



# **EA eDIPTFT32-A compiler manual**

Januar 2012

© ELECTRONIC ASSEMBLY GmbH

# Table of Contents

<b>1 Overview</b>	<b>4</b>
<b>2 Syntax rules</b>	<b>5</b>
<b>3 Compiler Functions</b>	<b>6</b>
<b>4 Compiler Options</b>	<b>8</b>
4.1 General .....	8
4.2 Transfer .....	9
4.3 String .....	10
4.4 Fonts .....	11
Font .....	11
WinFont .....	12
LogFontWidth .....	13
ExportOverview .....	14
ExportWinfont .....	15
4.5 Bitmaps .....	16
MaxSize .....	16
MaxColorDepth .....	17
Dithering .....	18
MakeTransparent .....	19
RemoveBorder .....	20
AlphaThreshold .....	21
DoGamma .....	21
DoRLE .....	21
Compress .....	21
Pattern .....	22
Border .....	23
Button .....	24
Picture .....	24
Animation .....	25
Instrument .....	26
4.6 Macros .....	28
ExportMacro .....	28
SystemMacros .....	28
Macro .....	29
TouchMacro .....	29
BitMacro .....	29
PortMacro .....	29
MatrixMacro .....	30
ProcessMacro .....	30
AnalogMacro .....	31
<b>5 EA eDIPTFT32-A commands</b>	<b>32</b>
5.1 Terminal .....	32
5.2 Display .....	33
5.3 Draw .....	34
5.4 Text .....	36
5.5 Bitmap .....	37
5.6 Animation .....	38
5.7 Bargraph .....	39
5.8 Instrument .....	40
5.9 Macros .....	41
5.10 Touch .....	43

5.11 Backlight .....	46
5.12 Digital IO-Port .....	47
5.13 Analogue Input .....	48
5.14 Other commands .....	50
<b>6 Default Fonts .....</b>	<b>51</b>
6.1 Terminal 8x8 .....	51
6.2 Terminal 8x16 .....	52
6.3 Font 4x6 .....	53
6.4 Font 6x8 .....	54
6.5 Font 7x12 .....	55
6.6 Geneva 10 .....	56
6.7 Chicago 14 .....	57
6.8 Swiss 30 .....	58
6.9 BigZif 50 .....	59
6.10 BigZif 100 .....	60
<b>7 Default Colors .....</b>	<b>61</b>
<b>8 G16FORMAT .....</b>	<b>62</b>
<b>9 How-to-use .....</b>	<b>65</b>
9.1 Factory Setting .....	67
9.2 RS485 - Factory Setting .....	68
9.3 Place Strings - BEGINNER .....	70
9.4 Place Strings - EXPERT .....	72
9.5 Cyrillic font - BEGINNER .....	74
9.6 BMP file - BEGINNER .....	75
9.7 Animated gif - BEGINNER .....	76
9.8 3 simple touch buttons - BEGINNER .....	77
9.9 Glass button - EXPERT .....	79
9.10 Radio group - BEGINNER .....	82
9.11 Keypad - EXPERT .....	84
9.12 Free draw area - BEGINNER .....	88
9.13 Free draw area - EXPERT .....	89
9.14 Frame - BEGINNER .....	91
9.15 Bargraph by touch - BEGINNER .....	93
9.16 Bargraph by touch - EXPERT .....	95
9.17 Instrument by touch - BEGINNER .....	97
9.18 Instrument by analogue input - BEGINNER .....	98
9.19 Instrument slide show - EXPERT .....	99
9.20 Languages/Macro Pages - BEGINNER .....	103
9.21 String tables - EXPERT .....	105
9.22 Analogue Macro - Beginner .....	107
9.23 Bit Macro - BEGINNER .....	109
9.24 Port Macro - EXPERT .....	111
9.25 Automatic Macro - EXPERT .....	113
9.26 Process Macro - BEGINNER .....	115

# 1 Overview

## General

The EA eDIPTFT32-A is able to store many pictures, fonts and macros in internal FLASH memory. The EA KIT Editor is a powerful, free of charge software tool to create those macros and to store the pictures and fonts very easily.

The EA KIT Editor combines 3 functions:

- The editor itself which allows a simple definition of the macros, pictures and fonts like a standard text editor.
- The compiler which translates the text into the uploading code and shows up syntax error.
- The transmitter which search the right connection and uploads the data into the EA eDIPTFT32-A.

