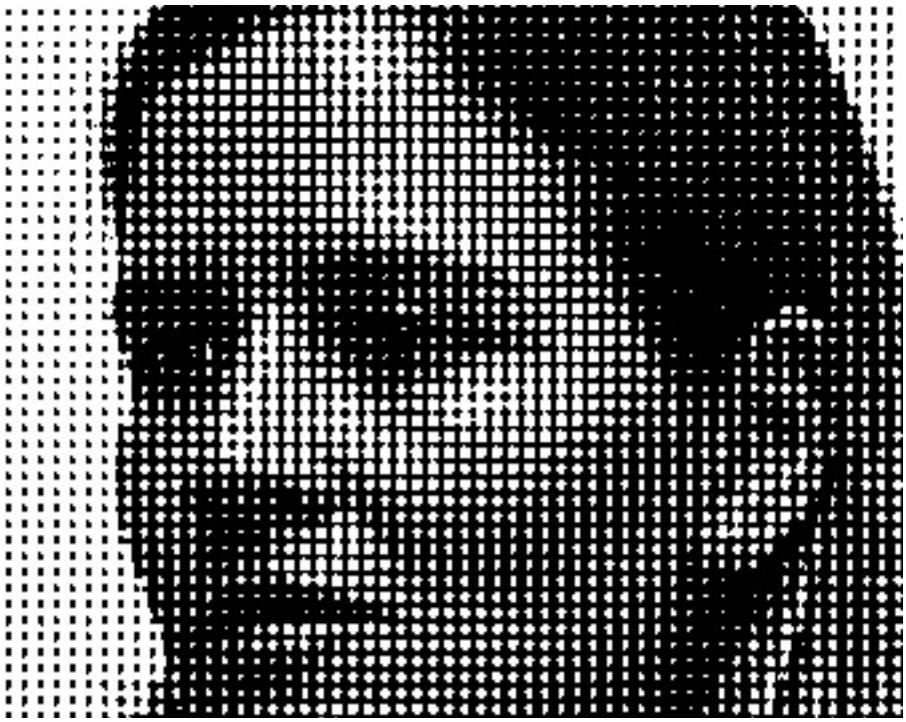
Gernot Hoffmann

Printer Test Patterns and Raster Tester



Best view: Zoom 200% / 72dpi (adjust in Acrobat)

Contents

1. Introduction

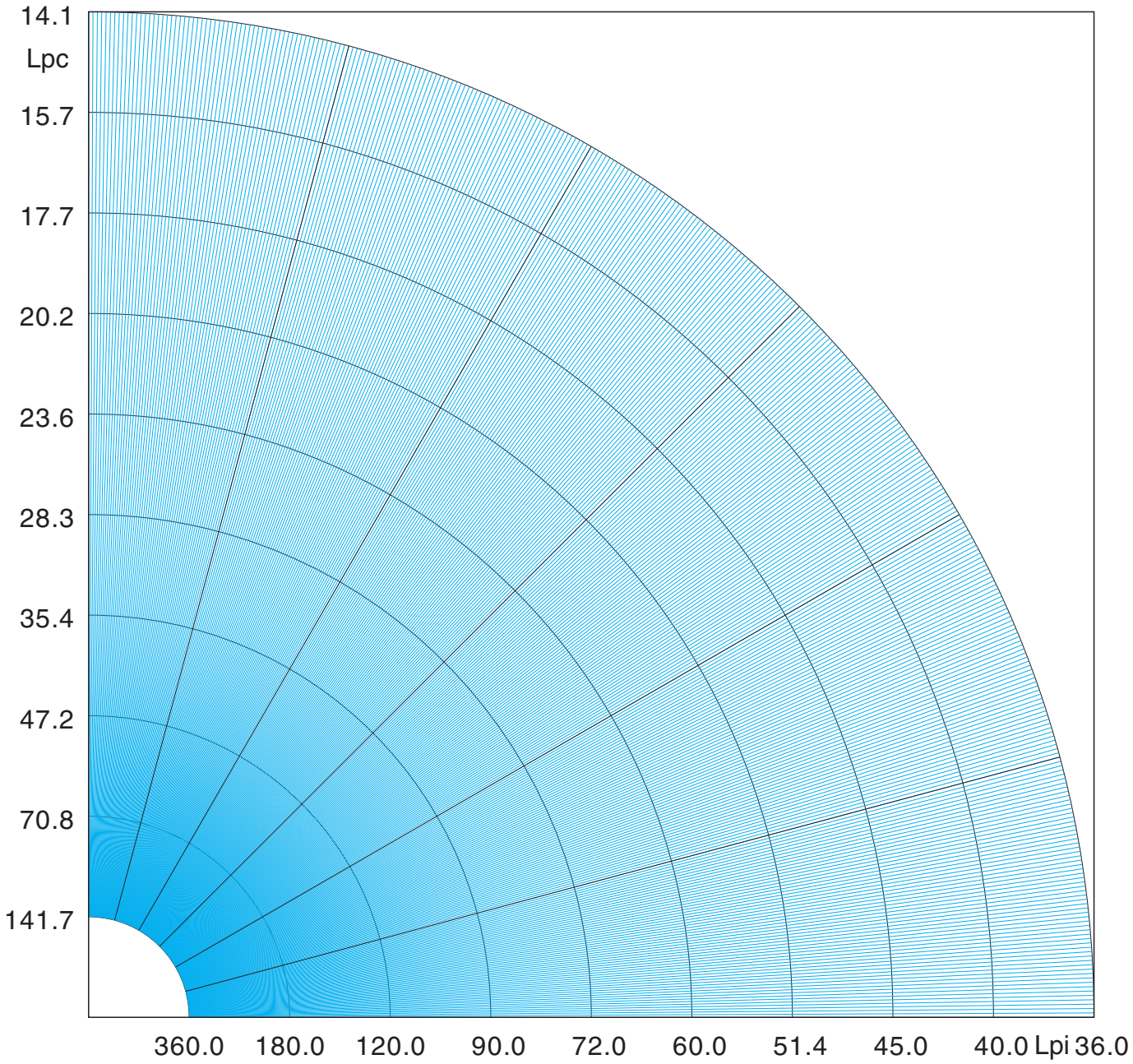
The printer test patterns are used to check the resolution and the accuracy of any printer.
Only PostScript printers will print C, M, Y and K accurately separated.

Print by Acrobat with settings ‘No color management’ and ‘Scalefactor 100%’.

Each pattern shows 360 radial lines in one quadrant. On the second circle at 180Lpi we have equal line and gap widths 0.070 mm for the standard patterns C, M, Y, K, CMY and CMYK. For CMYK each channel value is 80 instead of 100.
PostScript ‘zero line width’ can be used for a comparison. This mode prints as thin as posssible.

A ‘raster tester’ is a transparency, which shows on a printed image the raster width in Lpi and the screen angle in degrees. Elliptic Moiré patterns are here welcome: read the values in the respective center.
The raster tester (pages 11 and 12) can be printed by an imagesetter. The PDF was tested by imagesetter resolution 2800 dpi.

