Lotem Quantum Spectrum

KPG Matchprint Thermal 2 Head Setup Procedure

Document Number

2004-01-30

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Revision History

Revision	Date	Author	Comments
DRAFT	September 5, 2001	David Veraguth	Original draft
DRAFT	October 25,2001	David Veraguth	Change of Euro Drum speeds to enable Gen 3 media. New factor for calculation of optimal exposure, 1.2 instead of 1.15.
DRAFT	January 17, 2002	David Veraguth	Added parameter tables for HD,NA, Custom Red, Custom Light Grey and Custom Blue GT (Gen3) media. Wpower setting and DS change on Euro media. New HDM, Media and Med numbers assigned.
DRAFT	March 1,2002	David Veraguth	Added Custom Colours Green , Purple and Orange
0.45	April 9, 2003	David Veraguth, Victor Sum	Updated: -- EU Magenta and HD Black drum speeds -- media type and receiver gain parameters Added section to check for Staccato20 quality. Plus some minor edits.
1.0	November 21, 2003	Victor Sum	Revised procedure to use LED mode in the autofocus system. Updated firmware commands to reflect current tMCE.
1.1	2004-01-07	Victor Sum	Revised LED mode setup details.
1.2	Jan 30, 2004	Christine Hylands	Updated LED mode and LASER mode setup details. in section 4.5. Introduced section 4.5.1 and 4.5.2.

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1. INTRODUCTION

This document explains how to set up the Lotem Quantum Spectrum Thermal 2 Exposure Head after installation.

1.1 Who should use this document

This head setup procedure is intended for qualified production and field service personnel who are familiar with the following procedures:

- Lotem Quantum and thermal 2 exposure head safety practices. (Also see section 2, “Laser safety,” on page 1.)
- Installing and setting up a thermal 2 head in a standard (non-Spectrum) Lotem Quantum.

Read this document carefully. Sometimes there are important differences in how you set up a head for Spectrum and how you set up a head for plates. These are usually outlined at the beginning of each section.

1.2 Conventions used in this document

This document uses the following conventions:

- Service Shell or Splot terminal commands are identified by `Courier` font.
- For commands issued from the Service Shell or Splot terminal, `<n>` denotes a media number, often 9 through 12 for KPG Matchprint STD

  (e.g., `set media <n> Type 1`).

2. LASER SAFETY PRACTICES

To use this document the FSE (Field Service Engineer) **must** have attended and passed a thermal introductory course and is therefore familiar with the safety precautions when working with a thermal Lotem.



Danger:
Never operate a Lotem Quantum Spectrum with its enclosure open and the write laser on. The write laser MUST be disabled BEFORE the enclosure is opened.

3. DIFFERENCES FROM STANDARD THERMAL HEAD SETUP

Setting up a thermal exposure head for making Spectrum proofs is very similar to setting up a thermal head to expose plates on a Lotem Quantum, but there are a few key differences.

The main differences are:

- Focus/surface depth setup must be done for each donor color.
- Exposure setup must be done for each donor color.

4. INSTALLATION/HEAD SETUP PROCEDURE

The procedures below provide instructions on how to setup a Spectrum Thermal 2 exposure head after installation.

Only qualified personnel familiar with all Lotem Quantum and Thermal 2 exposure head safety practices should perform head setup. You should also be familiar with a standard Thermal 2 exposure head setup before attempting to set up a head for use with Spectrum.

4.1 Required tools

- X-Rite 938 spectrodensitometer

  or

- X-Rite 528 spectrodensitometer

4.2 Positioning the head and checking focus offset on plate

It is common integration/service practice when installing a head to check the existing `foffset` parameter by running a focus series. The most unambiguous way to do this, which is recommended for setting up the Spectrum, is to run an `foffset` series using an aluminum thermal plate (media with `sd` = 0).

Note: This section assumes that the customer is using Kodak IR plates. If the customer uses a different type of plate, refer to its Media Technical Note for any additional focus information specific to that plate.

