 17 = 7.1		Gray Value LB3=7.1										
										67.2												L=66.6
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		
Ink 6 - Light Magenta Not used																						
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		
Ink 7 - Light Black =LB4										0.95 x 7.1 =6.7		Gray Value LB4=6.7										
										87.4 85.4												L=67.1
0	5	10	15	20	23	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
Ink 8 - Light Light Black - Gloss LB5										0.23 x 6.7 = 1.5		Gray Value LB5=1.5										
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		

Part II: Making Preliminary Profile

1. Open an appropriate profile from QuadToneRIP//Profile/4880-7880-9880-UC/. Pick an existing profile that is similar to the one you want to create with the same or similar paper and for matte black.
2. Go to the bottom of this text file. If linearization data is there, delete all the numbers. Now save the file with a new name: Printer-Paper-Inkset.txt. Go to File/Save As with the new name. Save in the same folder as the one you had just opened.

3. Now in the file you just created plug the data from the ink separation we just determined. All lines beginning with # are just descriptors. Lines with = in it contain the data for the profile.

Enter your printer number and you ink set.

Enter the number of inks your printer has. Eight for the 4880

Set DEFAULT_INK_LIMIT =55

Now enter the black (K) limit determined above. Set boost K to 5 to 10 above the K ink limit value you just entered. Leave all the other ink limits blank.

Now enter values for the gray partitioning information. Set the number of gray parts to 6. For ink #1 (K) enter 100, e.g. GRAY_VALUE_1=100. Enter the ink cross over number for each color as you had determined above on the ink pattern page. Do not get confused by letters given for the inks. List your data from the densest to the least dense.

Enter the two inks that were not used. Double check that each ink is used once either in the gray partitioning section or in the unused ink section. All the inks must be used once either with a gray value set or in the not used section.

Save the file: File/Save As. Use the printer-paper-ink. The number of your printer, e.g. 4880, must be first. Save in the same folder that it came from.

Next double click the "install4880.command".

A new window opens. Check at the top of that folder to make sure the new profile was accepted. Correct as the message directs.

Anytime you make a change to the profile you have to save it and then use the install command for your printer. If you have PS open, you have to close it and re-open it to find the new profile that you just changed.

The next page is an example of the profile. Note that it does not have any linearization data yet.

```
# QuadToneRIP curve descriptor file
# for 4880 with OVI JE warm inks and MIS Eboni in the K slot on Epson
Presentation Matte

CALIBRATION=NO
GRAPH_CURVE=NO

N_OF_INKS=8
DEFAULT_INK_LIMIT=100

LIMIT_K=50
BOOST_K=60
LIMIT_C=
LIMIT_M=
LIMIT_Y=
LIMIT_LC=
LIMIT_LM=
LIMIT_LK=
LIMIT_LLK=

# Describe usage of each ink
# All inks must be listed

# Gray Partitioning Information

N_OF_GRAY_PARTS=6
GRAY_INK_1=K
GRAY_VAL_1=100

GRAY_INK_2=C
GRAY_VAL_2=33

GRAY_INK_3=M
GRAY_VAL_3=18

GRAY_INK_4=LC
GRAY_VAL_4=7.4

GRAY_INK_5=LK
GRAY_VAL_5=7.5

GRAY_INK_6=LLK
GRAY_VAL_6=2

GRAY_HIGHLIGHT=10
GRAY_SHADOW=10

GRAY_GAMMA=1
GRAY_CURVE=

# Toner Partition Information
N_OF_TONER_PARTS=0
TONER_INK_1=
TONER_VAL_1=
TONER_INK_2=
TONER_VAL_2=

TONER_HIGHLIGHT=10
TONER_SHADOW=10

TONER_GAMMA=1
TONER_CURVE=

# Unused Inks
N_OF_UNUSED=2
UNUSED_INK_1=Y
UNUSED_INK_2=LM

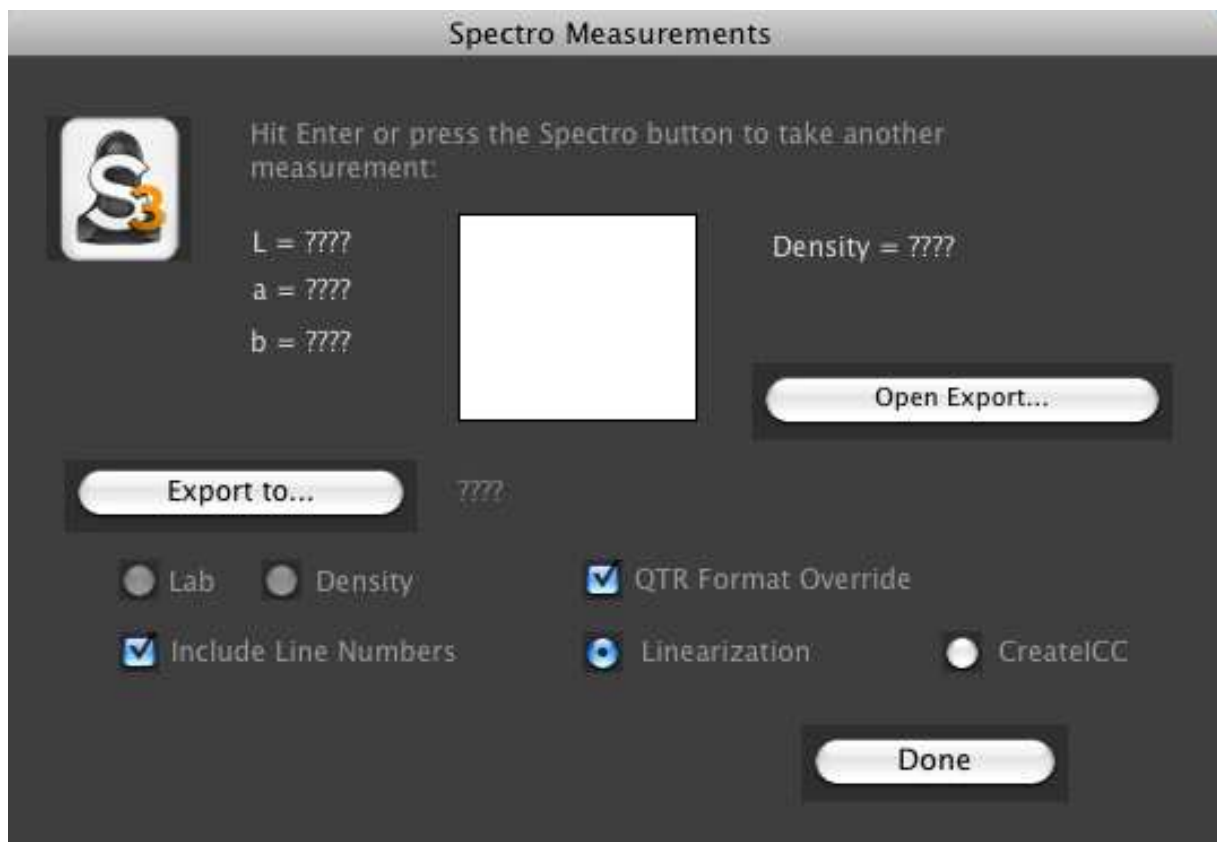
UC_NEUTRALIZER=NO
LINEARIZE=
```