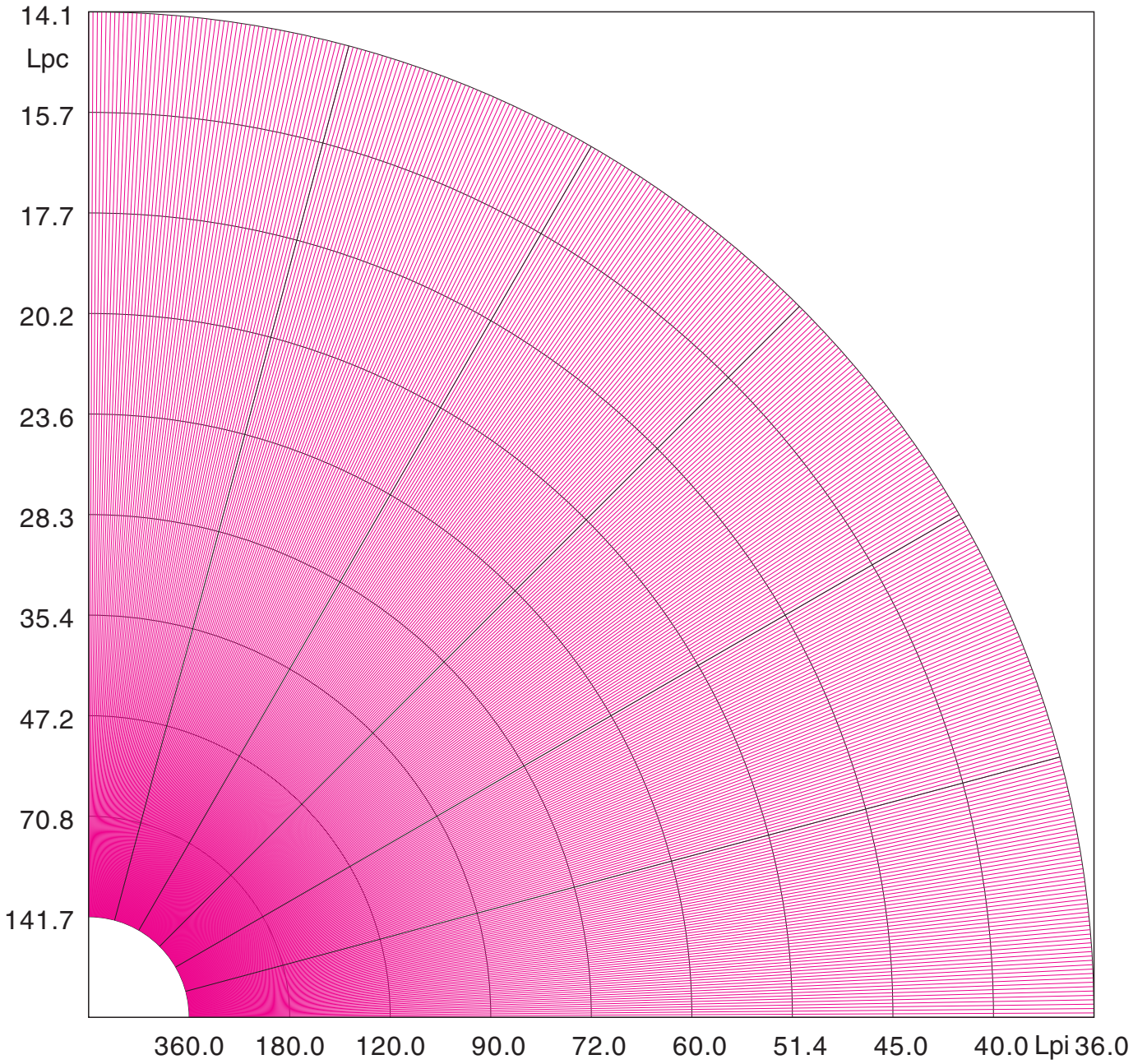
2. Printer Testpattern C



CMYK = 100/0/0/0

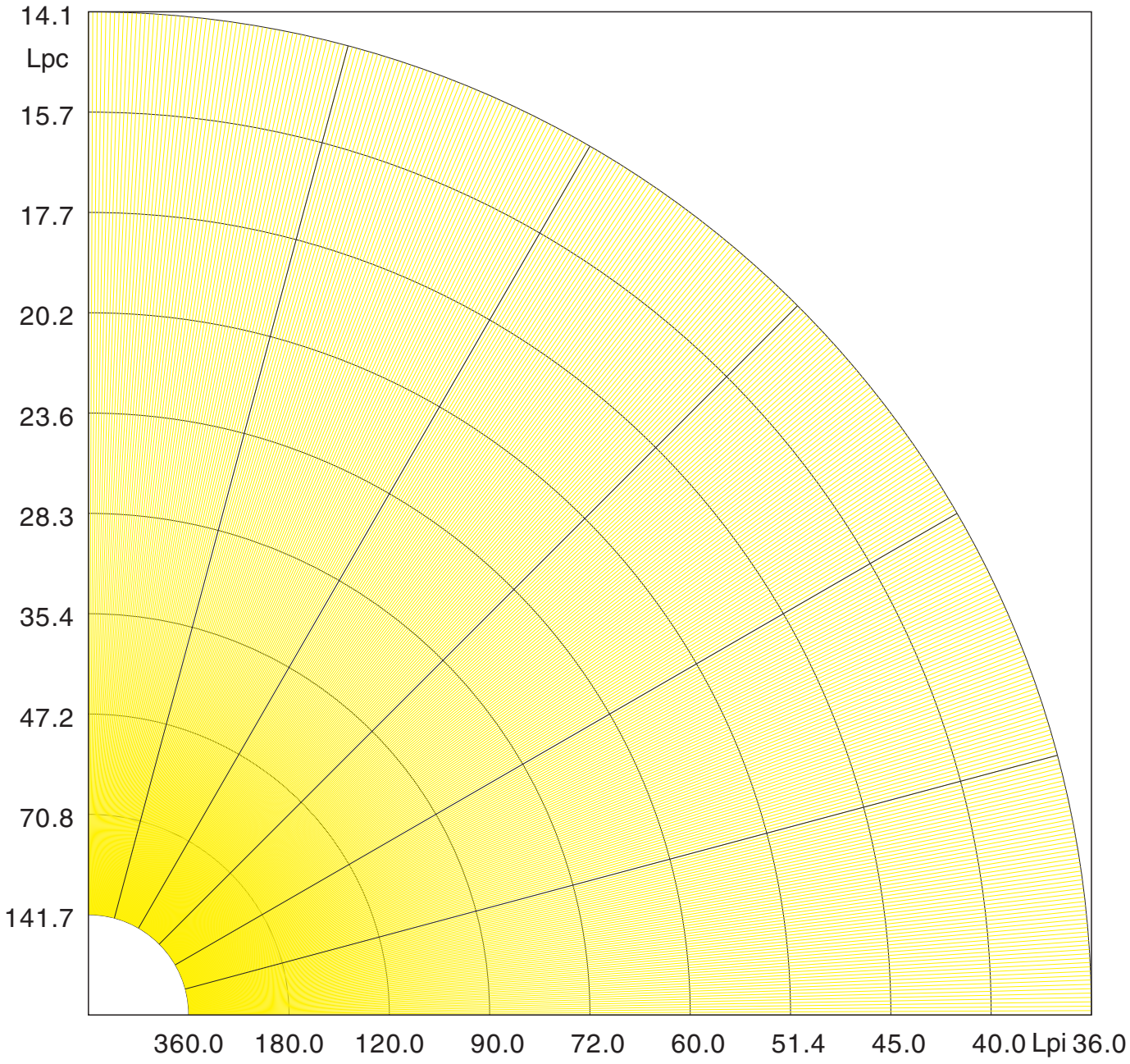
Box 161.70mm x 161.70mm for scale 100%
The length of the arc at 360.0 Lpi is one inch

