

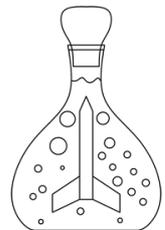
SAP1024B PROCESSOR GRAPHIC SCREEN DRIVE LIBRARY

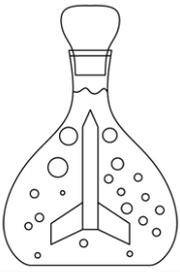
Last update – 30.04.2015

Adding guidebook – unavailable

Notes :

- The library is just tested in 240x120 screen, but because of its flexible design, it will work also in other screens.
- SAP1024B library is written for its integrated, but as this integrated is the copy of T6963C, so that it is also suitable for the screens have this integrated.
- As to be used in MicroC library, is designed for PIC18 MCUs. Other different programs and working in MCUs should be controlled.
- If you don't know how to add the MCL (binary) document to your project, please watch the promotional video.





Pin Connection:

```
char SAPTRIS at trisd; //data portları
char SAPDATA_giris at portd;
char SAPDATA_cikis at latd;
sbit SAP1024_RD at RC1_bit ; //GLCD RD UCU BAĞLANTI PİNİ
sbit SAP1024_CE at rc2_bit ; //GLCD CE UCU BAĞLANTI PİNİ
sbit SAP1024_CD at Rc3_bit ; //GLCD C/D UCU BAĞLANTI PİNİ
sbit SAP1024_RST at Rc4_bit ; //GLCD RST UCU BAĞLANTI PİNİ
sbit SAP1024_FS at Rc5_bit ; //GLCD FS UCU BAĞLANTI PİNİ
sbit SAP1024_WR at RCO_bit ; //GLCD wr UCU BAĞLANTI PİNİ

sbit SAP1024_RD_Direction at TRISC1_bit; //GLCD RD UCU BAĞLANTI PİNİ
sbit SAP1024_CE_Direction at TRISC2_bit; //GLCD CE UCU BAĞLANTI PİNİ
sbit SAP1024_CD_Direction at TRISC3_bit; //GLCD C/D UCU BAĞLANTI PİNİ
sbit SAP1024_RST_Direction at TRISC4_bit; //GLCD RST UCU BAĞLANTI PİNİ
sbit SAP1024_FS_Direction at TRISC5_bit; //GLCD FS UCU BAĞLANTI PİNİ
sbit SAP1024_WR_Direction at TRISCO_bit; //GLCD FS UCU BAĞLANTI PİNİ
```

- “SAPTRIS”, ”SAPDATA_input”, ”SAPDATA_output”, represent the data ports. Because of having 8 pieces of data input-output, in PIC, 1 full port is reserved for this work and is determined here. (portd, portb etc.)
- All the other pins are connected analyzing GLCD documents

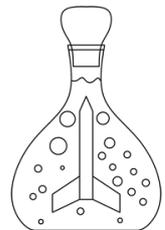
1-SYSTEMIC FUNCTIONS

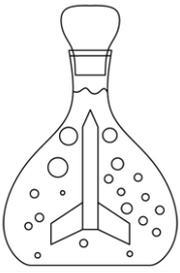
Note: Blue parts are functions - Red parts are parameters

a-SAP1024_INIT(ekran genişliği,ekran yüksekliği,font)

- It is the general analysis function. It should be mentioned at the beginning.
- Ekran genişliği = it determines the wideness of LCD to use.
- Ekran Yüksekliği = it determines the height of LCD to use.
- Font = it determines the font preference which is generally 8. In other words 8x8 should be chosen.
- Example-> SAP1024_INIT(240,128,8)

b-SAP1024_STATUS1()





- Before sending the data to processor of the LCD, it controls whether the processor is available or not. Before sending the data to processor of the LCD, it controls whether the processor is available or not.
- It doesn't have any back indication. While the processor is busy it remains in infinite loop and it doesn't push forward the operation.

c-SAP1024_KOMUT_GONDER(**COMMAND**)

- It works for sending command to LCD.
- **Example->**SAP1024_KOMUT_GONDER(**EXOR_MODE_CGROM**)
- You can find all the command parameters at the last page of guideline.

d-SAP1024_DATA_YAZ(**data**)

- It is used for sending data to LCD.
- Example-> SAP1024_DATA_YAZ(0b10000001)

e-SAP1024_DATA_OKU()