## 2 Syntax rules

<b>ESC</b>	<p>The ESC character (\$1B, 27d) is represented by the number sign '#'. The escape character must always be the first character in a line (except for tabs and spaces). This is followed by command letters and any parameters.</p>
<b>Comma</b>	<p>The comma is used to separate the parameters of a macro.</p>
<b>Numbers</b>	<p>All numbers are converted to binary values. Decimal, hexadecimal and binary numbers can be written. Example: 163(dez) = \$A3(hex) = %10100011(bin)</p>
<b>Comments</b>	<p>Comments must begin with a semicolon. Example: ; this is a comment</p>
<b>Text</b>	<p>Text (strings) must be enclosed within quotation marks " " or ' ' . It is possible to use Hex-values between curly brackets {} . ASCII numbers can also be entered directly. Example (output of "abc-def-xyz"): #ZL0,0,"abc",45,'def',{2D78797A}</p> <p><b>KitEditor:</b> double click within the curly brackets or quotation marks opens a EditBox, use the mouse to select special characters. Please make sure that you have selected the correct font (right click on the font and 'Select Font for EditBox')</p>
<b>Commands</b>	<p>Command letters and parameters specified in the EA eDIPTFT32-A data sheet are valid. Two exceptions facilitate the creation of command lines:</p> <ol style="list-style-type: none"> <li>1. The &lt;NUL&gt; is appended automatically by the compiler. This means commands in which a string is output, the &lt;NUL&gt; no longer has to be entered as the end identifier. Example: #ZL 0,0,"Text"</li> <li>2. In the Send bytes command, the number of bytes to be sent is not specified; this number is calculated automatically by the compiler. Example: #SB 1,2,"Test"</li> </ol>
<b>Constants</b>	<p>Words without quotation marks are interpreted as numeric constants, which have to be defined first. The name of a constant can have be up to 60 characters and must begin with a letter followed by letters, numbers or underscores. Up to 2000 constants can be defined. Please note that Compiler Options like e.g. INFO or MACRO can not be used. Example: CORNER_X=5; the word CORNER_X is replaced with immediate effect by the value 5.</p>
<b>String Constants</b>	<p>A string-constant is a constant name between two exclamation marks Example1: !NAME! = "example text" Example2: !NAME! = "abc",45,'def',{2D78797A}</p>
<b>Upper / lower case</b>	<p>No difference is made between upper case and lower case.</p>

### 3 Compiler Functions

#### Calculating

The 4 basic mathematical operations +, -, \* and / can be applied to numeric constants and numbers. Round brackets can be used, and multiplication and division come before addition and subtraction.

Example: `#RL X,Y, X+WIDTH, Y+HEIGHT`

following C-style operations are also possible:

- pre/post increment and decrement: ++, --; e.g: ++a, b++, --c, d--
- shift and bit operations: <<, >>, &, |, ^
- combined operators: \*=, /=, +=, -=, <<=, >>=, &=, |=, ^=

During compiling procedure all constants are calculated and transformed to fixed numbers.

#### Functions

During compiling procedure all functions are calculated and transformed to fixed numbers.

Follwing functions are available:

**LO**(value) returns the Low-Byte

**HI**(value) returns the High-Byte

**MIN**(value1,value2,...) returns the minimum value

**MAX**(value1,value2,...) returns the maximum value

**AVG**(value1,value2,...) returns the average value

**RANDOM**(min,max)

**RANDOM**(min,max,delta)

returns a random value from the range min..max

delta = maximum difference to the last random value

**SIN**(w, a) **COS**(w, a) **TAN**(w, a)

w = angle in tenth of degree

a = max. amplitude

to calculate the bounding box of images following functions are available:

<b>PICTURE_W</b> (nr)	<b>PICTURE_H</b> (nr)	for <a href="#">Images</a> <sup>[24]</sup>
<b>PICTURE_W</b> (nr, page)	<b>PICTURE_H</b> (nr, page)	
<b>BUTTON_W</b> (nr)	<b>BUTTON_H</b> (nr)	for <a href="#">Touchbutt</a> <a href="#">ons</a> <sup>[24]</sup>
<b>BUTTON_W</b> (nr, page)	<b>BUTTON_H</b> (nr, page)	
<b>ANIMATION_W</b> (nr)	<b>ANIMATION_H</b> (nr)	for <a href="#">Animation</a> <a href="#">s</a> <sup>[25]</sup>
<b>ANIMATION_W</b> (nr, page)	<b>ANIMATION_H</b> (nr, page)	
<b>INSTRUMENT_W</b> (nr)	<b>INSTRUMENT_H</b> (nr)	for <a href="#">Instrumen</a> <a href="#">ts</a> <sup>[26]</sup>
<b>INSTRUMENT_W</b> (nr, page)	<b>INSTRUMENT_H</b> (nr, page)	

to calculate the bounding box of strings following functions are available:

<b>STRING_W</b> (nr, par, font)	<b>STRING_H</b> (nr, par, font)	for <a href="#">internal Strings</a> <sup>[10]</sup> (firmware V1.2)
<b>STRING_W</b> (nr, par, font, page)	<b>STRING_H</b> (nr, par, font, page)	

<b>STRING_W</b> ( !NAME!,par,font)	<b>STRING_H</b> ( !NAME!,par,font)	for <a href="#">Stringcon stants</a> <sup>[5]</sup>
<b>STRING_W</b> ( !NAME!,par,font,page)	<b>STRING_H</b> ( !NAME!,par,font,page)	

nr = internal string number (see compiler option [STRING:](#)<sup>[10]</sup>)

font = font number (eDIP command [#ZF](#)<sup>[34]</sup>)

par = **STRING\_P**(zoomX, zoomY, width, height, space, code)

this values needs the compiler to calculate the correct outline in functions **STRING\_W** and **STRING\_H**

zoomX, zoomY = zoom factor 1..8 (eDIP command [#ZZ](#)<sup>[34]</sup>)

width, height = additional width/height 0..15 (eDIP command [#ZY](#)<sup>[36]</sup>)

space = spacewidth (eDIP command [#ZJ](#)<sup>[36]</sup>)

code = stringcode (eDIP command [#ST](#)<sup>[50]</sup>)