3. Printer Testpattern M



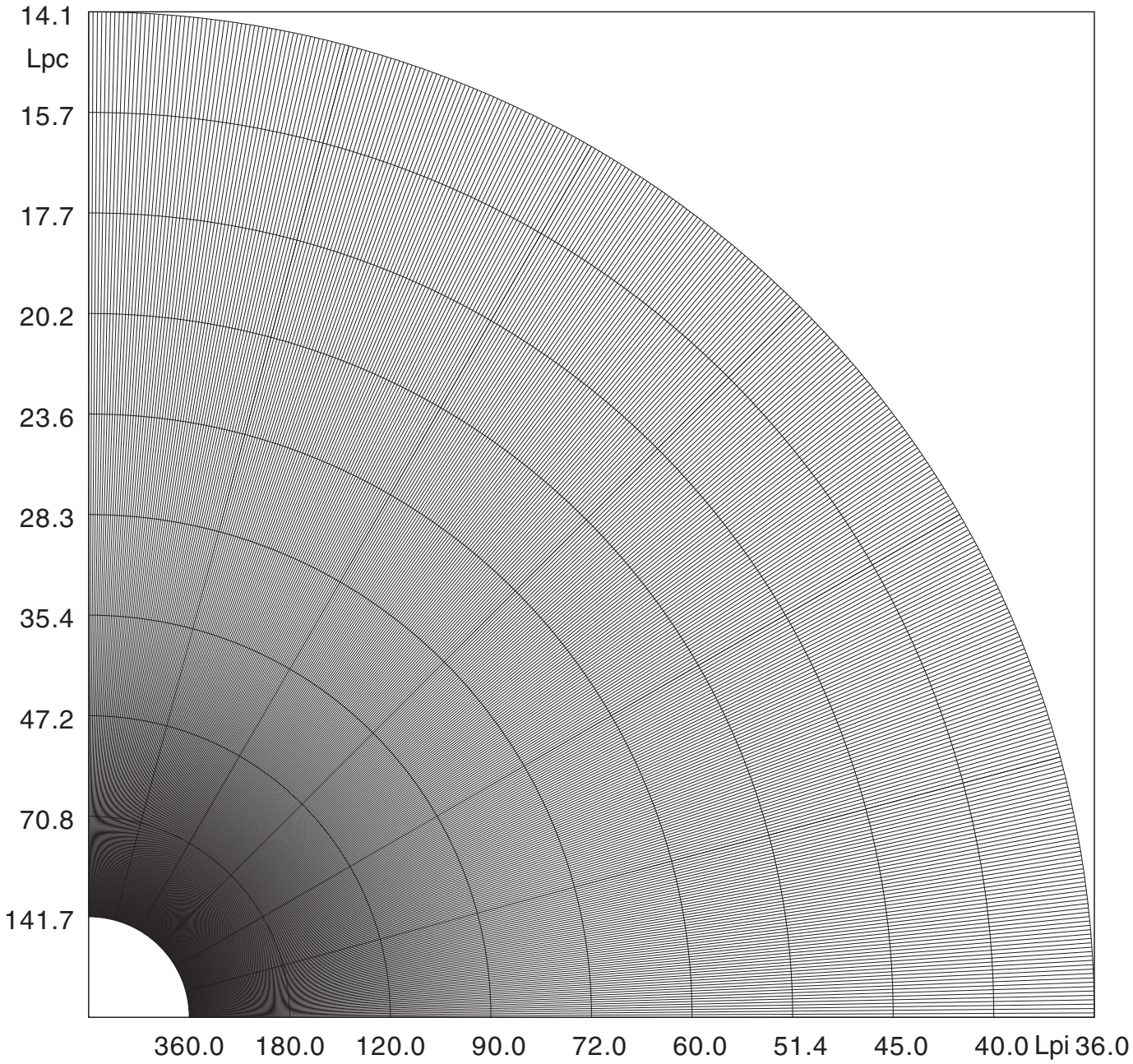
CMYK = 0/100/0/0

4. Printer Testpattern Y



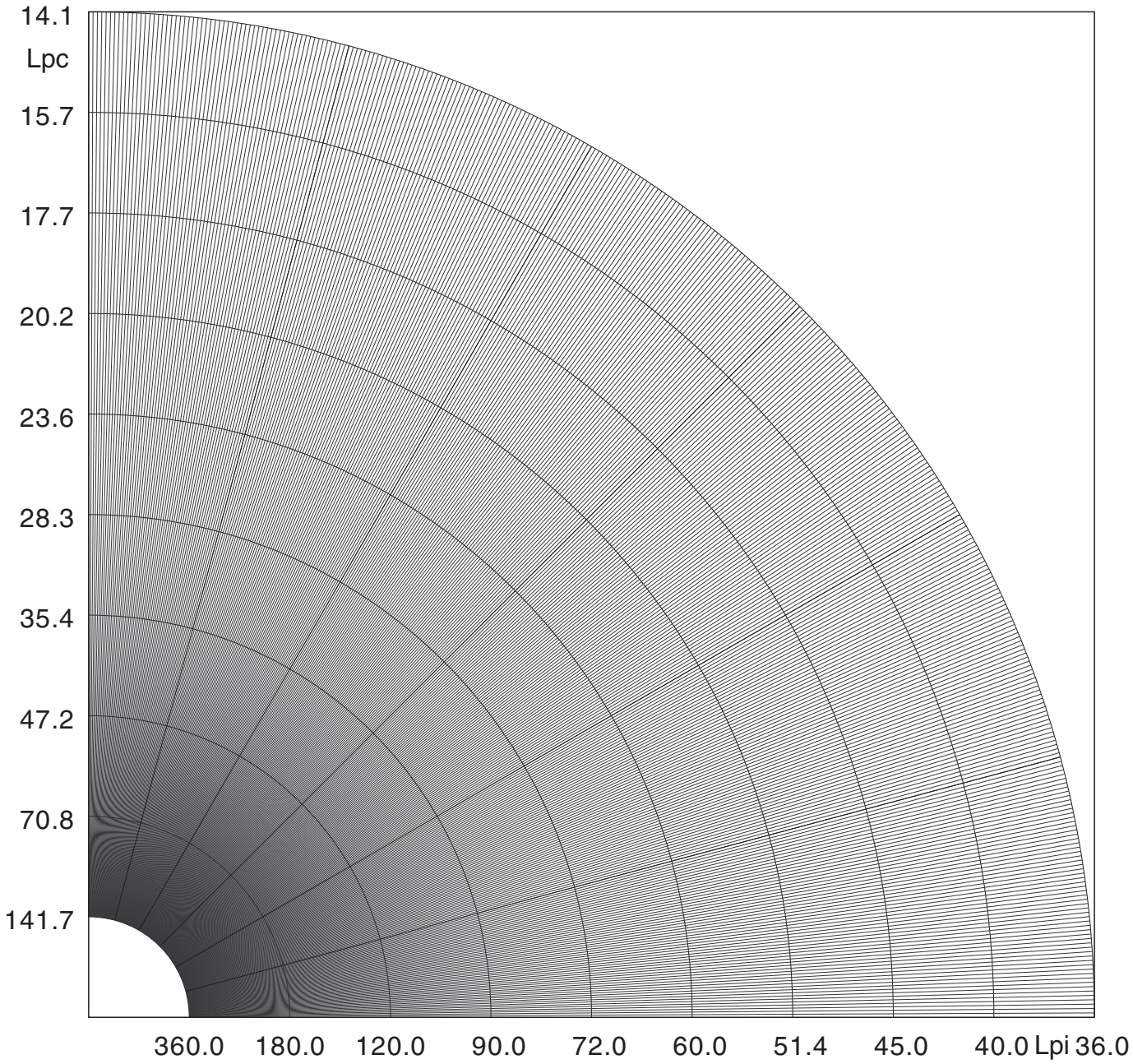
CMYK = 0/0/100/0

5. Printer Testpattern K



