

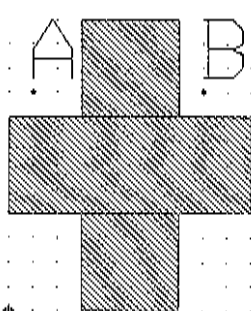
MICROELECTRÓNICA

Exercício 1 - Familiarização com o programa de layout LASI

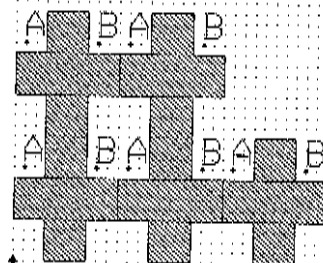
PROBLEMS

For the following problems, use the LASI setups given in Appendix A and in the C:\LASI5\CN20 directory for the CN20 process.

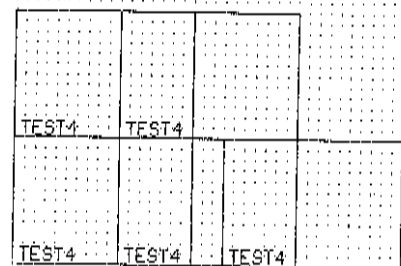
- 1.1 Create a cell called test3 with a rank of 1 using LASI. In this cell, draw a 10 μm by 10 μm box using the pol1 layer. Place the lower left corner of the box at the origin. Use the "z" (used to set the zero point) and the spacebar to measure the distance between opposite corners.
- 1.2 Explain how the **qMov** command can be used to edit the box in Problem 1 so that it measures 5 x 8 μm^2 . How would this be accomplished using **Get**, **Mov**, and **Put**?
- 1.3 What functions do the **sWin** and **rWin** commands perform?
- 1.4 What functions do the **cGet** and **cPut** commands perform?
- 1.5 The **Text** command allows text to be used for labeling in LASI. The **tLayr** selects which layer the text will be written in, while the **tSiz** sets the size of the text in 1.5 μm increments. Write the word "test" on the met1 layer with sizes of 3, 9, and 24 μm in the test3 cell of Problem 1. Show the result without using the reference mark. (The reference mark is removed by pressing **t** on the keyboard or by selecting the **T** in the top right corner of the drawing display, remembering to execute a **Draw** command afterward.) Labeling is extremely important in layout.
- 1.6 Create a cell named test4 with a rank of 1. Generate the layout shown in Fig. P1.6a in this cell. The text and boxes are written using the met1 layer. Next create a cell named test5 with a rank of 2. Add the test4 cell into the test5 cell five times as shown in Fig. P1.6b. The **cGet** and **Mov** commands may come in handy at this point. Next draw the cells as outlines, shown in Fig. P1.6c, using the **Outl** command. Note that we could have used the **Cpy** command to copy the layout in test4 five times and avoid adding the test5 cell. The problem with this is that as the layout becomes complicated the memory required in a "flat" cell increases dramatically. The hierarchical layout using the nested cells keeps memory usage to a minimum. The **Cpy** command should be used as little as possible.



(a)



(b)



(c)

Figure P1.6

- 1.7 Polygons or paths can be drawn using LASI by setting the **Obj** to "p" (instead of "b" for box). Setting the **Wdth** size to 0 causes LASI to draw polygons, while setting the width greater than 0 causes LASI to draw paths. When finished drawing a path or polygon, use the **aPut** command. Using LASI, copy the layout shown in Fig. P1.6a using the polygon object.
- 1.8 What part of an object made using the polygon or path must be encompassed to **Get** the object?
- 1.9 Using the **poll** layer, draw a triangle that measures nominally 10 μm on each side. How many vertices does the object have?
- 1.10 Circles can be drawn using a polygon (path with zero width) and the **Arc** command. Consider the layout shown in Fig. P1.10. Copy this layout in LASI. Begin by adding a vertex at point A using the **Add** command. This is followed by selecting the **Arc** command, moving and clicking the mouse in the desired center of the circle, and returning and clicking the mouse at point A. The

bottom of the display will then inquire how many segments should be used and which direction to draw, that is, counterclockwise or clockwise. Hit the Enter key to both of these questions, and LASI will draw the following circle.

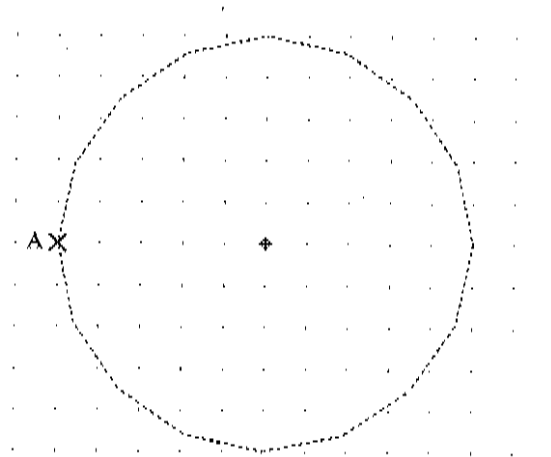


Figure P1.10

- 1.11 Pressing F1 on the keyboard within the LASI program calls the LASI help file. What would be added to the end of the **form.dbd** file in a drawing directory so that F2 performs the LASI command **Fit** and F3 performs an **aPut**? Frequently used commands can be executed using function keys to help speed up layout time.
- 1.12 Using the **Dpth** command, show how the cells in Fig. P1.6b can be drawn as outlines. What does the depth level mean? Show that, by pressing **i** on the keyboard (or top right corner of the drawing screen), the cells are also drawn as outlines.
- 1.13 What do the keyboard buttons **w**, **u**, **a**, **z**, and **space** do in LASI?
- 1.14 Describe how to add text in LASI and how to set the text size and layer.
- 1.15 Using LASI, show example layouts that show the difference between path objects and the poly objects. Use **poly1** in your examples. How do you **Get** a poly or path object?