Example:

```
String: 1, "Hello World"
```

```
font      = SWISS30B
stringcode = 1
zoomX     = 1
zoomY     = 1
addwidth  = 3
addheight = 5
spacewidth = 0
```

```
Makro: MnPowerOn
      #ST stringcode
      #ZY addwidth,addheight
      #ZJ spacewidth

      #ZF font
      #ZZ zoomX, zoomY
      #FZ YELLOW, TRANSPARENT
```

```
par = STRING_P(zoomX, zoomY, addwidth, addheight, spacewidth, stringcode)
w = STRING_W(1, par, font)
h = STRING_H(1, par, font)
x = (XPIXEL-w)/2
y = (YPIXEL-h)/2
      #RF x,y, x+w-1, y+h-1, BLUE
      #ZL x,y, stringcode, 2
```

**String Functions** A string-function converts a value into a string constant the function is between two exclamation marks. Following functions are available:

<b>!STR</b> (value, digits)!	for decimal numbers
<b>!HEXSTR</b> (value, digits)!	for hexadecimal numbers
<b>!BINSTR</b> (value, digits)!	for binary numbers
digits = 0: variable length	
digits > 0: fix numbers of digits with leading zeros	
digits < 0: fix numbers of digits with leading spaces	

## 4 Compiler Options

### 4.1 General

**eDIPTFT32-A** "title" Defines EA eDIPTFT32-A as target. "title" is a short description for the project. It is shown on the display when uploading the FLASH memory of the module. "title" can be read out by the command "ESC S J". Max. 32 character will be stored; more are allowed but will be suppressed.

---

**DESTINATION** <new.df> Specifies a new file name for the DATA-FLASH upload file. Optionally you can choose another path for the destination file.

---

**INCLUDE** <file> Includes the contents of the file <file> to be used in this actual file. This makes it possible to divide a project up into a number of source files. The file should have the extension \*.kmi.

---

**PATH** <path> Sets a new path to find the following files.

---

**CODETABLE:** nr A code table is useful adapt different ASCII tables. With that, the ASCII code can be changed for some single character (e.g. "ä", "ß"). Up to 255 different code tables nr (1..255) can be defined. nr = 0 will disable all conversion.

Example:

```
CodeTable: 1 ; use codetable 1 for *.FXT fonts with
DOS-Code
'€' = 128
'äöüÄÖÜß' = $84,$94,$81, $8E,$99,$9A, $E1
```



## 4.2 Transfer

`AUTOSCAN: n1`

Scan baudrate for connected eDIP on COM/USB before programming  
n1=0: autoscan off, use `baud` for connecting and programming  
n1=1: autoscan on, search baudrate automatically and programm with  
baudrate `baud`

`COMx: baud`

With this statement the COM port and baud rate is defined.

`USB: baud, "device"`

With this statement the USB device and baud rate is defined.  
If the EA EVAlE DIPTFT43 is connected to the USB, "device" is `"eDIP  
Programmer"`.

---

`RS485ADR: adr`

Selects the eDIP with RS485 address "adr" before uploading the  
macros.

"adr" can be a number from 0..255.

(see example [INIT\\_with\\_RS485\\_address.KMC](#)<sup>[68]</sup>)

---

`VERIFY`

Verifies the complete contents of the FLASH memory after upload.

## 4.3 String

```
STRING: nr "text..."
STRING: nr[page]"text..."
```

The statement STRING defines and stores internal strings nr (1..255). The internal strings can be used with any command that uses strings e.g. [#ZL](#), [#ZC](#), [#ZR](#), [#ZB](#)<sup>[36]</sup>, [#AT](#), [#AK](#), [#AU](#), [#AJ](#)<sup>[43]</sup>, [#BX](#)<sup>[39]</sup>, [#IX](#)<sup>[40]</sup>, [#VE](#)<sup>[48]</sup>

After the stringcode, defined with [#ST n1](#)<sup>[50]</sup>, internal strings are used. Optionally different strings can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. strings in different languages.

You can use the [Compiler Functions](#)<sup>[6]</sup> [STRING\\_W](#), [STRING\\_H](#) and [STRING\\_P](#) to get the outline in pixels of the string.

(see How-to-use example [String tables - EXPERT](#)<sup>[105]</sup>)

### Example 1:

```
StringCode = $01

STRING: 1, "Hello World"

MACRO: MnPowerOn
    #ST StringCode
    #ZL 10,5, StringCode, 1
```

### Example 2:

```
StringCode = $01

STRING: 1, "Hello World "
STRING: 1[1], "Hallo Welt "
STRING: 1[2], "Ciao a tutti "

MACRO: MnPowerOn
    #ST StringCode

    #MK 0
    #ZL 10,10, StringCode, 1

    #MK 1
    #ZL 10,30, StringCode, 1

    #MK 2
    #ZL 10,50, StringCode, 1
```

## 4.4 Fonts

### 4.4.1 Font

FONT: nr,<file>

FONT: nr[page],<file>

Defines a font file which will be assigned to the number nr (0..255).

<file> can be FXT, [G16](#)<sup>[62]</sup>.