1. Load the plate.
2. Position the head, using `head install on` to an error of –50 on a .3mm plate (z-stage should be in forward position)
3. Run a focus series, as described in steps a to e below.

   a) Set `med laserpower` approximately 2 watts under the `laserpower` setting the head was shipped with.

   b) Run the Service Shell or Splot `foffset` script, so that the current `foffset` is near the middle of the series. If `foffset` is close to 0 run a series from –50 to +50 in increments of 5um.

   c) Make sure you mark the test plots with the focus setting (e.g., -50, -45, etc.) **before** you process the plate. With the `med laserpower` set below its normal setting the plots not close to the ideal focus may be washed off the plate and disappear!

d) Pick the most solid plot **independent** of banding. This is the best `head foffset value.`

e) Change med `laserpower` back to the previous setting.

4. If the best `foffset` is found to differ by more than 5um from the existing value, enter the new value:

   `Set head foffset <new value>`

5. Unload the plate.

4.3 Proofing media setup verification

Steps 1 & 2 are for field service head installation/replacements only

1. At this stage, you should check to see if you can produce a good proof. Image a test file, and examine image quality. Check Dmax and dot gain on each color.

   Your proof will probably look good at this point, particularly if you're using a head that has been integrated for Spectrum.

   If the proof looks good, go on to Section 4.4 to complete the head installation.

   If the proof shows banding at this point, go on to check `extrascanlines`, set surface reflectivity, adjust the focus, set exposure, and do `beamslope` and `beamcurve` series.

2. If image banding was prominent in step 1, check `extrascanlines`. The value should be 0 for all KPG Matchprint proofing media.

   Also check `media <n> patternid`, as patternid should be 3.

4.4 Complete the head installation

If you are installing/replacing a Spectrum head in the field:

If the image quality was good after verification in 4.3 then the head installation is complete.

If you are integrating a Spectrum head in Production:

Only Gold media material, on North American/High Density/Euro color set, should be used for setting up a KPG Matchprint head.

Important!	Make sure you are using KPG Matchprint Gold media for the rest of the process. For the latest batch/run numbers for each donor color, see section 3.3.4 of the *Imation/CreoScitex System Certification Specifications* document:

http://intranet.creo.com/Products/spectrum/documents/production/Imation_Gold_Media_Run_Nos.doc

Prepare the thermal 2 head for spectrum setup, completing following steps:

To enable access to all parameters enter the 3 passwords below passwords.

- `access dev`
- `prm hazardous media enable`
- `th2 "eng"`

For KPG Matchprint Standard Proofing Media (GT):

>> th2 "set …"	med 8	med 9	med 10	med 11
name	KPGM STD Cyan	KPGM STD Magenta	KPGM STD Yellow	KPGM STD Black
colour	Cyan	Magenta	Yellow	Black
laserpower	11	11	11	11
drumspeed	150	120	170	170
beamslope	0	0	0	0
beamcurve	0	0	0	0
focusmode	0	0	0	0
sd	0	0	0	0
focuslasermode**	1	1	1	1
sr**	0.01	0.01	0.01	0.01

To change the parameters above type, eg.: `th2 "set med <n> sd 0"`

>> set …	media 9	media 10	media 11	media 12
Name	KPGM STD Cyan	KPGM STD Magenta	KPGM STD Yellow	KPGM STD Black
Extrascanlines	0	0	0	0
Type*	12	12	12	12
Colour	Cyan	Magenta	Yellow	Black
Debrisoptions	0	0	0	0
PatternID	3	3	3	3

To change the parameters above type, eg.: `set media <n+1> PatternID 3`

* For TMCE version 1.20 and later. Earlier versions use 7.

