14 PCL Rectangular Area Fill Graphics

Introduction

The PCL language includes commands for filling or shading rectangular areas on the page with pre-defined patterns, and allows creation and use of user-defined patterns. Pre-defined patterns include eight shading patterns and six cross-hatch patterns.

Note

User-defined patterns are not supported on all LaserJet family printers. Refer to the “PCL Feature Support Matrix” in the *PCL 5 Comparison Guide*.

The first step in filling an area, if using a user-defined pattern, is to download the pattern (see Chapter 13). Next, position the cursor (using cursor move commands) and specify the dimension of the area (using the horizontal and vertical rectangle size commands). The cursor identifies the upper left corner of the rectangular fill area. Once the rectangle size and position are identified, select the specific pattern (**shading level** (Figure 14-1), **cross-hatch pattern** (Figure 14-2), or **user-defined pattern**), to be used for filling the rectangular area. Finally the command is issued to fill the defined rectangular area. Once a user-defined pattern has been downloaded, the fill procedure can be repeated as often as required.

Rectangular Area Fill Procedure

1 *For user-defined patterns:* if you have not done so already, download the binary pattern data (User-Defined Pattern Command - $^{E}_{C}$***c#W** - Chapter 13).

2 Position the cursor (choice of various cursor commands - Chapter 6).

3 Specify width of rectangle (Horizontal Rectangle Size Command - Decipoints=$^{E}_{C}$***c#H**, or PCL Units=$^{E}_{C}$***c#A**).

4 Specify height of rectangle (Vertical Rectangle Size Command - Decipoints=$^{E}_{C}$***c#V**, or PCL Units=$^{E}_{C}$***c#B**).

5 Select specific shade, cross-hatch, or user-defined pattern (Pattern ID Command - $^{E}_{C}$***c#G** - Chapter 13)[1].

6 Fill rectangular area with pattern (Fill Rectangular Area Command - $^{E}_{C}$**c#P**).[1] This ends the procedure and prints the patterned area.

Note An area's width extends in the positive X-direction of the PCL coordinate system, and the height extends in the positive Y-direction.

The Pattern Transparency Mode controls how a pattern fills a rectangular area. Pattern Transparency Mode determines what effect transparent or opaque) the white pixels of the pattern have on the rectangular area (refer to "Pattern Transparency Mode Command" in Chapter 13).

1. White (1), black (0) or current (5) pattern also can be specified using this command.

Horizontal Rectangle Size (Decipoints) Command

This Horizontal Rectangle Size command specifies the rectangle width in decipoints.

$^{E}_{C}$ * c # H

=Number of decipoints (1/720 inch)

Default = 0
Range = 0 - 32767 (valid to 4 decimal places)

The printer converts the specified width to printer dots by rounding up to an integral number of dots. For example, 5 decipoints, which corresponds to 2.08 dots in 300 dpi mode, is converted to 3 dots.

Horizontal Rectangle Size (PCL Units) Command

This Horizontal Rectangle Size command specifies the rectangle width in PCL Units.

$^{E}_{C}$ * c # A

=Number of PCL Units

Default = 0
Range = 0 - 32767

For example, if the unit of measure is set to 300 units-per-inch, to specify a two-inch wide rectangle, send the command: $^{E}_{C}$***c600A**

The same command specifies a one-inch wide rectangle if the unit of measure is set to 600 units-per-inch.

Note The number of units-per-inch used in PCL dot moves is determined by the current setting of the **Unit of Measure** command (see “Unit of Measure Command” in Chapter 4).

Vertical Rectangle Size (Decipoints) Command

This Vertical Rectangle Size command specifies the rectangle height in decipoints.

$^{E}_{C}$ * c # V

=Number of decipoints (1/720 inch)

Default = 0
Range = 0 - 32767 valid to 4 decimal places

The printer converts the specified width to printer dots by rounding up to an integral number of dots. For example, 5 decipoints, which corresponds to 2.08 dots in 300 dpi mode, is converted to 3 dots.

Vertical Rectangle Size (PCL Units) Command

This Vertical Rectangle Size command specifies the rectangle height in PCL Units.

$^{E}_{C}$ * c # B</BLD

=Number of PCL Units

Default = 0
Range = 0 - 32767

For example, if the unit of measure is set to 300 units-per-inch, to specify a two-inch high rectangle, send the command: $^{E}_{C}$***c600A**

The same command specifies a one-inch high rectangle if the unit of measure is set to 600 units-per-inch.