Optionally different fonts can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

(see How-to-use example [Place Strings - BEGINNER](#)<sup>[70]</sup>)

predfined fonts (`include <..\default_font.kmi>`):

```
; default fonts
```

```
FONT4x6    = 1
```

```
FONT6x8    = 2
```

```
FONT7x12   = 3
```

```
GENEVA10   = 4
```

```
CHICAGO14  = 5
```

```
SWISS30B   = 6
```

```
BIGZIF50   = 7
```

```
BIGZIF100  = 8
```

Path: `<..\Fonts>`

Font: FONT4x6, <4x6.FXT>

Font: FONT6x8, <6x8.FXT>

Font: FONT7x12, <7x12.FXT>

Font: GENEVA10, <GENEVA10.FXT>

Font: CHICAGO14, <CHICAG14.FXT>

Font: SWISS30B, <SWISS30B.FXT>

Font: BIGZIF50, <BIGZIF50.FXT>

Font: BIGZIF100, <BIGZIF100.FXT>

see Character Table

[Terminal 8x8](#)<sup>[51]</sup>

[Terminal 8x16](#)<sup>[52]</sup>

[Font 4x6](#)<sup>[53]</sup>

[Font 6x8](#)<sup>[54]</sup>

[Font 7x12](#)<sup>[55]</sup>

[Geneva 10](#)<sup>[56]</sup>

[Chicago 14](#)<sup>[57]</sup>

[Swiss 30](#)<sup>[58]</sup>

[BigZif 50](#)<sup>[59]</sup>

[BigZif 100](#)<sup>[60]</sup>



#### 4.4.2 WinFont

**WINFONT:** nr, "name",script,style, regions..., size

**WINFONT:** nr[page], "name",script,style, regions..., size

Defines a Windows font and assigns to font number nr (0..255).

The best is to double click on "name" to edit all parameter.

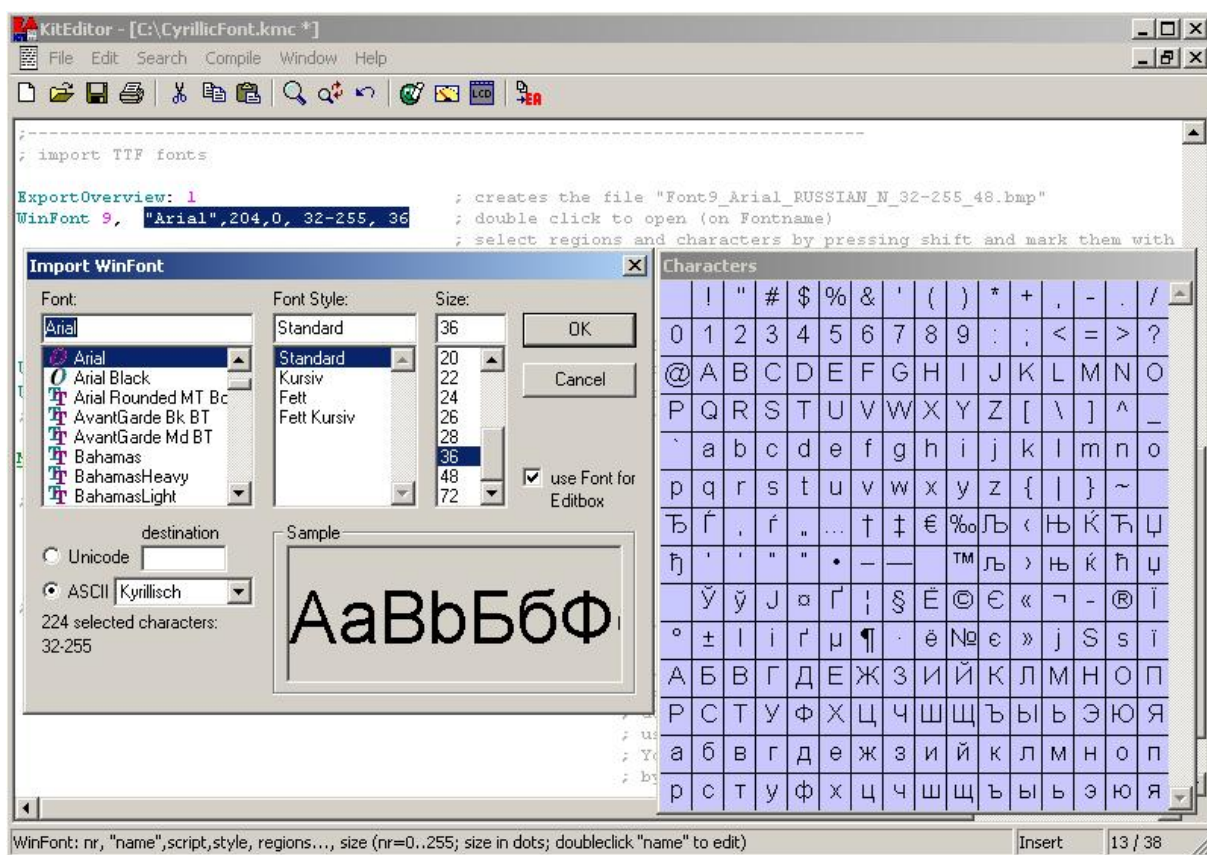
Select the start-character by pressing the left mouse button and move to the end-character.

Additional regions can be selected with the SHIFT-key.

Optionally different winfonts can be stored for different pages [0..15].