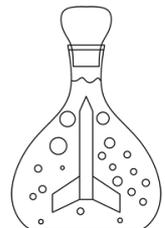
- It reads the value of the location of the pointer and it returns with itself

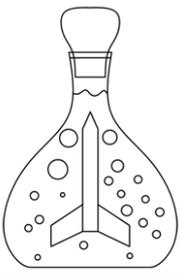
f-SAP1024_GRAFIK_ADRES_POINTER_KONUMLANDIRMA(**x**, **y**)

- It determines the location of pointer. It starts writing from the determined position.
- The left – top corner of screen is x=0, y=0. There isn't the minus parameter.
- X = shows the “x” position on screen.
- Y= shows “y” position on screen.
- **Example->**SAP1024_GRAFIK_ADRES_POINTER_KONUMLANDIRMA(**10** , **5**)

g-SAP1024_LCD_GRAFIK_TEMIZLE()

- It deletes all the graphic memory. It means that all the graphics on screen will be totally deleted.





h-SAP1024_LCD_TEXT_TEMIZLE()

- It deletes all the writing memory. It means that all the writings on screen will be totally deleted.

i-SAP1024_LCD_TEMIZLE()

- It deletes writing and graphic at the same time.

j-SAP1024_CURSOR_POZIZYON(x, y)

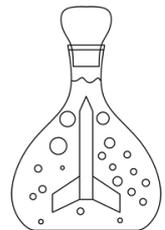
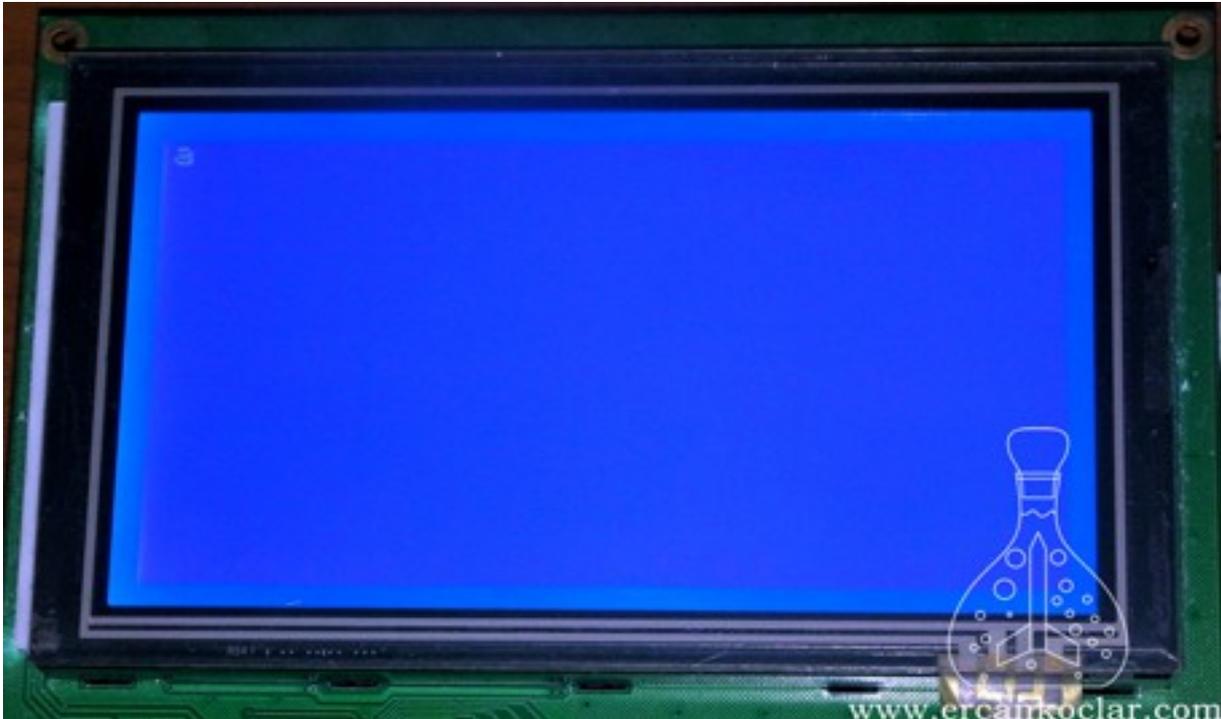
- It determines the cursor position, but firstly the cursor should be arrange visible.