Note The number of units-per-inch used in PCL dot moves is determined by the current setting of the **Unit of Measure** command (see “Unit of Measure Command” in Chapter 4).

Pattern ID (Area Fill ID) Command

The Pattern ID command (formerly called Area Fill ID) identifies the specific shading, cross-hatch, or user-defined pattern (see Figure 14-2) to be used when filling a rectangular area.

$$E_C * c \# G$$

Table 14-1

Selecting Shaded Patterns		**Selecting Cross-Hatch patterns:**	
# =	1 thru 2 = 1- 2% shade	# =	1 - Pattern #1
	3 thru 10 = 3-10% shade		2 - Pattern #2
	11 thru 20 = 11-20% shade		3 - Pattern #3
	21 thru 35 = 21-35% shade		4 - Pattern #4
	36 thru 55 = 36-55% shade		5 - Pattern #5
	56 thru 80 = 56-80% shade		6 - Pattern #6
	81 thru 99 = 81-99% shade		
	100 = 100% shade		
Selecting User-Defined patterns:[1]			
# = ID number of user-defined pattern			

1. Not supported on all LaserJet family printers. Refer to the “PCL Feature Support Matrix” in Chapter 1 of the *PCL 5 Comparison Guide* for specifics.

Default = 0 (no pattern)
Range = 0 - 32767 (values outside the range are ignored)

The value field (#) identifies the level of shading, the cross-hatch pattern, or the user-defined pattern.

There are eight HP defined shading patterns defined within the PCL language. To specify one of the eight shading patterns, use any value within the value field range for the desired shade. For example, to select the 56-80% shade (shown in Figure 14-1) use a value of 56, or 80, or any value in between such as 73.

There are six HP defined cross-hatch patterns. To specify a cross-hatch pattern type, use a value between 1 and 6 to select a pattern as shown in Figure 14-2.

For user-defined patterns, this command, sent prior to downloading a user-defined pattern, assigns an ID pattern number to the downloaded pattern. (For more information, see “User-defined Pattern Graphics,” in Chapter 13.)

Note This command works in conjunction with the Fill Rectangular Area Command (described next in this section) and the Select Current Pattern Command (described in Chapter 13).