** If there is a problem using LED mode for the focus laser then try using LASER mode. See section 4.5 for more details.

For KPG Matchprint HD Proofing Media (GT):

>> th2 "set …"	med 4	med 5	med 6	med 7
name	KPGM HD Cyan	KPGM HD Magenta	KPGM HD Yellow	KPGM HD Black
colour	Cyan	Magenta	Yellow	Black
laserpower	11	10	11	10
drumspeed	150	125	145	150
beamslope	0	0	0	0
beamcurve	0	0	0	0
focusmode	0	0	0	0
sd	0	0	0	0
focuslasermode**	1	1	1	1
sr**	0.01	0.01	0.01	0.01

To change the parameters above type, eg.: th2 "set med <n> sd 0"

>> set …	media 5	media 6	media 7	media 8
Name	KPGM HD Cyan	KPGM HD Magenta	KPGM HD Yellow	KPGM HD Black
Extrascanlines	0	0	0	0
Type*	12	12	12	12
Colour	Cyan	Magenta	Yellow	Black
Debrisoptions	0	0	0	0
PatternID	3	3	3	3

To change the parameters above type, eg.: set media <n+1> PatternID 3

* For TMCE version 1.20 and later. Earlier versions use 7.

** If there is a problem using LED mode for the focus laser then try using LASER mode. See section 4.5 for more details.

For KPG Matchprint Euro Proofing Media (GT):

>> th2 "set …"	med 4	med 5	med 6	med 7
name	KPGM EU Cyan	KPGM EU Magenta	KPGM EU Yellow	KPGM EU Black
colour	Cyan	Magenta	Yellow	Black
laserpower	11	10	11	11
drumspeed	160	150	145	170
beamslope	0	0	0	0
beamcurve	0	0	0	0
focusmode	0	0	0	0
sd	0	0	0	0
focuslasermode**	1	1	1	1
sr**	0.01	0.01	0.01	0.01

To change the parameters above type, eg.: `th2 "set med <n> sd 0"`

>> set …	media 5	media 6	media 7	media 8
Name	KPGM EU Cyan	KPGM EU Magenta	KPGM EU Yellow	KPGM EU Black
Extrascanlines	0	0	0	0
Type*	12	12	12	12
Colour	Cyan	Magenta	Yellow	Black
Debrisoptions	0	0	0	0
PatternID	3	3	3	3

To change the parameters above type, eg.: `set media <n+1> PatternID 3`

* For TMCE version 1.20 and later. Earlier versions use 7.

** If there is a problem using LED mode for the focus laser then try using LASER mode. See section 4.5 for more details.

For KPG Matchprint Custom Colour Proofing Media (GT):

>> th2 "set …"	med 12	med 13	med 14	med 15	med 2	med 3
name	KPGM Red	KPGM Green	KPGM Blue	KPGM Lt Grey	KPGM Purple	KPGM Orange
colour	Red	Green	Blue	Lt Grey	Purple	Orange
laserpower	9	4.5	5.5	9	7.5	8
drumspeed	120	85	75	100	105	105
beamslope	0	0	0	0	0	0
beamcurve	0	0	0	0	0	0
focusmode	0	0	0	0	0	0
sd	0	0	0	0	0	0
focuslasermode**	1	1	1	1	1	1
sr**	0.01	0.01	0.01	0.01	0.01	0.01

To change the parameters above type, eg.: `th2 "set med <n> sd 0"`

>> set …	media 13	media 14	media 15	media 16	media 3	media 4
Name	KPGM Red	KPGM Green	KPGM Blue	KPGM Lt Grey	KPGM Purple	KPGM Orange
Extrascanlines	0	0	0	0	0	0
Type*	12	12	12	12	12	12
Colour	Red	Green	Blue	Lt Grey	Purple	Orange
Debrisoptions	0	0	0	0	0	0
PatternID	3	3	3	3	3	3

To change the parameters above type, eg.: `set media <n+1> PatternID 3`

* For TMCE version 1.20 and later. Earlier versions use 7.

** If there is a problem using LED mode for the focus laser then try using LASER mode. See section 4.5 for more details.

NOTE: When setting up a Thermal 2 head on a Lotem Quantum Spectrum, ensure that the z-stage is in the back position and in the correct mode (resolution) during calibration plots!

To do so type: `set mds lastthickness 350`

`Mode x (x= mode number)`

4.5 Setting surface reflectivity and receiver gain

The `sr` and `rcvrgain` values must be set for each donor color. The default focus setup for Matchprint proofing media is to use LED mode. However, if LED mode does not provide enough focus signal, LASER mode must used.