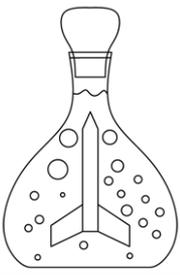
2- VISUAL FUNCTIONS

Note: for understanding better the visual functions, watching the promotional videos are reccomanded.

a-SAP1024_KARAKTER_YAZMA(karakter)

- It works for writing one character.
- **Example->**SAP1024_KARAKTER_YAZMA('a')





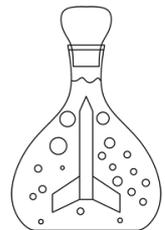
b-SAP1024_YAZI_YAZMA(sutun_X,satir_Y,yazi)

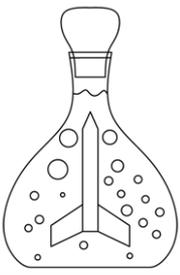
- It works for writing a sentence or a word.
- Standard sap1024B reads from the rom memory, because of that the character size can not be changed.
- “column_X” and “row_Y” is not exactly a pixel but it can be said as 8 pixels.
- **Example**->SAP1024_YAZI_YAZMA(10,10,”Ercan Koclar”)



c-SAP1024_LCD_GELISMIS_YAZI(pozisyon_x,pozisyon_y, yazi, font,olcek,bosluk, invert)

- It is the developed script writing function.
- The fonts which are prepared outside, also can be used here. (In the library, from the name “standard” font is integrated. Except this, new font can be prepared and used).
- olcek = it adjusts the script size
- bosluk = while increasing, the characters are coming closer to each other.



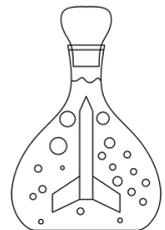


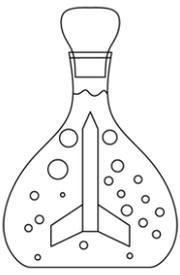
- **Example-**`SAP1024_LCD_GELISMIS_YAZI(1,1, "ROKETLER", standart,1,1,0)`
`SAP1024_LCD_GELISMIS_YAZI(20,20, "ROKETLER", standart,2,1,0)`
(for understanding better the difference, different parameters are written)



d-`SAP1024_LCD_RESIM_BAS(veri,invert)`

- It works by transferring set codes for a picture which covers the screen totally.
- It is used for printing full screen pictures.
- The set of codes should be "#include" to your project.
- For the part of data, the name of the set should be written, not the document name. (for more details please watch the promotion video)
- **Example-**`SAP1024_LCD_RESIM_BAS(ben_kimim,1)`

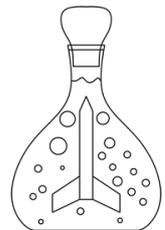


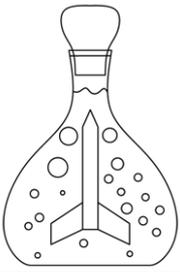


This is the original image, in which, 1 bite returned picture is used.

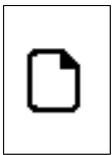
e-SAP1024_LCD_SIMGE_BAS(pozisyon_x,pozisyon_y,veri,genislik_pixel,yukseklk_pixel,invert)

- Despite the full screen, this is a useful function especially for menu design.
- It converts small symbol pictures to sets, so that it helps to create required parts of the screen which are independent from others. In this case there wouldn't be any need to refresh the full screen.
- For example, if you have 4 pieces of symbols, while pressing these, by doing “invert”, if you want to clarify the action of pressing, in this stage, by inverting only the code of the symbol (from the function), you can make a change to that part, therefore this picks speed for you.
- The sets should be made “#include”.
- veri = the set of the symbol is written

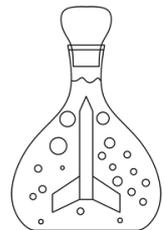


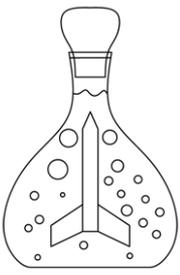


- genislik_pixel = the wideness of the picture of symbol
- yukseklk_pixel = the height of the picture of symbol
- **Example-** \rightarrow `SAP1024_LCD_SIMGE_BAS(0,0,simge1,40,56, 0)`
`SAP1024_LCD_SIMGE_BAS(50,0,simge2,49,59, 1)`



This is the original images, in which, 1 bite returned picture is used.