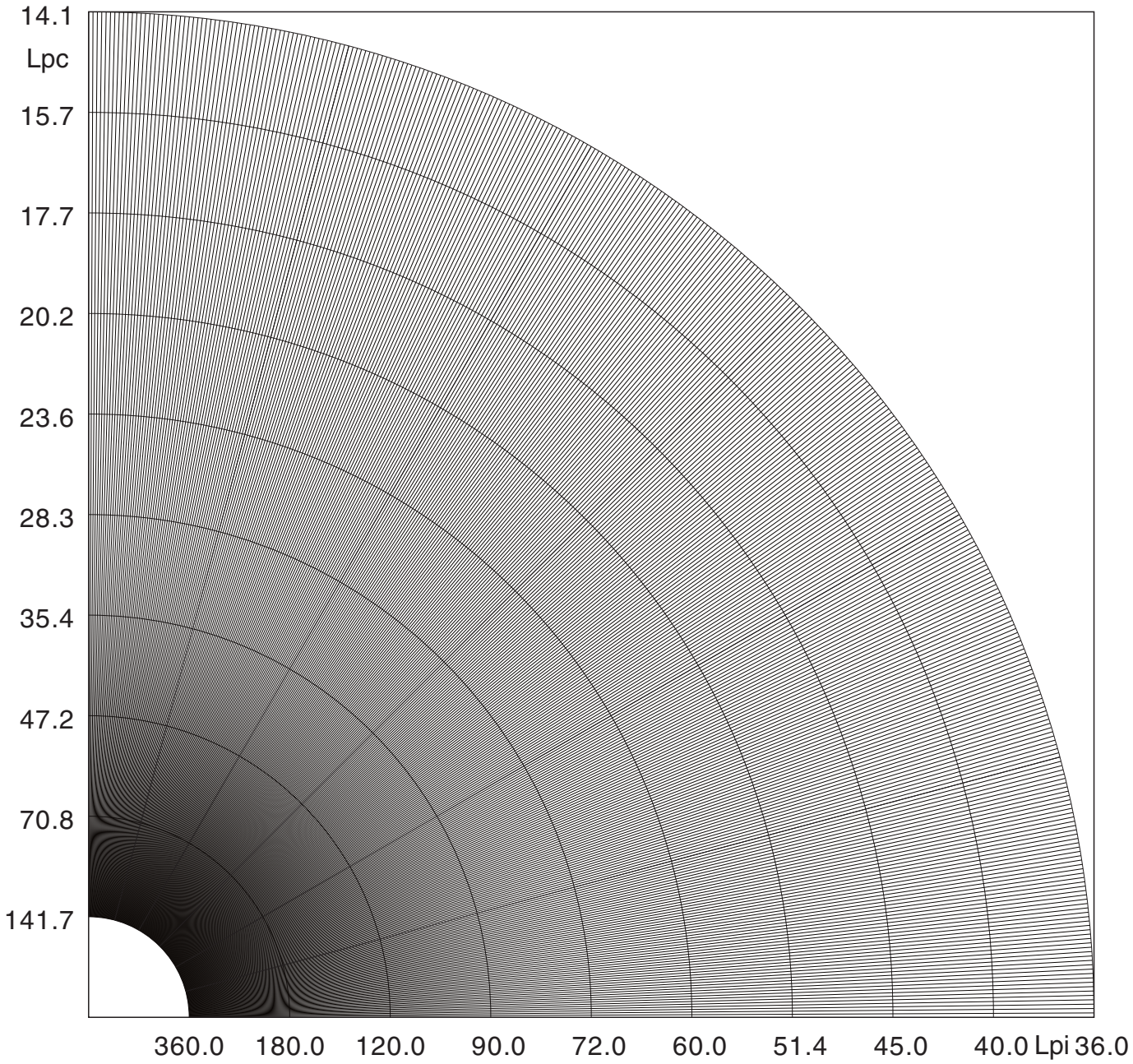
CMYK = 0/0/0/100

6. Printer Testpattern CMY



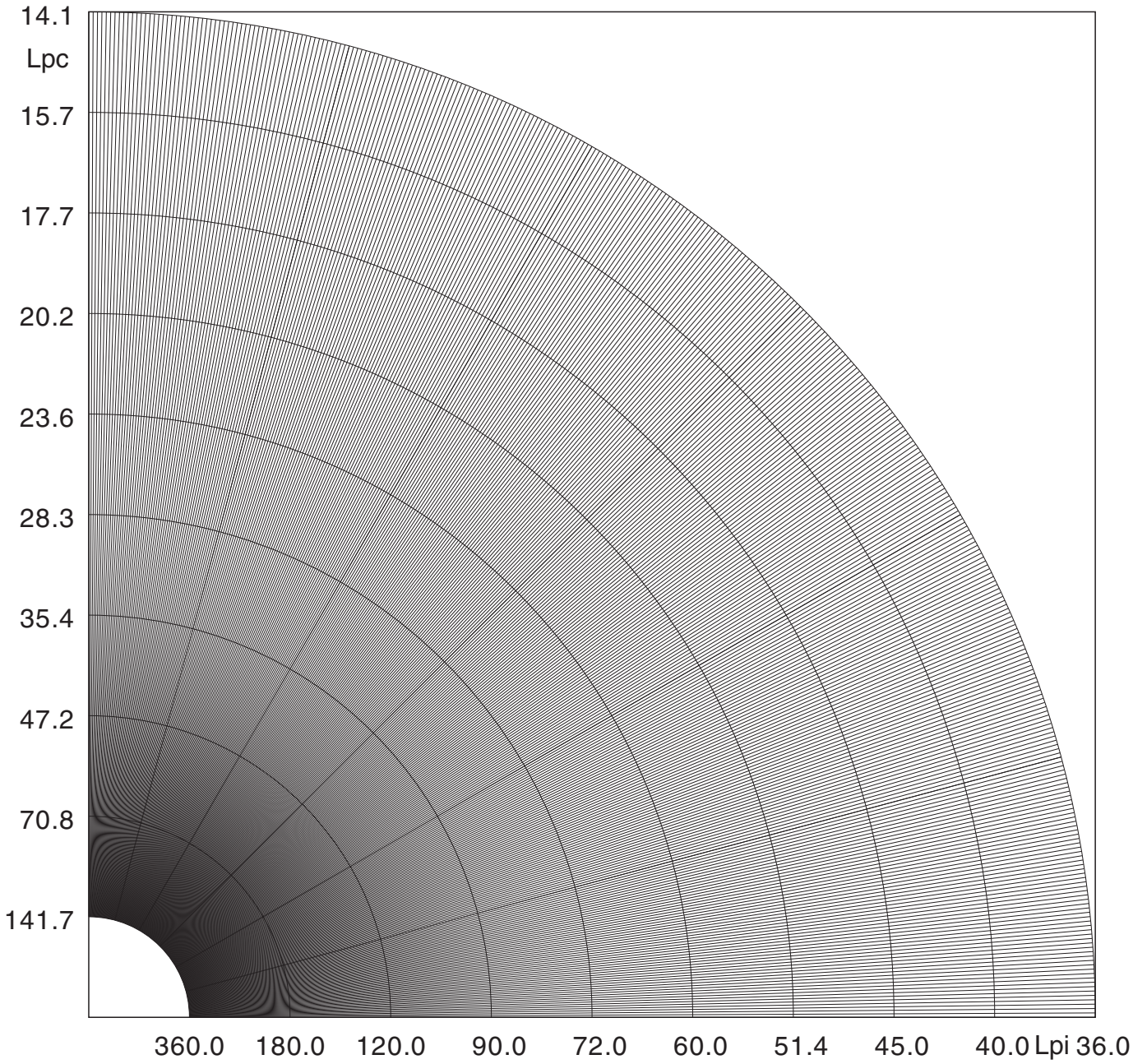
CMYK = 100/100/100/0

7. Printer Testpattern CMYK



CMYK = 80/80/80/80

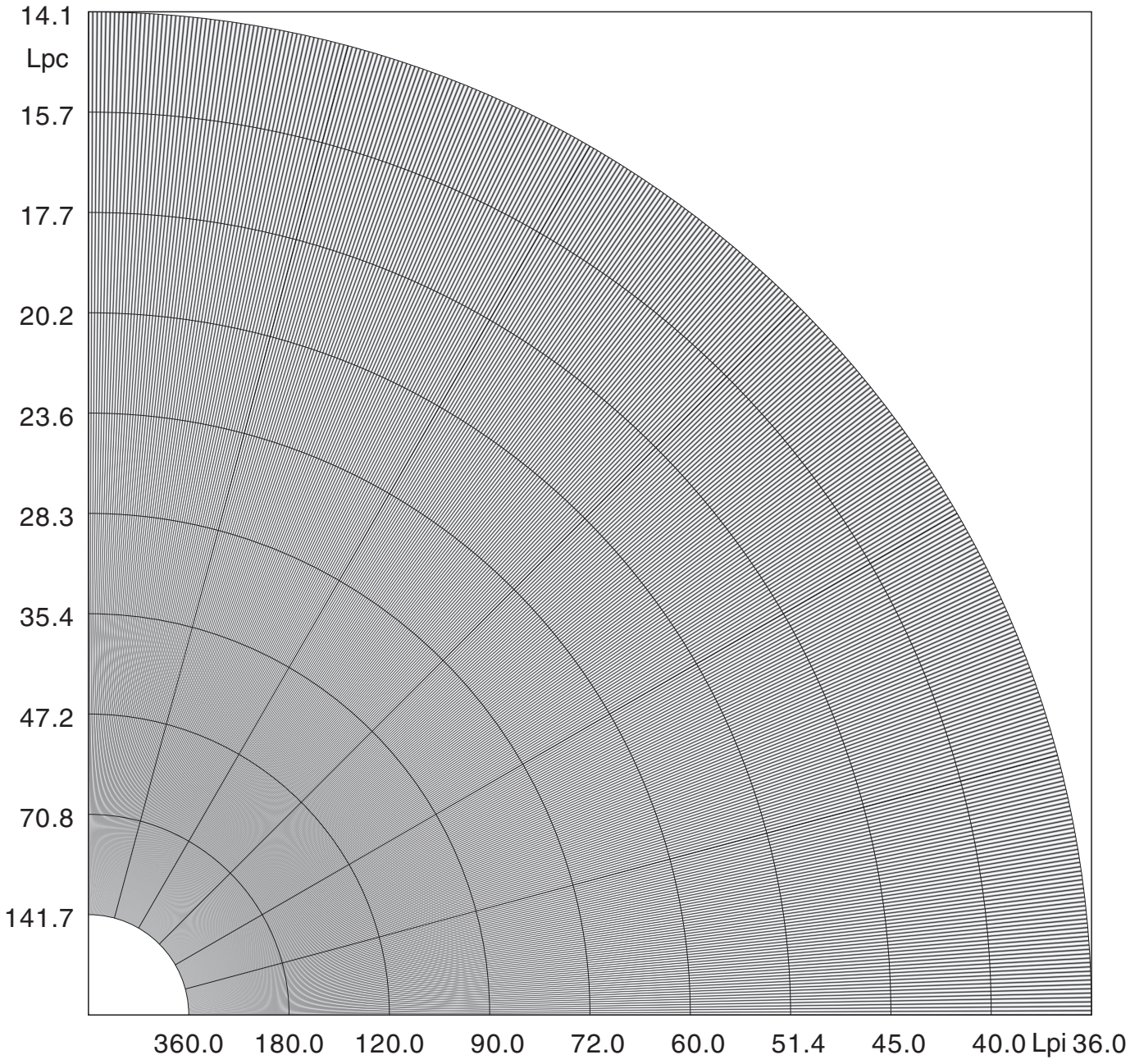
8. Printer Testpattern K / Zero Line Width



CMYK = 0/0/0/100

The radial lines are programmed with zero line width. PostScript interpreters assign the smallest printable width, but this is not well defined.