If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

(see How-to-use example [Cyrillic font - BEGINNER](#)<sup>[74]</sup>)



### 4.4.3 LogFontWidth

LOGFONTWIDTH: n1

Each character in proportional font does have an individual width. The statement LOGFONTWIDTH provides the width for all characters in form of a table. The result is in LOG file (find it in project directory).  
 n1 > 0: specifies the count of column  
 n1 = 0: no table will be generated

Example:

```
LogFontWidth: 4
WinFont: 9, "Arial", 0, 0, 32-127, 24
```

Output in Logfile:

```
Import WinFont "Arial", ANSI
height: 24 dots, used codes: 32..127, 5182 bytes
width: 32:' '= 7    33:'!' = 8    34:'"' = 9    35:'#' = 13
        36:'$' = 13   37:'%' = 21   38:'&' = 16   39:':' = 5
        40:'(' = 8    41:')' = 8    42: '*' = 9    43:'+' = 14
        44:',' = 7    45:'-' = 8    46: '.' = 7    47:'/' = 7
        48:'0' = 13   49:'1' = 13   50:'2' = 13   51:'3' = 13
        52:'4' = 13   53:'5' = 13   54:'6' = 13   55:'7' = 13
        56:'8' = 13   57:'9' = 13   58:':' = 7    59: ';' = 7
        60:'<' = 14   61:'=' = 14   62:'>' = 14   63:'?' = 13
        64:'@' = 24   65:'A' = 15   66:'B' = 16   67:'C' = 17
        68:'D' = 17   69:'E' = 16   70:'F' = 15   71:'G' = 19
        72:'H' = 17   73:'I' = 6    74:'J' = 12   75:'K' = 16
        76:'L' = 13   77:'M' = 19   78:'N' = 17   79:'O' = 19
        80:'P' = 16   81:'Q' = 19   82:'R' = 17   83:'S' = 16
        84:'T' = 14   85:'U' = 17   86:'V' = 15   87:'W' = 23
        88:'X' = 15   89:'Y' = 16   90:'Z' = 15   91:'[' = 7
        92:'\' = 7    93:']' = 7    94:'^' = 12   95:'_' = 13
        96:'`' = 8    97:'a' = 13   98:'b' = 14   99:'c' = 12
        100:'d' = 14  101:'e' = 13  102:'f' = 7    103:'g' = 14
        104:'h' = 14  105:'i' = 5    106:'j' = 6    107:'k' = 12
        108:'l' = 6    109:'m' = 20  110:'n' = 14  111:'o' = 13
        112:'p' = 14  113:'q' = 14  114:'r' = 8    115:'s' = 12
        116:'t' = 7    117:'u' = 14  118:'v' = 11  119:'w' = 17
        120:'x' = 11  121:'y' = 12  122:'z' = 12  123:'{' = 8
        124:'|' = 6    125:'}' = 8    126:'~' = 14  127:'•' = 18
```

#### 4.4.4 ExportOverview

**EXPORTOVERVIEW:** *n1*

This statement enables the generation of a BMP file for all following fonts and animations.

This is good to get an overview which character / pictures are available.

*n1*= 1: only fonts will be exported

*n1*= 2: only animations will be exported

*n1*= 3: fonts and animations will be exported

*n1*= 0: no export at all


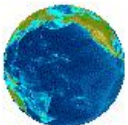
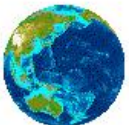



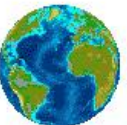

Example:

```
ExportOverview: 3
WinFont: 9, "Arial", 0, 0, 32-127, 48 ; export "Font9_Arial_ANSI_N_32-127_48.bmp"
Animation: 1 <Erde.G16> ; export "Animation1_Erde_G16_1-8.bmp"
```

Font9\_Arial\_ANSI\_N\_32-127\_48.bmp:

+ Lower Upper	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez: 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez: 96)	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	□

Animation1\_Erde\_G16\_1-8.bmp:

\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)
							

#### 4.4.5 ExportWinfont

`EXPORTWINFONT: n1`

n1= 1: Exports all following win fonts as a FXT-File. The file is stored in project path.

To change or add some character it can easily be edited with the "KitEditor.exe" or another simple text editor .

n1= 0: no FXT-export will be done.

---

```
ExportWinFont: 1
WinFont: 9, "Arial", 0, 0, 66-67, 8 ; use only character 'B' and 'C'
```

Font9\_Arial\_ANSI\_N\_66-67\_8.fxt:

```
; First Nr   : 66
; Last  Nr   : 67
; Typ        : monospaced
; width      : 7
; height     : 8
```

```
66 $42 'B'
#####..
#...#.
#...#.
#####.
#...#.
#...#.
#...#.
#####..
```

```
67 $43 'C'
..###..
.#...#.
#.....
#.....
#.....
#.....
.#...#.
..###..
```



## 4.5 Bitmaps

### 4.5.1 MaxSize

**MAXSIZE:** *width,height,p* If a picture or bitmap is larger than *width* x *height* dots (default: 320x240) the size can be reduced automatically to fit to the display.

*p* = 1 reduce proportional

*p* = 0 reduce non proportional to exact "width" and "height", distortions are possible

Examples:

**Picture:** 1, <BugBunny.BMP>



**MaxSize:** 200,200,1

**Picture:** 1, <BugBunny.BMP>



**MaxSize:** 200,200,0

**Picture:** 1, <BugBunny.BMP>





## 4.5.2 MaxColorDepth

`MAXCOLORDEPTH: bitpixel` Reduces color depth of bitmaps. This saves memory space. Attention: This may effect to the quality of the image.

bitpixel = 1: black&white (monochrome)  
bitpixel = 4: change to 4 bit color depth  
bitpixel = 8: change to 8 bit color depth  
bitpixel = 16: change to 16 bit color depth

Examples:

`MaxColorDepth: 16`  
`Picture: 1, <Astronaut.BMP>`



`MaxColorDepth: 8`  
`Picture: 1, <Astronaut.BMP>`



`MaxColorDepth: 4`  
`Picture: 1, <Astronaut.BMP>`



`MaxColorDepth: 1`  
`Picture: 1, <Astronaut.BMP>`



### 4.5.3 Dithering

`DITHERING: n1`

The EA eDIPTFT32-A is a 16-Bit Hi-Color Display with 65536 colors. It is necessary to convert a 24-bit True-Color or 24-bit Color-Palette from RGB888 into RGB565 colorspace.

n1=0: no dithering, not used bits are truncated

n1=1: dithering is only on for 24-bit True-Color images (default)

n1=2: dithering is only on for 8-/4-bit images with 24-bit Color-Palette

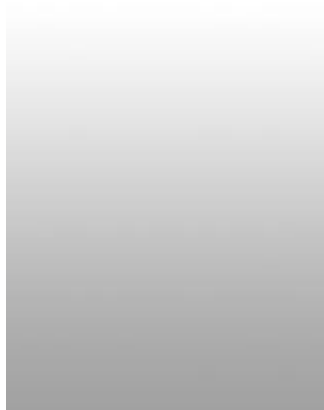
n1=3: dithering is on for all 24-bit True-Color and 24-bit Color-Palette images

---

24-bit original BMP  
115254 Byte

dithering = 1  
DoRLE=0: 76830 Byte  
DoRLE=1: 49502 Byte

dithering = 0  
DoRLE=0: 76830 Byte  
DoRLE=1: 12443 Byte



#### 4.5.4 MakeTransparent

`MAKETRANSSPARENT: type`

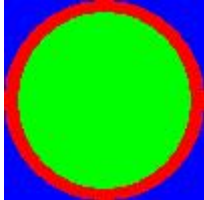
Parts of a picture can be switched to transparent for a nice overlie of a picture on the background. GIF, TGA, PNG and G16 files may already include any transparency information. If not (or a BMP / JPEG format is used) one color can be defined to become transparent. The color will be picked out from 1 of 9 positions (type).

1 = Top Left	2 = Top Center	3 = Top Right
4 = Middle Left	5 = Middle Center	6 = Middle Right
7 = Bottom Left	8 = Bottom Center	9 = Bottom Right

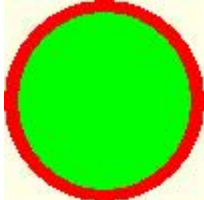
0 = no transparency (default)

Examples:

```
MakeTransparent: 0  
Picture: 1, <Kreis.BMP>
```



```
MakeTransparent: 1  
Picture: 1, <Kreis.BMP>
```



```
MakeTransparent: 2  
Picture: 1, <Kreis.BMP>
```



```
MakeTransparent: 5  
Picture: 1, <Kreis.BMP>
```



### 4.5.5 RemoveBorder

`REMOVEBORDER: n1`

With this compiler option it is possible to remove an additionally not used border in a single image

n1=0: off

n1=1: cut a single color boundary

n1=2: cut a single color boundary only before resize (see [MAXSIZE](#)<sup>[16]</sup>)

n1=3: cut only a transparency boundary

n1=4: cut transparency boundary only before resize (default) (see [MAXSIZE](#)<sup>[16]</sup>)

#### Examples:

`MakeTransparent: 0`

`RemoveBorder: 0`

`Picture: 1, <toucan.BMP>`



`MakeTransparent: 0`

`RemoveBorder: 1`

`Picture: 2, <toucan.BMP>`



`MakeTransparent: 0`

`RemoveBorder: 3`

`Picture: 1, <toucan.BMP>`



`MakeTransparent: 1`

`RemoveBorder: 3`

`Picture: 2, <toucan.BMP>`



`MaxSize: 100,100,1`

`MakeTransparent: 0`

`RemoveBorder: 0`

`Picture: 1, <toucan.BMP>`



`MaxSize: 100,100,1`

`MakeTransparent: 0`

`RemoveBorder: 2`

`Picture: 2, <toucan.BMP>`



`MaxSize: 100,100,1`

`MakeTransparent: 0`

`RemoveBorder: 4`

`Picture: 1, <toucan.BMP>`



`MaxSize: 100,100,1`

`MakeTransparent: 1`

`RemoveBorder: 4`

`Picture: 2, <toucan.BMP>`



### 4.5.6 AlphaThreshold

`ALPHATHRESHOLD: n1`

The image formats \*.TGA and \*.PNG may include an alpha channel for transparency

n1=0: alpha channel will be ignored

n1=1..255: threshold level for a single transparency color, like a mask (default=128)

### 4.5.7 DoGamma

`DOGAMMA: n1`

The image format \*.PNG may include an gamma table

n1=0: ignore the image gamma information (default)

n1=1: use the image gamma information

### 4.5.8 DoRLE

`DORLE: type`

Large pictures and fonts need a lot of memory space. RLE compression may reduce data size to save memory space. RLE compression is loss-free.

type = 0: RLE compression is disabled

type = 1: RLE compression is always on

type = 2: RLE is made automatically when compressed file is smaller than the non-compressed one (default).

### 4.5.9 Compress

`COMPRESS: n1`

Compression for animation (generates difference images). Large animations need a lot of memory space. Compression may reduce data size to save memory space. The drawing time may also be reduced.