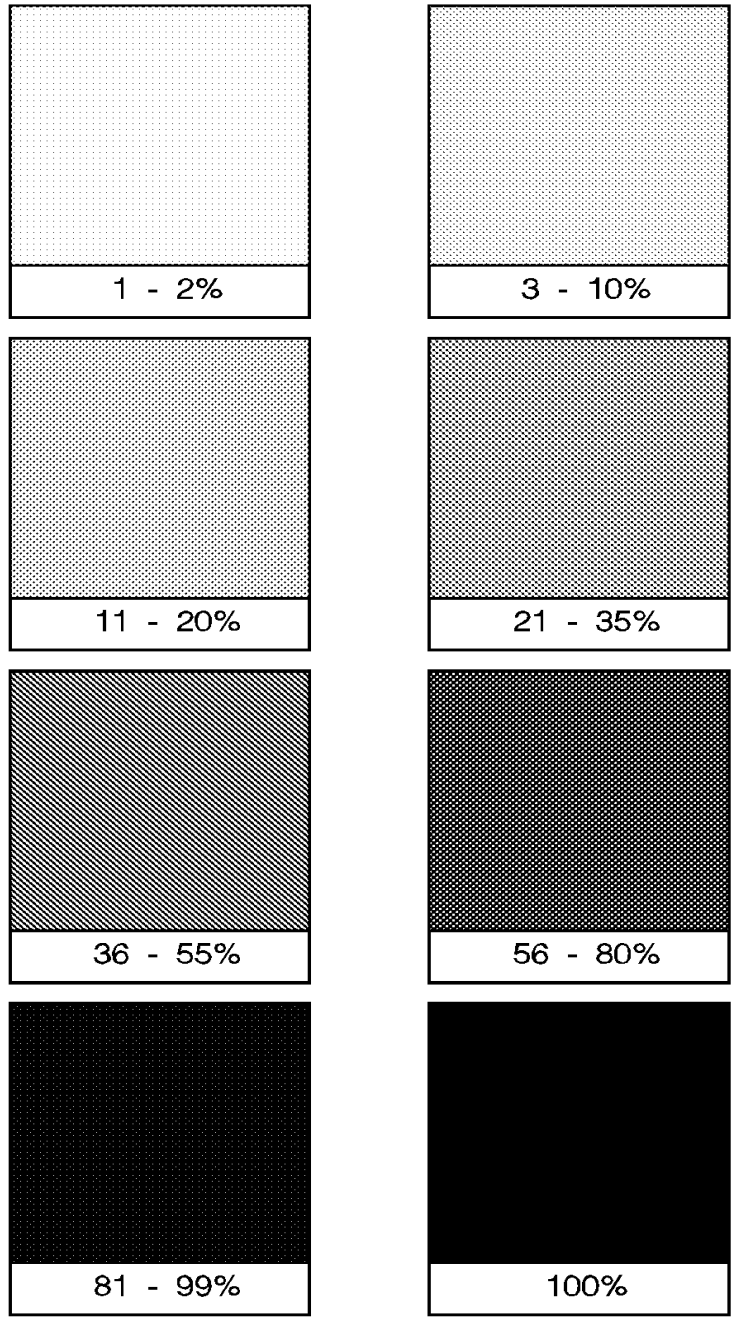

Figure 14-1 Shading Patterns

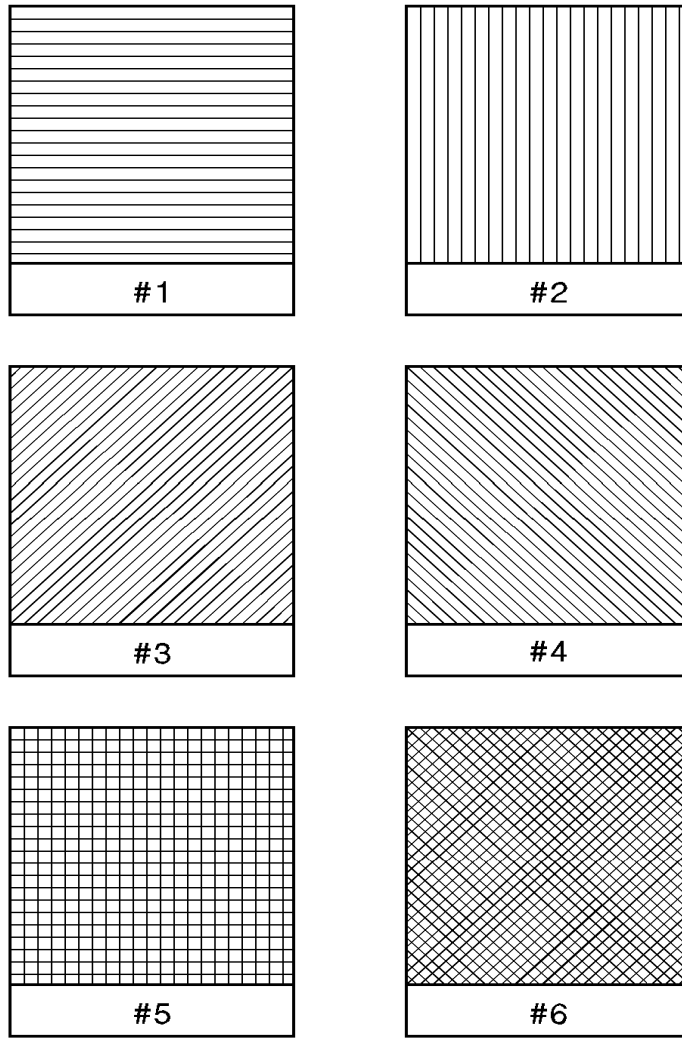

Figure 14-2 Cross-hatch Patterns

Fill Rectangular Area Command

This command fills (prints) a rectangular area of the specified width and height with the specified area fill.