9. Printer Testpattern K / Modulation Transfer Function

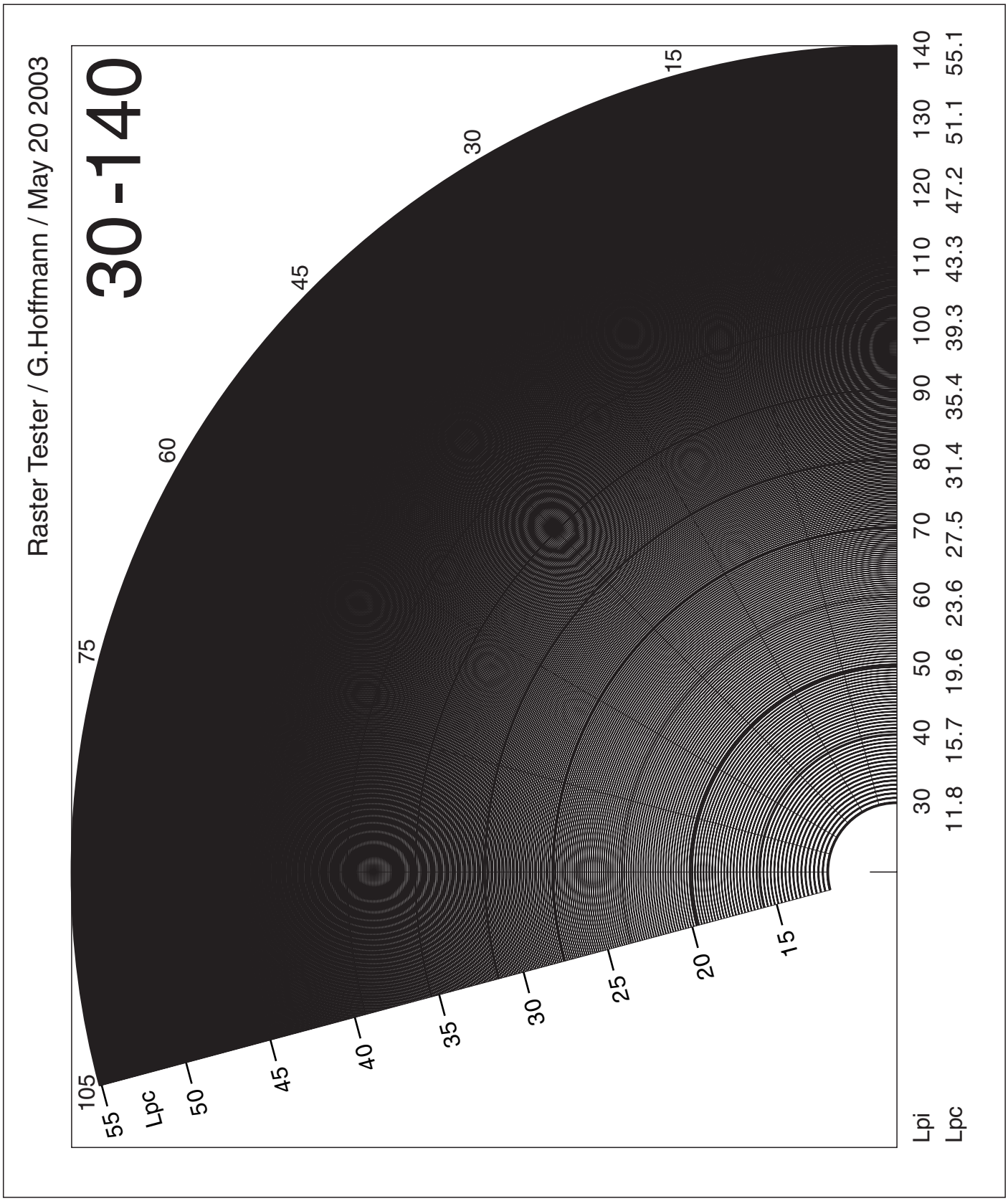


CMYK = 0/0/0/100

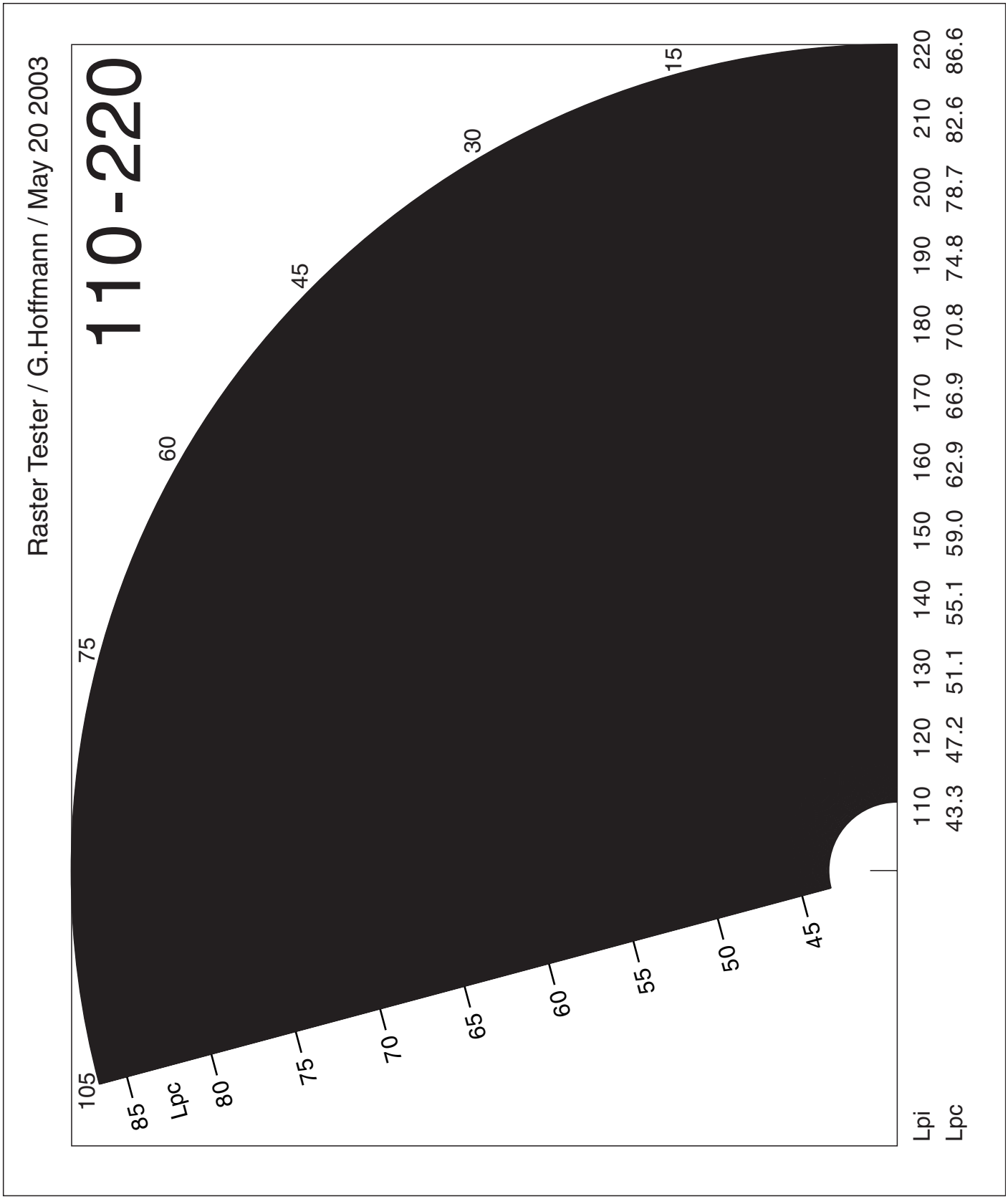
Each ray is in fact a sector with varying K. Each sector has the angle range ±0.125°.
For 0° to 90° we have 360 sectors. Ideally, the K value should vary according to the function K=0.5(cos(α)+1) where α is in the range -180° to +180° in each sector.
A sector contains this sequence for K: 0, 10, 30, 60, 100, 60, 30, 10, 0 , somewhat tweaked for dot gain.

