

1DT301, Computer Technology I, autumn 2018.

Lab. 5: Display JHD202

Goal for this lab:

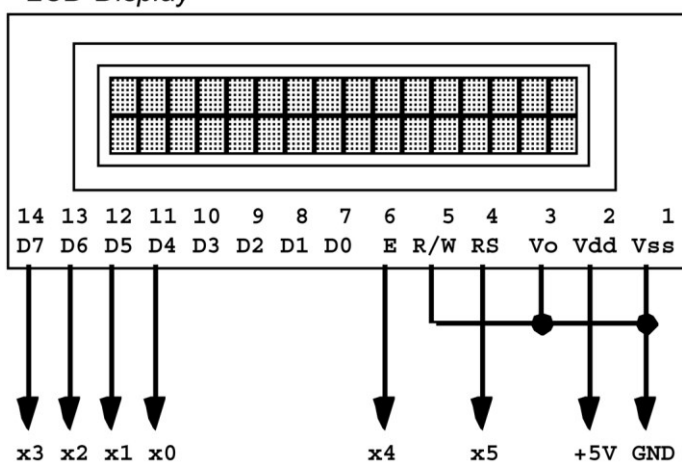
To read and understand the data sheet for the display unit JHD202, write a program that initiate the display and displays text that is coming from the serial port.

Presentation of results:

Present each task for the teacher when you have solved the task.

Use text in the program (comments) to explain the function. Each program should also have a head like the example in previous labs.

LCD-Display



Figur 8.1: LCD-displayen och dess anslutning mot datorkortet

Task 1: Write a program that displays a character on the display.

Write a program in Assembly that displays the character %. Look in the data sheet how to initiate the display. The data sheet you'll find on <https://www.student.vxu.se/>.

The display will be connected as in the figure above. 4-bit-mode should be used, since only RS, E, D7, D6, D5 and D4 are connected to I/O-pins on the STK600.

(The program *lab5_init_display.asm* gives you a good start...)

Task 2: Electronic bingo machine.

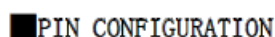
You should create an electronic bingo generator. The generator should create random numbers between 1 and 75. The numbers should be displayed on the display. Clear the display before a new value is displayed. Use interrupt and a pushbutton for the input.

Task 3: Serial communication and display.

Use program modules from lab 4 and write a program that receives a character on the serial port and displays each character on the display.

Task 4: Modify the program in task 3.

Modify the program in task 3 so that 4 lines of text can be displayed. Each textline should be displayed during 5 seconds, after that the text on line 1 should be moved to line 2 and so on. The text should be entered from the terminal program, PUTTY, via the serial port.



AC Characteristics Read Mode Timing Diagram

Mode	Characteristic	Symbol	Min.	Typ.	Max.	Unit
Write Mode (Refer to Fig-6)	E Cycle Time	t_c	500	-	-	ns
	E Rise / Fall Time	t_{R,t_F}	-	-	20	
	E Pulse Width (High, Low)	t_w	230	-	-	
	R/W and RS Setup Time	t_{su1}	40	-	-	
	R/W and RS Hold Time	t_{H1}	10	-	-	
	Data Setup Time	t_{su2}	80	-	-	
	Data Hold Time	t_{H2}	10	-	-	
Read Mode (Refer to Fig-7)	E Cycle Time	t_c	500	-	-	ns
	E Rise / Fall Time	t_{R,t_F}	-	-	20	
	E Pulse Width (High, Low)	t_w	230	-	-	
	R/W and RS Setup Time	t_{su}	40	-	-	
	R/W and RS Hold Time	t_H	10	-	-	
	Data Output Delay Time	t_D	-	-	120	
	Data Hold Time	t_{DH}	5	-	-	

Mode	Characteristic	Symbol	Min.	Typ.	Max.	Unit
Write Mode (Refer to Fig-6)	E Cycle Time	tc	1000	-	-	ns
	E Rise / Fall Time	t _R t _F	-	-	25	
	E Pulse Width (High, Low)	tw	450	-	-	
	R/W and RS Setup Time	tsu1	60	-	-	
	R/W and RS Hold Time	t _{H1}	20	-	-	
	Data Setup Time	tsu2	195	-	-	
	Data Hold Time	t _{H2}	10	-	-	
Read Mode (Refer to Fig-7)	E Cycle Time	tc	1000	-	-	ns
	E Rise / Fall Time	t _R ,t _F	-	-	25	
	E Pulse Width (High, Low)	tw	450	-	-	
	R/W and RS Setup Time	tsu	60	-	-	
	R/W and RS Hold Time	t _H	20	-	-	
	Data Output Delay Time	t _O	-	-	360	
	Data Hold Time	t _{DH}	5	-	-	