PART III: CREATE LINEARIZATION DATA

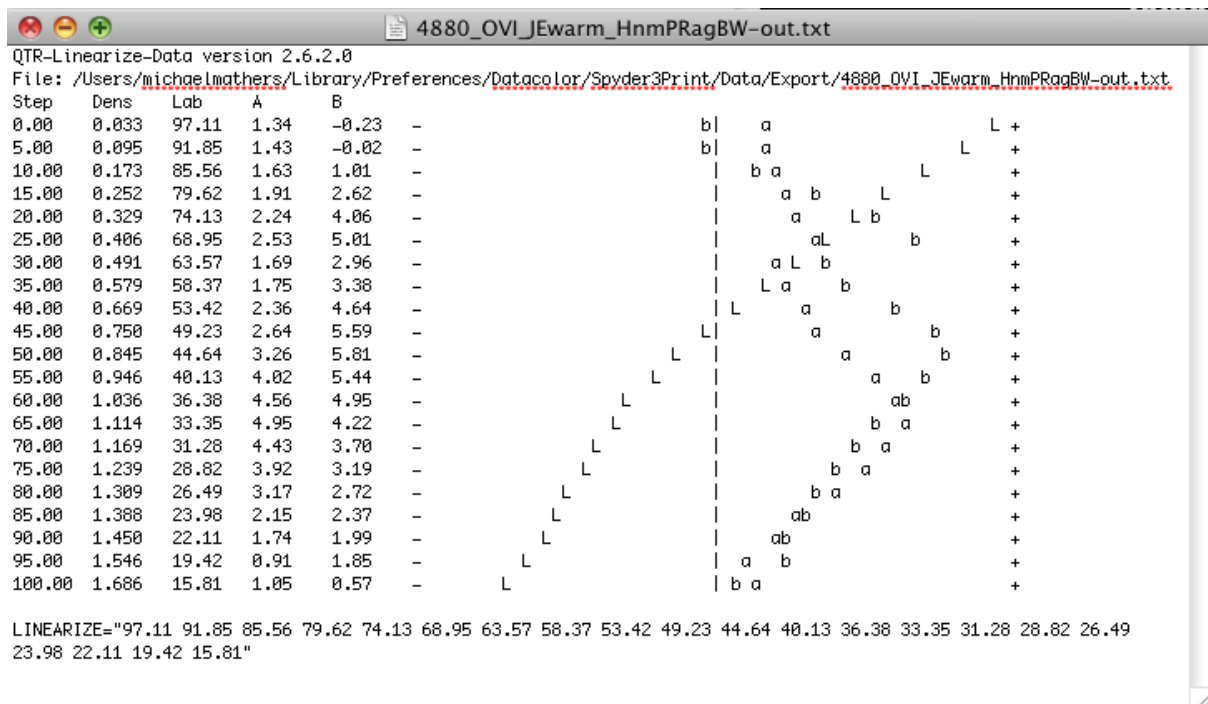
1. Print the 21 step wedge with PS to create a custom QTR curve. Find the 21 step wedge in Applications/QuadToneRIP/Eye-One/Step-21-gray.tif. Print the wedge with PS with the profile you have just made. Print it in the landscape view and stretch the wedge to fill the length of the paper to get the largest patches to make reading it easier. Also to save paper start with printing the wedge at the top of the sheet. On the second print page on the Layout drop down menu select QTR. Set the mode to QTR (not the calibration mode). In the Curve 1 box select the profile you made above. Print. Allow the print to dry.