Compression is only useable for **cyclic** animations. It is not possible to use single sub images from a compressed animation (see commands `#WI[38]`, `#WF[38]`).

n1=0: compression off (default)

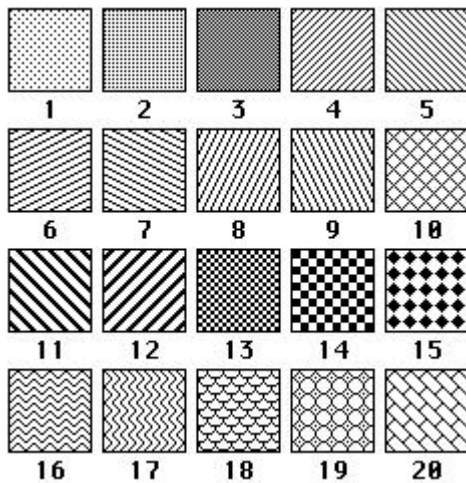
n1=1: compression on (only useable for cyclic animations)

### 4.5.10 Pattern

**PATTERN:** nr <file>

**PATTERN:** nr[page]<file> Pattern are used to fill a [box](#)<sup>[34]</sup>, a [bargraph](#)<sup>[39]</sup> or to draw a [line](#)<sup>[34]</sup>. The statement PATTERN defines the pattern nr (0..255) as the bitmap <file>. The bitmap size need to be 8x8 dots exactly. <file> can be BMP, GIF, JPG, TGA, PNG or G16. Optionally different pattern can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

predfined pattern (`include <..\default_pattern.kmi>`):



```
; default pattern (8x8 Bitmaps)
Path: <..\BITMAPS\monochrome\Pattern>

Pattern: 1 <pattern01.bmp>
Pattern: 2 <pattern02.bmp>
Pattern: 3 <pattern03.bmp>
Pattern: 4 <pattern04.bmp>
Pattern: 5 <pattern05.bmp>
Pattern: 6 <pattern06.bmp>
Pattern: 7 <pattern07.bmp>
Pattern: 8 <pattern08.bmp>
Pattern: 9 <pattern09.bmp>
Pattern: 10 <pattern10.bmp>
Pattern: 11 <pattern11.bmp>
Pattern: 12 <pattern12.bmp>
Pattern: 13 <pattern13.bmp>
Pattern: 14 <pattern14.bmp>
Pattern: 15 <pattern15.bmp>
Pattern: 16 <pattern16.bmp>
Pattern: 17 <pattern17.bmp>
Pattern: 18 <pattern18.bmp>
Pattern: 19 <pattern19.bmp>
Pattern: 20 <pattern20.bmp>
```

### 4.5.11 Border

```
BORDER: nr <file>
BORDER: nr[page] <file>
BORDER: nr <file1>,<file2>
BORDER: nr[page] <file1>,<file2>
```

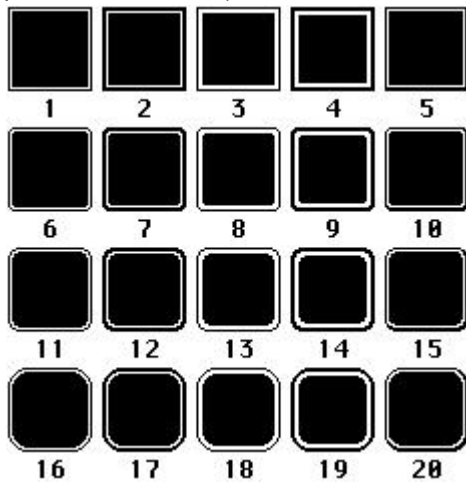
A border is used for [rectangle](#)<sup>[34]</sup>,  [bargraph](#)<sup>[39]</sup> and [touch key/switch](#)<sup>[43]</sup>. A border can be scaled. The statement BORDER defines a bitmap <file> for a border nr (0..255). <file> can be BMP, GIF, JPG, TGA, PNG or G16. The bitmap size need to be 24x24 dots exactly.

When used for a touch key or a switch, 2 different bitmaps can be defined as <file1> and <file2>. <file1> is for touch key/ switch and <file2> will be used if the touch key/ switch is pressed.

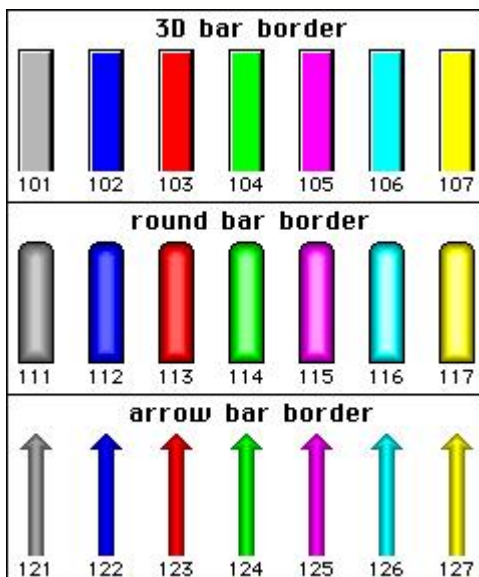
Optionally different border can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