In LED mode, the media rcvrgain must be determined iteratively to achieve the desired focus sum of ~1200. There are two methods to determine `rcvrgain`: using synchronous head install on or manually. Which method to use depends on the MCE firmware version.

Note: If you try to issue "`foc cal reflect`" to determine sr, but the focus laser cannot achieve a sum value greater than 1200, you will get the following error message:

```
Focus: focus signal too low: Image may be off media.
```

In this case, check the sum value using "`head install on`". The `sr` and `rcvrgain` should be set to give sum values between 700 and 1300. See procedure below.

4.5.1 LED mode – MCE firmware version 1.32.xx or later (synchronous head install on)

The steps below describe how to determine `rcvrgain` using "synchronous head install on" which will yield an optimal averaged value over many focus points around the mainscan length of the media.

WARNING: The "`plot headtest`" command will not work reliably on MCE firmware versions prior to 1.32.xx

1. Load the receiver and donors into the loading cassette and insert into the proofing device.
2. Load the receiver using the Lotem Quantum Spectrum Control Software
3. Load a donor using the Lotem Quantum Spectrum Control Software
4. Position the carriage so that the focus laser reflects off the donor

   ```
   QUANTUM >> carriage moveto 500
   ```

5. Switch to the firmware media slot associated with the donor color loaded in the machine:

   ```
   QUANTUM >> media <m>
   ```

6. Ensure that the media parameter for the donor is set to enable LED mode:

```
QUANTUM >> th2 "set med <n> focuslasermode 1",where n=m-1
```

7. Set `sr` to 0.01 for the current donor:

```
QUANTUM >> th2 "set med <n> sr 0.01"  ,where n=m-1
```

8. Set `rcvrgain` to 15 for the current donor:

```
QUANTUM >> th2 "set med <n> rcvrgain 15" ,where n = m-1
```

9. Access "developer mode" in MCE:

```
QUANTUM >> access dev
```

10. Shift the start of the scan by 65 mm in the mainscan direction:

```
QUANTUM >> plot moffset 0 65
```

11. Start synchronous head install on. Scan only the mainscan length of the receiver:

```
QUANTUM >> plot headtest 710
QUANTUM >> head install on
```

12. The drum should be spinning at the media's set drum speed. Observe the sum values scrolling up the diagnostic screen.

If the sum values is…	Then…

less than 700	The focus signal is too weak to use LED mode. LASER mode must be used for this donor colour. Do the following
	1. Stop synchronous head install on:
	`QUANTUM >> head install off`
	`QUANTUM >> plot stop`
	2. Enable LASER mode:
	`QUANTUM >> th2 "set med <n> focuslasermode 0"`
	3. Change `rcvrgain` and `sr` to the following values:
	`QUANTUM >> th2 "set med <n> rcvrgain 2.2"`
	`QUANTUM >> th2 "set med <n> sr 1.0"`
	4. Restart synchronous head install on:
	`QUANTUM >> plot headtest`
	`QUANTUM >> head install on`
	5. Reduce the `sr` iteratively using

	`QUANTUM >> th2 "foc reflect [new sr]"`
	until sum is ~1200. The sum value will change immediately if the "foc reflect" command is used to adjust `sr`.
	The `new_sr` will be `~ (sum/1200) * old_sr`
	Note: Changing `sr` in `med <n>` slot instead of using the "`foc reflect`" command will NOT affect the sum immediately. To make the new_sr value in the `med <n>` slot active, you must stop and restart `head install on`. You do not need to stop and restart `plot headtest`.
	6. Set the `sr` value in the `med <n>` slot to the `new_sr` value:
	`QUANTUM >> th2 "set med <n> sr [new_sr]"`

between 700 and 1300	The `rcvrgain` and `sr` values are acceptable. No adjustments required.
greater than 1300	`rcvrgain` must be adjusted to make the sum ~ 1200. If sum = 2047, the focus signal is saturated. **Note:** On some early TH2 heads, the focus signal saturation value approximately 1850 instead of 2047. Adjusting `rcvrgain` iteratively using `QUANTUM >> th2 "set med <n> rcvrgain [new_rcvrgain]"` until sum is ~1200. The sum value will change immediately with `rcvrgain`, so you do not need to stop and restart `head install on`. The `new_rcvrgain` value should be `~ (1200/sum)*old_rcvrgain`.