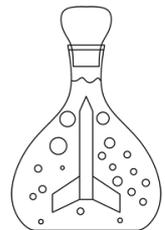
f-SAP1024_PIXEL(**pozisyon_x**,**pozisyon_y**,**renk**)

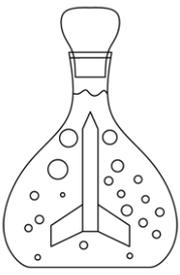
- It colors the pixel which the position of it have already determined.
- Renk =1 the pixel is white, if not the pixel will be erased.
- Besides the basic function, it can be used for every drawing and usually for the graphical images. (For example, oscilloscope graphic)

➤ **Example->**SAP1024_PIXEL(**0,0,1**)

SAP1024_PIXEL(**10,10,1**)

SAP1024_PIXEL(**1,2,1**)





g-SAP1024_CIZGI(**pozisyon_x0,pozisyon_y0,pozisyon_x1,pozisyon_y1,kalinlik,renk**)

- It provides drawing a line in required length and thickness.
- It draws a line between the positions of start(x0,y0) and the end(x1,y1)
- It can be used as general line, also it is so helpful for hour project.

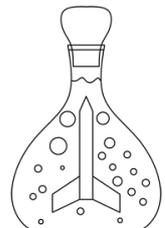
➤ **Example->**SAP1024_CIZGI(0,0,35,25,1,1)
SAP1024_CIZGI(25,25,30,32,2,1)

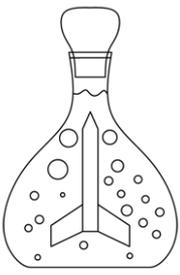


h-SAP1024_DORTGEN(**pozisyon_x0,pozisyon_y0,pozisyon_x1,pozisyon_y1, kalinlik,renk**)

- Tetragon, provides drawing tetragon and square.
- Can give a thickness
- Through the 4 points draws line.

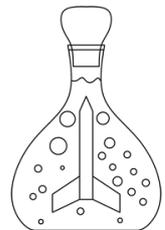
➤ **Example->**SAP1024_DORTGEN(0,0,20,40, 5,1)
SAP1024_DORTGEN(50,50,45,40, 1,1)

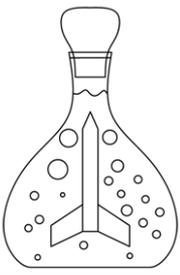




i-SAP1024_DORTGEN_RADUS(pozisyon_x0,pozisyon_y0,pozisyon_x1,pozisyon_y1, r, dolu, renk)

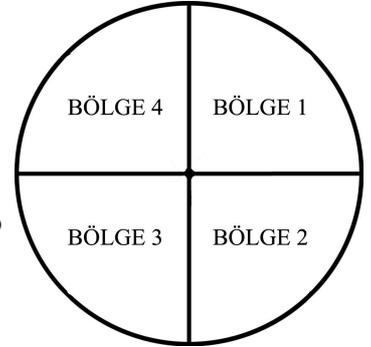
- On the contrary of straight tetragons, it draws tetragons with radius corners.
- r is the required radius
- Example->SAP1024_DORTGEN_RADUS(10,10,30,30, 5, 1, 1)
SAP1024_DORTGEN_RADUS(50,50,80,80, 10, 0, 1)





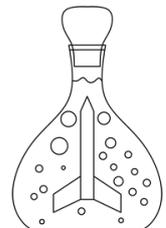
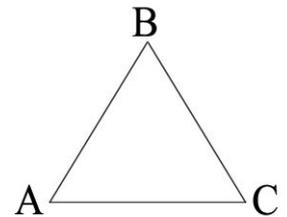
j-SAP1024_CEMBER(**pozisyon_x,pozisyon_y,r,dolu,bolge,renk**)

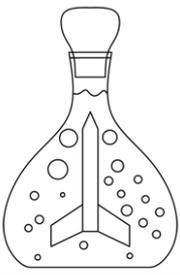
- It draws a circle within the required “r” scale, from the determined central point (x,y).
- Area, determines the 4 angle of the circle (90 degree). If it would be zero, the circle will be drawn in full. If any number will be entered, according to that number, equivalent of that number will be drawn in 90 degrees.
- **Example->**SAP1024_CEMBER(50,50,30,1,0,1)
SAP1024_CEMBER(100,30,10,1,0,1)
SAP1024_CEMBER(10,10,5,0,1,1)-> 1.area(bölge) is selected



k-SAP1024_UCGEN(**ax,bx,cx,ay,by,cy, renk**)