This test does not work as well as expected for toner printers - some Moiré effects.

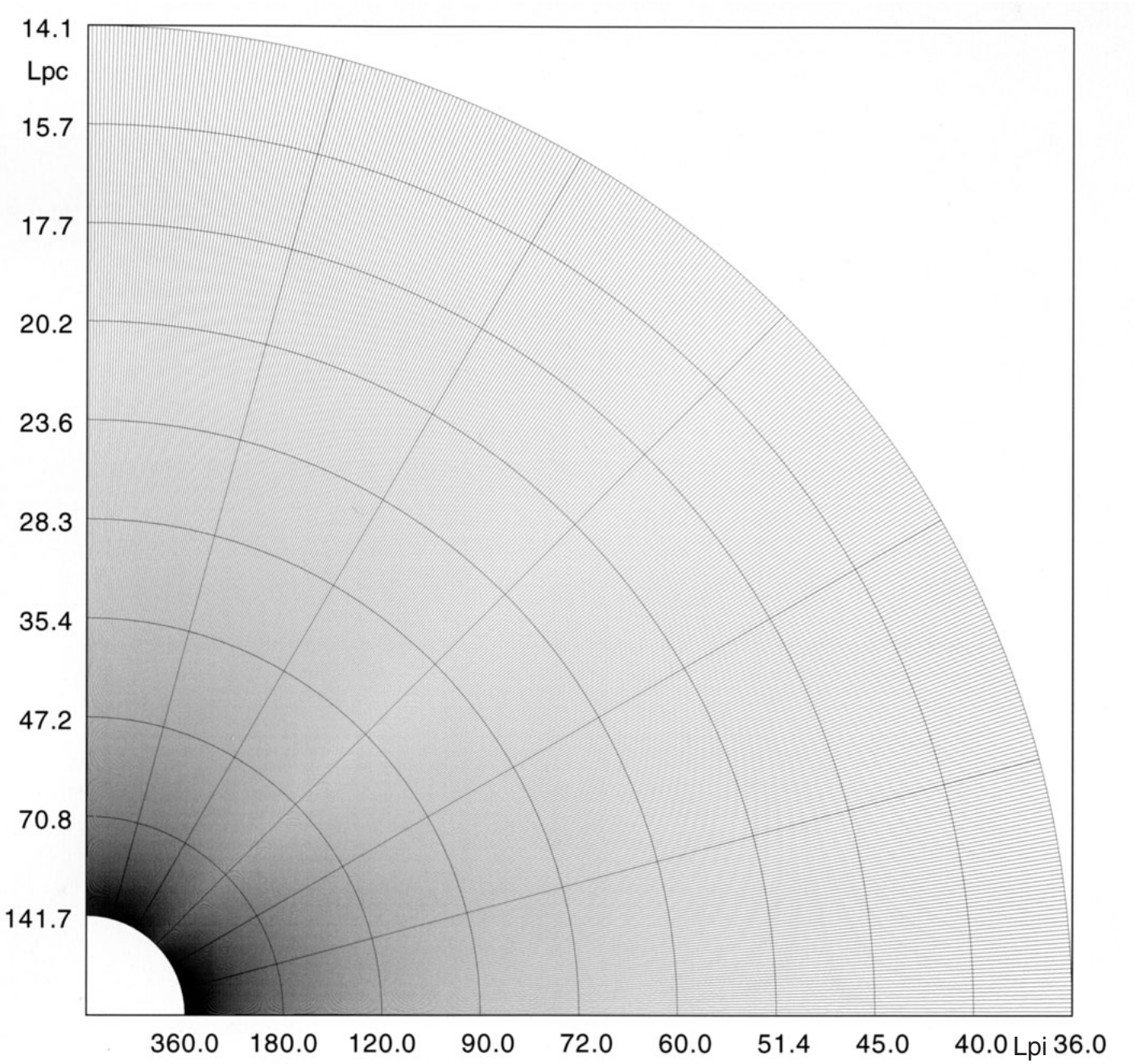
10. Raster Tester 30-140 Lpi



11. Raster Tester 110-220 Lpi



12. Printer Testpattern K / Zero Line Width / OKI 9600



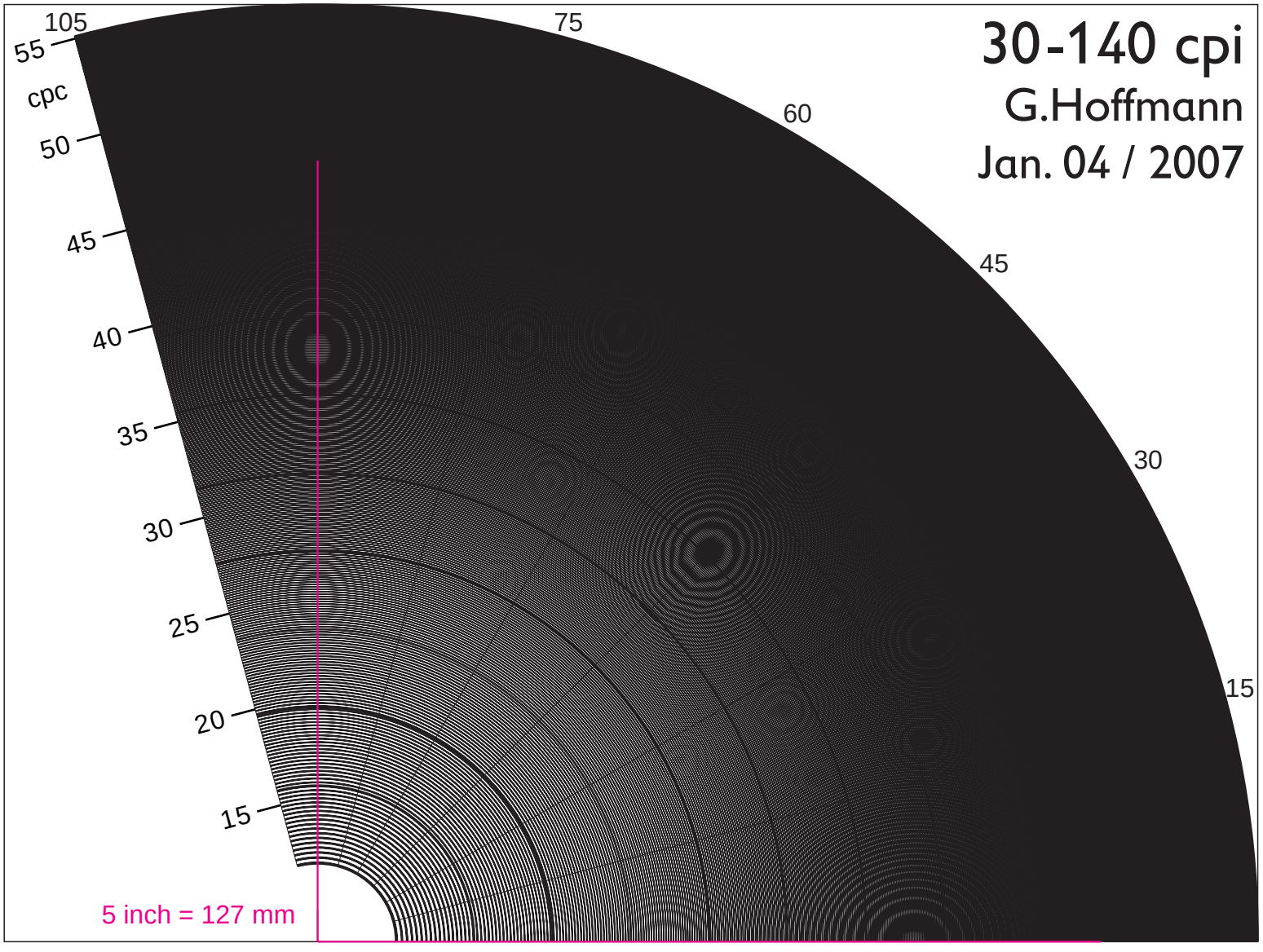
The Zero Line Width graphic was toner printed by 1200x1200 dpi / 121 Lpi / 45°. The print was scanned with 1200 dpi, blurred and downsampled for 144dpi (optimal for PDF zoom 200% at 72 dpi resolution).
The only interesting effects would be Moiré artefacts. There are almost none.