13. Stop synchronous head install on:

```
QUANTUM >> head install off

QUANTUM >> plot stop
```

Steps 1 to 13 must be repeated for each donor colour. However, you can continue with Section 4.6 with the color donor that is presently loaded on the drum and return to this section for the next color donor.

4.5.2 LED mode – MCE firmware version prior to 1.32.xx (manual method)

The steps below describe how to determine `rcvrgain` manually by using `head install on`.

1. Load the receiver and donors into the loading cassette and insert into the proofing device.

2. Load the receiver using the Lotem Quantum Spectrum Control Software
3. Load a donor using the Lotem Quantum Spectrum Control Software
4. Position the carriage so that the focus laser reflects off the donor

   `QUANTUM >> carriage moveto 500`

5. Switch to the firmware media slot associated with the donor color loaded in the machine:

   `QUANTUM >> media <m>`

6. Ensure that the media parameter for the donor is set to enable LED mode:

   `QUANTUM >> th2 "set med <n> focuslasermode 1"`,where n=m-1

7. Set `sr` to 0.01 for the current donor:

   `QUANTUM >> th2 "set med <n> sr 0.01"` ,where n=m-1

8. Set `rcvrgain` to 15 for the current donor:

   `QUANTUM >> th2 "set med <n> rcvrgain 15"` ,where n = m-1

9. Check the focus laser signal: `QUANTUM >> head install on`
10. Move the drum to several locations around the drum where the focus laser spot is on the donor using the following command:

    `QUANTUM >> drum move x` ,where "x" is in degrees

11. Note the SUM value at each spot. Calculate the average SUM value around the drum.

If the average sum value is…	Then…

less than 700	The focus signal is too weak to use LED mode. LASER mode must be used for this donor colour.
	1. Stop head install on: `QUANTUM >> head install off`
	2. Enable LASER mode:
	`QUANTUM >> th2 "set med <n> focuslasermode 0"`
	3. Change `rcvrgain` and `sr` :
	`QUANTUM >> th2 "set med <n> rcvrgain 2.2"`
	`QUANTUM >> th2 "set med <n> sr 1.0"`
	4. Restart `head install on`
	5. Reduce the `sr` iteratively using

	`QUANTUM >> th2 "foc reflect [new sr]"`
	until sum is ~1200. The sum value will change immediately if the "foc reflect" command is used to adjust `sr`.
	The `new_sr` will be `~ (sum/1200) * old_sr`
	Note: Changing `sr` in `med <n>` slot instead of using the "`foc reflect`" command will NOT affect the sum immediately. To make the new_sr value in the `med <n>` slot active, you must stop and restart `head install on`.
	6. Set the `sr` value in the `med <n>` slot to the `new_sr` value:
	`QUANTUM >> th2 "set med <n> sr [new_sr]"`

between 700 and 1300	The `rcvrgain` and `sr` values are acceptable. No adjustments required.
greater than 1300	`rcvrgain` must be adjusted to make the sum ~ 1200. If sum = 2047, the focus signal is saturated. **Note:** On some early TH2 heads, the focus signal saturation value approximately 1850 instead of 2047. Adjusting `rcvrgain` iteratively using `QUANTUM >> th2 "set med <n> rcvrgain [new_rcvrgain]"` until sum is ~1200. The sum value will change immediately with `rcvrgain`, so you do not need to stop and restart `head install on`. The `new_rcvrgain` value should be `~ (1200/sum)*old_rcvrgain`.

12. Stop head install on: QUANTUM >> head install off

Steps 1 to 12 must be repeated for each donor colour. However, you can continue with Section 4.6 with the color donor that is presently loaded on the drum and return to this section for the next color donor.