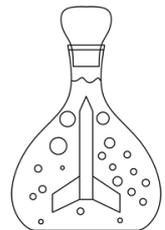
- If the coordinates of the three points of a triangle will be entered, the desired triangle can be drawn in a required mode.
- Positioning of the triangle is the same as next image.
- **Example->**SAP1024_UCGEN(0,40,20,20,25,30, 1)
SAP1024_UCGEN(100,150,125,50,50,25, 1)

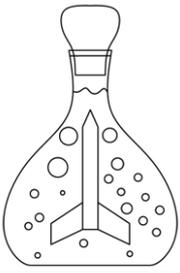




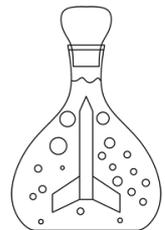
2- COMMANDS

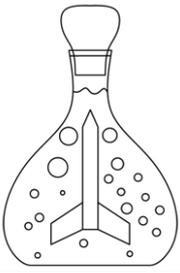
- CURSOR_POINTER_SET
- SET_OFFSET_REGISTER
- SET_ADDRESS_POINTER
- //-----SET KONTROL WORD COMMANDS--//
- SET_TEXT_HOME_ADDRESS
- SET_TEXT_AREA
- SET_GRAPHIC_HOME_ADDRESS
- SET_GRAPHIC_AREA
- //-----MODE SET COMMANDS-----//
- OR_MODE_CGROM
- EXOR_MODE_CGROM



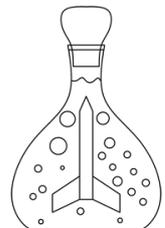


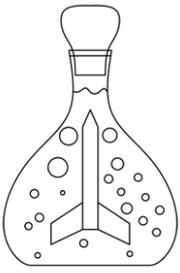
- AND_MODE_CGROM
- TEXT_ATTRIBUTE_MODE_CGROM
- OR_MODE_CGRAM
- EXOR_MODE_CGRAM
- AND_MODE_CGRAM
- TEXT_ATTRIBUTE_MODE_CGRAM
- //-----**DISPLAY MODE COMMANDS**-----//
- DISPLAY_OFF
- TEXT_CURSOR_OFF
- TEXT_CURSOR_ON_BLINK_OFF
- TEXT_CURSOR_ON_BLINK_ON
- GRAPHIC_CURSOR_OFF
- GRAPHIC_CURSOR_ON_BLINK_OFF
- GRAPHIC_CURSOR_ON_BLINK_ON
- TEXT_GRAPHIC_CURSOR_OFF
- TEXT_GRAPHIC_CURSOR_ON_BLINK_OFF
- TEXT_GRAPHIC_CURSOR_ON_BLINK_ON
- //-----**CURSOR PATTERN COMMANDS**-----//
- BIR_CIZGILI_IMLEC
- IKI_CIZGILI_IMLEC
- UC_CIZGILI_IMLEC
- DORT_CIZGILI_IMLEC
- BES_CIZGILI_IMLEC
- ALTI_CIZGILI_IMLEC
- YEDI_CIZGILI_IMLEC
- SEKIZ_CIZGILI_IMLEC





- //----DATA AUTO WRITE/READ COMMANDS---//
- DATA_AUTO_WRITE
- DATA_AUTO_READ
- RESET_AUTO_READ_WRITE
- //----DATA WRITE AND READ COMMANDS----//
- DATA_WRITE_INCREMENT_ADD
- DATA_READ_INCREMENT_ADD
- DATA_WRITE_DECREMENT_ADD
- DATA_READ_DECREMENT_ADD
- DATA_WRITE_KEEP_ADD
- DATA_READ_KEEP_ADD
- //-----SCREEN PEEK COMMAND-----//
- SCREEN_PEAk
- //-----SCREEN COPY COMMAND-----//
- SCREEN_COPY





You came to the end of the library. Wish it would be useful for you. In case of having any question and facing any problem or error, in bottom part of my page feel free to write your problems as a comment.

Don't forget to watch the library video.

This library is not allowed to be used in any commercial projects.