Please use Zoom 200% and Resolution 72dpi instead of 96dpi in Acrobat

13.1 Camera Test Image / 30-140 Cycles per Inch

The diagram (lower part of this page) can be printed by an inkjet on roll paper, enlarged by factor 4. Any scale factor is possible, because it is a vector graphic.
Factor 4 guarantees for a 720dpi inkjet that no Moiré appears.
The diagram shows cycles per inch (cpi) and cycles per centimeter (cpc). A cycle consists of a line and a gap.

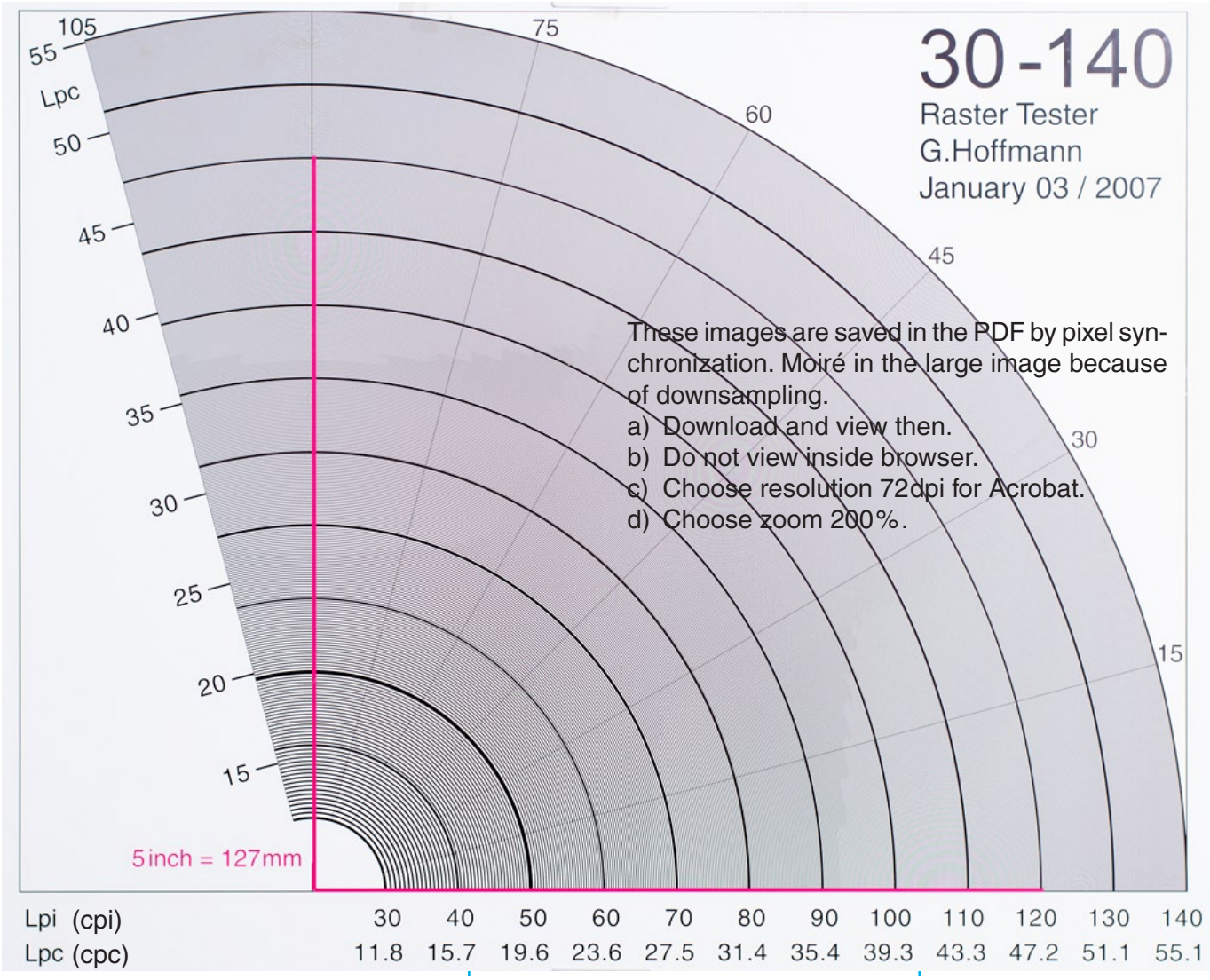
Printed width 4 x 210 mm = 840 mm.
Printed height 4 x 170 mm = 680 mm.



cpi	30	40	50	60	70	80	90	100	110	120	130	140
cpc	11.8	15.7	19.6	23.6	27.5	31.4	35.4	39.3	43.3	47.2	51.1	55.1

13.2 Camera Test Image / Measuring Resolution

Measure in the photo by Photoshop the width of the horizontal magenta line, using the Measure Tool and Info; here we have w= 2145 pixels. This represents in the original unscaled image 5 inches. One inch consumes 2145 px / 5 = 431 px.
Assumed we read (somewhat arbitrarily) the resolution threshold at 120 cpi, then we find R = 120 cpi / 431 px = 0.278 cycles / px or 3.59 px / cycle. Of course one cannot have more than 0.5 cycles / px. The resolution is further limited by an anti-aliasing filter.
Camera Nikon D5100, 50mm lens, two flashes. Application of contrast and sharpening. The small image shows a part of the photo without downsampling.



14. References

[1] Henry R. Kang
Digital Color Halftoning
SPIE Optical Engineering Press 1999

This doc:
http://docs-hoffmann.de/raster16052003.pdf

Gernot Hoffmann
May 16 / 2003 – July 08 / 2015
Website
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