$^{E}_{C}$ * c # P

=0 - Black fill (rule)
1 - Erase (white) fill
2 - Shaded fill
3 - Cross-hatch fill
4 - User-defined pattern fill
5 - Current pattern fill

Default = 0
Range = 0 - 5 (values outside the range are ignored)

Black fill — fills the rectangular area with black fill.
White fill — erases any fill in the rectangular area (it fills the rectangular area with white fill).
Shaded fill — fills the rectangular area with one of the eight shading patterns as specified by the Pattern ID command.
Cross-Hatch fill — fills the rectangular area with one of the six cross-hatched patterns as specified by the Pattern ID command.
User-defined fill — fills the rectangular area with custom pattern data as specified by the Pattern ID command and downloaded by the User-Defined Pattern command.
Current Pattern — fills the rectangular area with the current pattern.

Notes

The order in which data (patterns/rules, text, raster) is received is the order in which it is processed during the rasterization of the page.

The current pattern is not applied to a rectangular area unless specified by this command.

The fill or pattern used as the current pattern is selected using the Select Current Pattern ($^{E}_{C}$*v#T) command. For a detailed description of the Select Current Pattern command refer to Chapter 13, *The PCL Print Model.*

Black fill (value field 0), also known as black rule, and the white fill (value field of 1) “patterns” do not have a choice of different patterns, and thus do not require a pattern specification using the Pattern ID command.

The upper left corner of the rectangular area is located at the cursor position when printing a rectangular area. After printing the rectangular area the cursor is returned to the upper left corner; the cursor position does not change positions as a result of printing a rectangular area.

Rectangular areas are independent of the text area and perforation skip mode; these boundaries are ignored (rectangles are not clipped at these boundaries). Addressable rectangular areas are limited to the logical page. Rectangular areas that extend outside the logical page are clipped at the logical page boundaries (refer to Figures 2-3 and 2-4 for logical page and printable area boundary specifications).

Transparency mode, described in Chapter 13, controls how the area fill pattern is applied to the page. Refer to the following section for a description of how transparency mode affects the rectangular fill area.

A white fill “erases” any data placed within the rectangular area prior to receipt of the white fill, regardless of the transparency mode settings. Data placed in a previously erased area is visible.

Pattern Transparency for Rectangular Area Fill

Pattern transparency, described in Chapter 13, under “Pattern Transparency Mode Command,” affects how a pattern is applied to the rectangular fill area. Rectangular areas are special case images for transparency mode. The pattern and pattern type are selected by the Pattern ID command ($^{E}_{C}$*c#G) and the Fill Rectangular Area ($^{E}_{C}$*c#P) command (described earlier in this chapter).

Note

Source transparency has **no effect** on the rectangular fill area since the rectangular area is viewed as all 1’s (solid black) source image.

When applying a pattern (area fill) to the rectangular area, the usual transparency mode settings apply. The pattern transparency mode determines the effect white pixels of the pattern have on the destination for value fields 0 (black fill), 2 (shaded fill), 3 (cross-hatch fill), or 5 (current pattern fill) of the Fill Rectangular Area command.

The “0” bits of the area fill are either applied (opaque) or ignored (transparent) based on the transparency mode setting (see Figure 14-3). When a value field of 1 (white fill) is used, pattern transparency mode is **always treated as if it were opaque.**

The effect of transparency modes on rectangular areas is illustrated in Figure 14-3. In both examples, the source transparency mode is opaque regardless of the actual setting. In the first example, the pattern transparency mode is transparent; the white pixels in the pattern are not applied to the destination, so that the pattern is visible in only two quadrants of the destination. In the second example, the pattern transparency mode is opaque, and the pattern is visible in the entire rectangular area.