4.6 Setting focus (surface depth)

Correct focus for the thermal head for each donor media must be properly set **by adjusting the surface depth `med` parameter.** Surface depth (`sd`) is set per media, while `foffset` is set per head. You should not change the `foffset` value for the head.

1. Check that media thickness is set correctly.

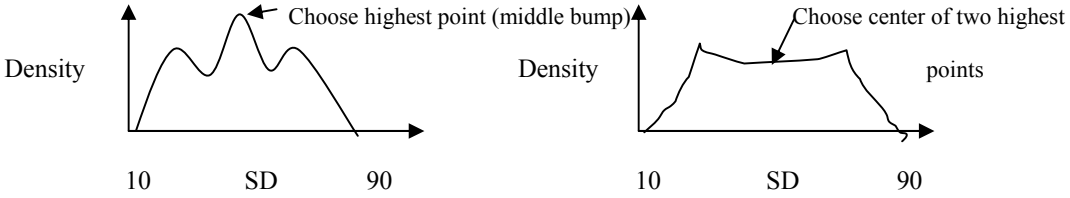
   `set mds lastthickness 350`

2. Run the Service Shell or Splot surface depth script, using plot 12, starting at `sd` 10 to 90 in increments of 5um.

3. Carefully mark or otherwise indicate the first strip in the series. Often the first few strips in the series are very faint and it can become confusing to determine which strip corresponds to which `sd` value.

4. Determine `sd` by choosing the value corresponding to the darkest strip in the `sd` series.

   Note: The Density vs. SD curve on some Custom Colour might look different than the ones of the process colours. They could look like illustrated in the following graphs:



   If the SD is not obvious, repeat SD-Series with reduced `laserpower`.

   Tip: Use the X-Rite 938 or 528 to measure the density of the series strips, then graph density vs. sd (you can graph it on computer, on paper by hand, or mentally). Use the average of three density measurements per strip. The best `sd` corresponds to the peak in the graph. For Custom Colours use following filters for the density measurements:

Custom Colour	Red	Green	Blue	Lt. Grey	Purple	Orange
X-Rite Filter used for Custom Colour measurements	Magenta	Cyan	Visual (Black)	Visual (Black)	Visual (Black)	Yellow

   i.e. if the Custom Colour Red is measured and the X-Rite shows following densities: Black=0.64,cyan=0.27, Magenta=1.579, Yellow=1.426, use the Magenta density (filter) as the density reading.

   Important: Ignore banding as a criterion for best focus.

5. Enter the best `sd` value for this donor:

   `th2 "set med <n> sd <value determined in step 4>"`

6. Repeat steps 2 to 5 for each remaining donor color.

4.7 Setting exposure

The most important factor to take into account when setting exposure for proofing media is stability. The density vs. exposure curve is not linear. At some points, a small change in `laserpower` can lead to a large change in density of the proofing media. Setting `laserpower` to a value in this range will lead to a very unstable machine configuration.

The procedure described here has been found to provide a consistent, repeatable way to set exposure that gives the necessary machine-to-machine consistency on any given batch of media. It also gives a high degree of immunity to changes or drift in head power or focus, and also provides good latitude for AM banding.

You will have to perform the following steps once per donor color.
Also note that drum speeds for KPG Matchprint proofing media are fixed in order to meet imaging time specifications.

1. Run the Service Shell or Splot `laserpower` script using plot 12 (100% tint) starting at 9W to 18.5W in increments of 0.5W. For Custom Colour Blue and Green start at 4W to 19W in increments of 1W.

2. Measure the density of each strip in the `laserpower` series using an X-Rite 938 or 528 spectrodensitometer, choosing the Status T filter set. Take at least three density measurements of each strip and use the average value of the three.