If the density of the steps do not obviously progress with each step, then you will need to adjust the gray values in the profile. If the next step is not denser than the one before, you will no be able to linearize your data. Remember every time you make a change to the profile it has to be saved again. Run the install command again and PS has to be closed and re-opened.

2. Once you have a 21 step wedge that progresses properly, then open Spyder3Print. Click on Tools, select Calibrate, then re-open Tools and select Measure. Click Export to. Enter the file name (printer_ink_paper). Next click QTR Format Override and click Line Numbers and Linearization. Now read the density patches with the colorimeter from zero to 100. Click Done. Go to File on the top menu bar and click on Export to find your newly created file.



3. Click and drop the file onto QuadToneRIP/QTR-Linearization-data. A new window will open with a graph of the data and below will be the linearization data at the bottom. An example follows.



4. Copy the linearization data. Paste it into the bottom of the profile you have been working on. It has to be in quotes. Save the profile, re-install it, open PS and try printing the 21 step ramp to see the change. Print a sample image. Now you have a profile specific for your printer, your ink set and a specific paper choice.

Below is an example of the profile with the linearization data. This is the profile that will be your final product to print you images with that one paper and that ink set.

```
# QuadToneRIP curve descriptor file
# for 4880 with OVI JE warm inks and MIS Eboni in the K slot on Epson
Presentation Matte

CALIBRATION=NO
GRAPH_CURVE=NO

N_OF_INKS=8
DEFAULT_INK_LIMIT=100

LIMIT_K=50
BOOST_K=60
LIMIT_C=
LIMIT_M=
LIMIT_Y=
LIMIT_LC=
LIMIT_LM=
LIMIT_LK=
LIMIT_LLK=

# Describe usage of each ink
# All inks must be listed

# Gray Partitioning Information

N_OF_GRAY_PARTS=6
GRAY_INK_1=K
GRAY_VAL_1=100

GRAY_INK_2=C
GRAY_VAL_2=33

GRAY_INK_3=M
GRAY_VAL_3=18

GRAY_INK_4=LC
GRAY_VAL_4=7.4

GRAY_INK_5=LK
GRAY_VAL_5=7.5

GRAY_INK_6=LLK
GRAY_VAL_6=2

GRAY_HIGHLIGHT=10
GRAY_SHADOW=10

GRAY_GAMMA=1
GRAY_CURVE=

# Toner Partition Information
N_OF_TONER_PARTS=0
TONER_INK_1=
TONER_VAL_1=
TONER_INK_2=
TONER_VAL_2=

TONER_HIGHLIGHT=10
TONER_SHADOW=10

TONER_GAMMA=1
TONER_CURVE=

# Unused Inks
N_OF_UNUSED=2
UNUSED_INK_1=Y
UNUSED_INK_2=LM

UC_NEUTRALIZER=NO
LINEARIZE="100 91.43 84.26 75.44 68.03 61.83 56.08 51.27 46.3 43.49 39.95
36.62 33.1 31.26 29.83 28.78 27.43 26.44 25.16 23.31 17.45"
```

PART IV: ICC PROFILE FOR SOFT PROOFING IN PHOTO SHOP

1. Use the new step wedge you just printed in Part III,4.
2. Allow it to dry then scan it as you did in Part III, 2.
3. Re-open Spyder3Print/Tools/Measure and click on Open Export. Click and drag the file you just made and drop on the QTR/Create_ICC. A new file will appear in the Spyder3/Print/Data/export folder with the extension .icc
4. Copy this file. Then under a new Finder window go to Mac HD/Library/ColorSync/Profile and paste the ICC file.
5. Open PS. Select View/Proof Setup/Custom. Click on Device to Simulate. Chose the profile you created. Check Black Point Compensation and Simulate Black Ink. Click Save. Name your profile.

Now each time you work on an image in PS make sure you go to View/Proof Setup and check that profile that you will be using for the final print. This procedure will give you a soft proof of the image you are working one. This assumes the monitor has been calibrated.

ADDENDUM:

Once you have a good profile for a specific ink set and you want to change to another paper, you can simplify the process. First print the ink separation page and determine the black (K) ink limit for the new paper as in step 1. Next choose a profile that you already have for a similar paper and plug in your new K ink limit and delete the linearization data and save this preliminary profile with the new name for that paper. Now precede with the rest of steps 3 and 4. If the new curve is not linear, you might have to adjust some of the ink limits to get it right.

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