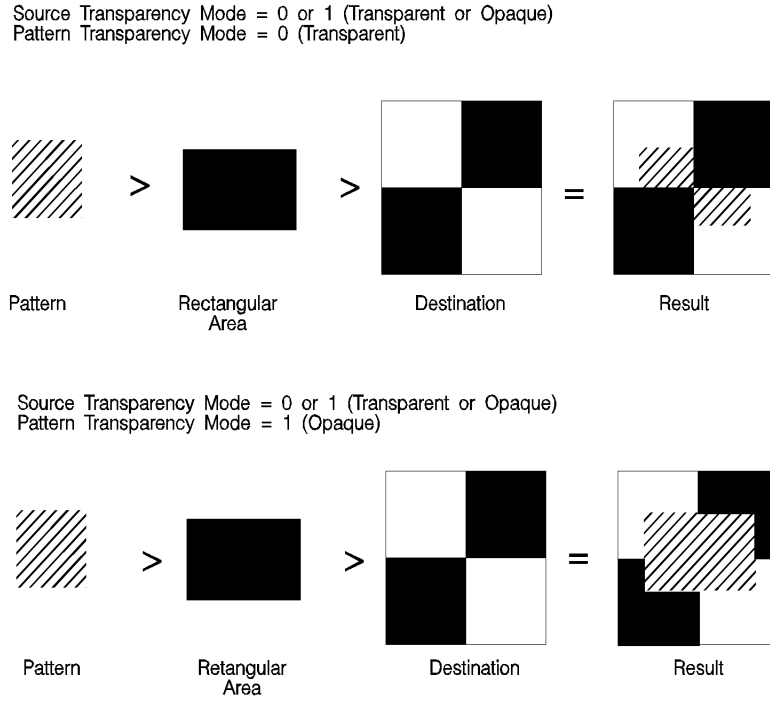

Figure 14-3 Effect of Transparency Modes on Rectangular Areas

Rectangular Area Fill Examples

This section shows example usage of area fill commands to print pre-defined patterns as well as user-defined patterns.

Pre-defined Pattern Examples

Solid Fill (Black/White)

To print a 900 by 1500 Unit black rule (3 inches by 5 inches at 300 units-per-inch), then white fill a small area inside the black rectangle, perform the following steps.

1 1. Position the cursor:

$^{E}_{C}$*p300x400Y

This moves the cursor to PCL Unit position (300, 400) within the PCL coordinate system.

2 2. Specify the width of the rule:

$^{E}_{C}$*c900A

This sets the rule width to 900 PCL Units (3 inches at 300 units-per-inch).

3 3. Specify the height of the rule:

$^{E}_{C}$*c1500B

This sets the rule height to 1500 PCL Units (5 inches at 300 units-per-inch).

4 4. Print the rule:

$^{E}_{C}$*c0P

This example prints a black filled rectangular area.

5 5. Position the cursor inside the rectangular area:

$^{E}_{C}$*p600x700Y

6 6. Specify the width and height for the smaller white fill rectangular area:

$^{E}_{C}$*c300a600B

7 7. Select the white fill and print.

$^{E}_{C}$*c1P

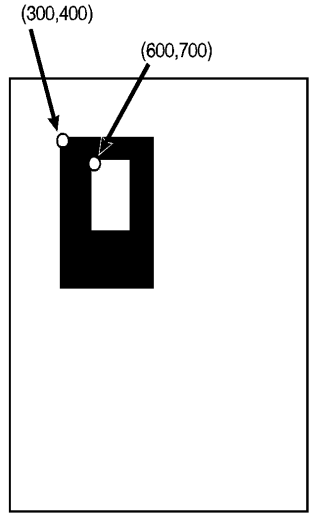

Figure 14-4 Solid Fill Example

Shaded Fill

To print a 900 by 1500 Unit 25% shaded rectangle (3 inches by 5 inches at 300 units-per-inch), perform the following steps.

1 Position the cursor:

$^{E}_{C}$*p300x400Y

This moves the cursor to PCL Unit position (300, 400) within the PCL coordinate system.

2 Specify the width of the rectangle:

$^{E}_{C}$*c900A

This sets the rectangle width to 900 PCL Units (3 Inches at 300 units-per-inch).

3 Specify the height of the rectangle:

$^{E}_{C}$*c1500B

This sets the rectangle to 1500 PCL Units (5 inches at 300 units-per-inch).

4 Specify the Pattern ID:

$^{E}_{C}$*c25G

This sets the Pattern ID to 25.

1 Print the rectangular shaded area:

$^{E}_{C}$*c2P

This example prints the following:

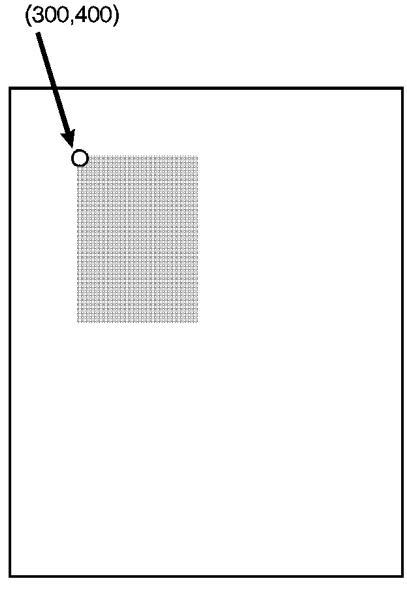

Figure 14-5 Shaded Fill Example

Cross-hatch Fill

To print a 900 by 1500 Unit rectangular area (3 inches by 5 inches at 300 units-per-inch), filled with a horizontal cross-hatch pattern, perform the following steps:

1. Position the cursor:

   $^{E}_{C}$*p300x400Y

Moves the cursor to PCL Unit position (300,400) within the PCL coordinate systems.