3. Examine the measured density vs. `laserpower`. You should see the density increasing with `laserpower` until it "plateaus". It may begin to decrease slightly again if the media has become overexposed. To determine the correct exposure for Custom Colour Blue and Green use the exposure setup spreadsheet which can be found on the Techplanet at:

   http://techplanet.creo.com/proofing/trendsetter_spectrum/nav/media_matchprint.htm#imation_head_setup

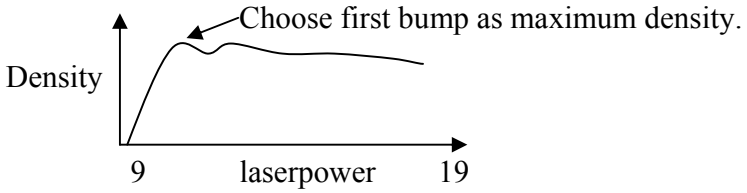
   Make sure to use the correct Exposure Setup Spreadsheets, which are meant for the KPG Matchprint GT media (Gen.3)

   It is helpful to plot the values in Excel or another plotting package. It is also very helpful to mentally, or with a pencil, draw a curve through the data which will help to distinguish between the true trend in the exposure series and simple "noise" fluctuations in the density measurements. (See Figure 1 on page 15).

4. Determine the maximum density.

   (Dmax is about 1.30 in the example below.)

   Note: On Magnenta HD and some Custom Colours the Density vs. Exposure curve might have two higher density points as shown in the graph below. If the density drop between the two highest densities is less than 0.05 choose the first bump as maximum density. If the density drop is more than 0.05 , use the second bump as maximum density.



5. Determine the `laserpower` that gives a density 0.02 lower than the maximum density. In some cases there will be two `laserpowers` which give densities 0.02 lower than maximum. Choose the `laserpower` that is lower than the `laserpower` at maximum density. (In the example that follows, `laserpower` is 14.7 W, not 19.5W)

6. Calculate the correct `laserpower` by multiplying the `laserpower` found in step 5 by a factor of 1.2. (In the example that follows, 14.7 W x 1.2 = 17.64W.)

Example

Example density data for Cyan is given in Table 1, and graphed in Figure 1.

Table 1: Measured Cyan density vs. `laserpower`

`laserpower`	Density
11	1.083
11.5	1.129
12	1.171
12.5	1.189
13	1.221
13.5	1.238
14	1.264
14.5	1.275
15	1.292
15.5	1.293
16	1.301
16.5	1.299
17	1.295
17.5	1.305
18	1.293
18.5	1.284
19	1.289
19.5	1.282
20	1.281
20.5	1.280

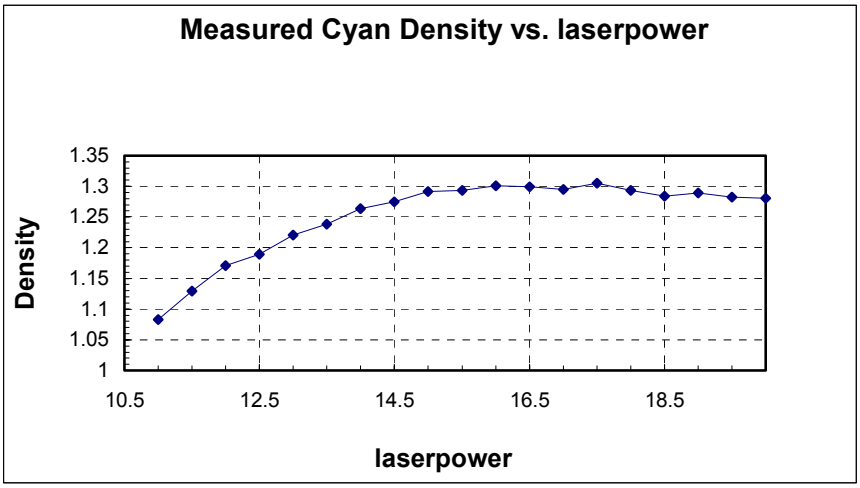


Figure 1: Measured density vs. `laserpower` for cyan using KPG Matchprint proofing media.

From the graph, and the table, the peak density is about 1.30. Here is where a smoothed curve is helpful to help determine whether the peak value is just a measurement spike. In this case, it is not.

We need the `laserpower` corresponding to a density 0.02 less than the peak, namely 1.28. This is between 14.5 and 15W, and a little closer to 14.5. Select 14.7 W.