2. Specify the width of the rectangle:

   $^{E}_{C}$*c900A

Sets the rectangle width to 900 PCL Units (3 inches at 300 units-per-inch).

3. Specify the height of the rectangle:

   $^{E}_{C}$*c1500B

Sets the rectangle height to 1500 PCL Units (5 inches at 300 units-per-inch).

4. Specify the Pattern ID:

   $^{E}_{C}$*c1G

Sets the Pattern ID to 1.

5. Print the rectangular pattern-filled area:

   $^{E}_{C}$*c3P

This example prints the following:

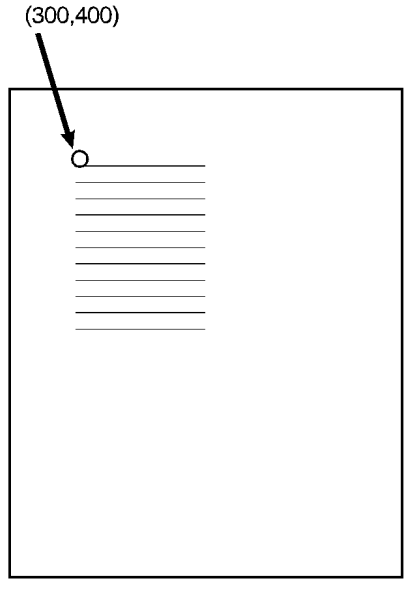

Figure 14-6 Patterned Fill Example

User-defined Pattern Example

This example shows how to print a user-defined pattern which has already been downloaded to the printer. For this example we will print the pattern of triangles which was downloaded in the example in Chapter 13, under “User-Defined Pattern Command.”

The following commands define a 600 PCL Unit square rectangular area, select ID number 3, and print the user-defined pattern associated with that ID number.

1 Position the cursor:

E_C*p300x400Y

Moves the cursor to PCL Unit position (300,400) within the PCL coordinate systems.

2 Specify the width and height of the rectangle:

E_C*c600a600B

Sets the rectangle width and height both to 600 PCL Units (2 x 2 inches at 300 Units/inch).

3 Specify the Pattern ID:

$^{E}_{C}$*c3G

Sets the Pattern ID to 3.

4 Print the user-defined pattern-filled area:

$^{E}_{C}$*c5P

This example prints as shown in Figure 14-7.

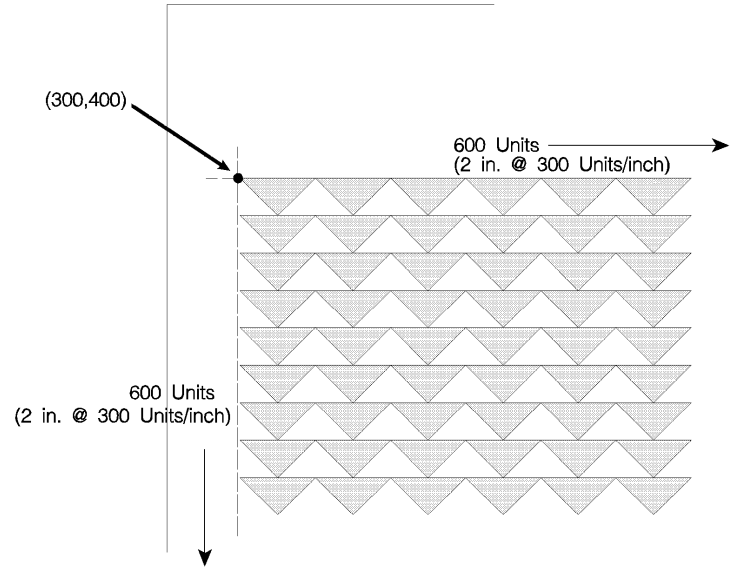

Figure 14-7 User-Defined Pattern Fill Example