There is a second `laserpower` corresponding to 1.28, but it occurs at higher `laserpower`, near 19.5W. Ignore this one.

Calculate the correct `laserpower` setting:

14.7 W x 1.2 = **17.64W**

7. If the density measurements did not reveal an obvious shoulder and plateau in the density vs. `laserpower` data, repeat the exposure series and extend it to higher or lower powers as necessary.
8. Enter the calculated `laserpower` value using the following commands:

   `th2 "set med <n> laserpower <value calculated>"`

9. Repeat steps 1 to 8 for each remaining donor color.

4.8 Beam balancing (if necessary to reduce banding)

It should not usually be necessary to perform beam balancing in order to get acceptable image quality.

If necessary, run the Service Shell or Splot `beamslope` script, using plots 12 and 50, starting at –10 to 10 in increments of 2. Laminate series and select the `beamslope` value with the least banding.

Enter best value using command:

`th2 "set med <n> beamslope <value selected>"`

Repeat this for `beamcurve`.

Note: `beamslope` and `beamcurve` is different for each donor!

4.9 Check image quality

Check image quality after the `beamslope` and `beamcurve` series.

1. Enter the command `media <n> (to select the media last improved)`
2. Enter the command `stroke cal`
3. Do a `plot 1`
4. Check image quality.

5. ADJUSTING THE HEAD FOR STACCATO20 QUALITY

Overview: Spectrum thermal heads which are setup to provide good image quality at regular AM line screens will likely not image Staccato20 screens at optimal quality for that head. This section lists the steps required to tune a thermal head to give optimal quality with Staccato20 and coarser screens.

The procedure will comprise running surface depth (`sd`) and, possibly, beam slope and curve series using plot pattern 33 (3x3 checkerboards) to approximate the Staccato20 image quality. (NOTE: If the 2x2 checkerboard pattern is available in the tMCE, then use it in place of the 3x3 checkerboard listed below in the procedure steps as this is really a better pattern to use but it may not be programmed into the firmware version on the machine at hand.)

The most critical adjustment for MatchPrint media is the `sd`. Just a few microns of difference is enough too cause noticeably poorer Staccato20 image quality on many heads. More than likely only the first step in the list below would be sufficient to get acceptable quality. The subsequent steps should be executed only if the quality is still not good enough after the first step.

Most colours with the probable exception of yellow will benefit from the tuning outlined here. Yellow usually shows good image quality without the need for tuning.

If the head that is being worked on has been setup for correct exposure and surface depth using the standard head setup procedure then proceed to step 1. Otherwise, setup any colours for `sd` and exposure with the standard procedure before continuing to step 1. Visual quality will be assessed for determining the setup.

1. Run an `sd` series using plot pattern 33 (3x3 checkerboards) in steps of 3 microns from 15 microns below the current `sd` setting to 15 microns above the current `sd` setting. Use the normal exposure setting for that particular colour and make the plot strips large enough so that image quality can be easily judged (eg. At least 25mm wide and 100mm high.) Select the strip with best image quality and set the corresponding `sd` value in the head for that colour. Repeat for all colours requiring tuning. After this step, run a Staccato20 image file to check the quality. Continue with the following steps only if the quality is unacceptable.

2. Run a beam slope series using plot pattern 33 from -10 to +10 in steps of two. Choose the strip with the best image quality and set the `med beamslope` parameter for that colour to the corresponding value. Remember to calibrate the stroke profile after setting the new slope parameter before continuing (`stroke cal`).

3. Run a beam curve series using plot pattern 33 from -10 to +10 in steps of two. Choose the strip with the best image quality and set the `med beamcurve` parameter for that colour to the corresponding value. Remember to calibrate the stroke profile after setting the new curve parameter before continuing (`stroke cal`).

4. Run another `sd` series using plot pattern 33 in steps of 2 microns from 10 microns below the `sd` value currently set (in step 1) to 10 microns above. Choose the strip that has the best image quality and set the corresponding `sd` value in the head for that colour.

After following the steps above the head should now be set near to the best Staccato quality achievable for that head. In the case of Black, image quality may not be great but it is known that this colour is problematic.