(see How-to-use example [Frame - BEGINNER](#)<sup>[94]</sup>)

predfined borders (`include <..\default_border.kmi>`):



```
; default border (24x24 Bitmaps)
Border: 1 <border01.bmp>
Border: 2 <border02.bmp>
Border: 3 <border03.bmp>
Border: 4 <border04.bmp>
Border: 5 <border05.bmp>
Border: 6 <border06.bmp>
Border: 7 <border07.bmp>
Border: 8 <border08.bmp>
Border: 9 <border09.bmp>
Border: 10 <border10.bmp>
Border: 11 <border11.bmp>
Border: 12 <border12.bmp>
Border: 13 <border13.bmp>
Border: 14 <border14.bmp>
Border: 15 <border15.bmp>
Border: 16 <border16.bmp>
Border: 17 <border17.bmp>
Border: 18 <border18.bmp>
Border: 19 <border19.bmp>
Border: 20 <border20.bmp>
Border: 31 <Register_Normal.bmp>,<..Selected.bmp>
Border: 32 <3Dgrey_Normal.bmp>,<..Selected.bmp>
```



```
; default bars (24x24 Bitmaps)
Border: 101 <Bar3Dgrey.G16>
Border: 102 <Bar3Dblue.G16>
Border: 103 <Bar3Dred.G16>
Border: 104 <Bar3Dgreen.G16>
Border: 105 <Bar3Dmagenta.G16>
Border: 106 <Bar3Dcyan.G16>
Border: 107 <Bar3Dyellow.G16>
Border: 111 <BarRoundGrey.G16>
Border: 112 <BarRoundBlue.G16>
Border: 113 <BarRoundRed.G16>
Border: 114 <BarRoundGreen.G16>
Border: 115 <BarRoundMagenta.G16>
Border: 116 <BarRoundCyan.G16>
Border: 117 <BarRoundYellow.G16>
Border: 121 <BarArrowGrey.G16>
Border: 122 <BarArrowBlue.G16>
Border: 123 <BarArrowRed.G16>
Border: 124 <BarArrowGreen.G16>
Border: 125 <BarArrowMagenta.G16>
Border: 126 <BarArrowCyan.G16>
Border: 127 <BarArrowYellow.G16>
```



### 4.5.12 Button

```
BUTTON: nr <file>
BUTTON: nr[page] <file>
BUTTON: nr <file1>,<file2>
BUTTON: nr[page] <file1>,<file2>
```

A button is used for a touch key or a switch ([see Touch commands](#)<sup>[43]</sup>). Note that using a button for touch key/ switch is not so flexible as a border (width and height is fix). The statement BUTTON defines a bitmap <file> for a button nr (0..255). <file> can be BMP, GIF, JPG, TGA, PNG or G16. Optionally 2 different buttons can be defined as <file1> and <file2>. <file1> is for touch key/ switch and <file2> will be used if the touch key/ switch is pressed. Optionally different buttons can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

You can use the [Compiler Functions](#)<sup>[6]</sup> BUTTON\_W and BUTTON\_H to get the outline in pixels of the buttons.

(see How-to-use example [Glass button - EXPERT](#)<sup>[79]</sup>)

### 4.5.13 Picture

```
PICTURE: nr,<file>
PICTURE: nr[page],<file>
```

It is convenient to store all bitmap in FLASH; this will save transfer time via serial interface. The statement PICTURE defines a bitmap <file> with nr (0..255). Optionally different pictures can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

Following image formats can be used:

- BMP: Windows Bitmap with 1-, 4-, 8-, 16-, 24-, 32-BIT colordepth incl. RLE.
- GIF: Graphics Interchange Format incl. optionally transparency
- JPG: JPEG Compressed Images
- TGA: TARGA Images with 8-, 16-, 24-, 32-BIT colordepth incl. RLE and transparency.
- PNG: Portable Network Graphics indexed-color / truecolor / greyscale and transparency.
- G16: internal eDIPTFT format, incl. RLE and transparency

All pictures are converted into internal G16 format with RLE encoding (Compileroption [DORLE](#)<sup>[21]</sup>).

Too big pictures are resized proportional (Compileroption [MAXSIZE](#)<sup>[16]</sup>).

It is also possible to reduce the colordepth (Compileroption [MAXCOLORDEPTH](#)<sup>[17]</sup>).

One Color can be defined as transparent for bitmaps without transparency (Compileroption [MAKETRSPARENT](#)<sup>[19]</sup>).

It is possible to cut a single color or transparency border (Compileroption [REMOVEBORDER](#)<sup>[20]</sup>).

You can use the [Compiler Functions](#)<sup>[6]</sup> PICTURE\_W and PICTURE\_H to get the outline in pixels of the picture.

The pictures can be used with the [Bitmap commands](#)<sup>[37]</sup>

(see How-to-use example [BMP file - BEGINNER](#)<sup>[75]</sup>)



#### 4.5.14 Animation

```
ANIMATION: nr <file>
ANIMATION: nr[page] <file>
ANIMATION: nr <file1>,<file2>,...
ANIMATION: nr[page] <file1>,<file2>,...
```

A animation is a self-running picture. The statement ANIMATION defines an animation image with nr (0..255).

<file> can be an animated GIF, G16.

<file1>,<file2>,... two or more single bitmaps BMP, GIF, JPG, TGA, PNG or G16

Note that max. 4 animations can run at the same time.

The animation images can be used with the [Animation commands](#)<sup>[38]</sup>.

Optionally different animations can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

For **cyclic** animations, compression may reduce data size to save memory space (Compileroption [COMPRESS](#)<sup>[21]</sup> :).

You can use the [Compiler Functions](#)<sup>[6]</sup> ANIMATION\_W and ANIMATION\_H to get the outline in pixels of the animation.

(see How-to-use example [Animated gif - BEGINNER](#)<sup>[76]</sup>)

## 4.5.15 Instrument

**INSTRUMENT:** nr <instrument.I16>

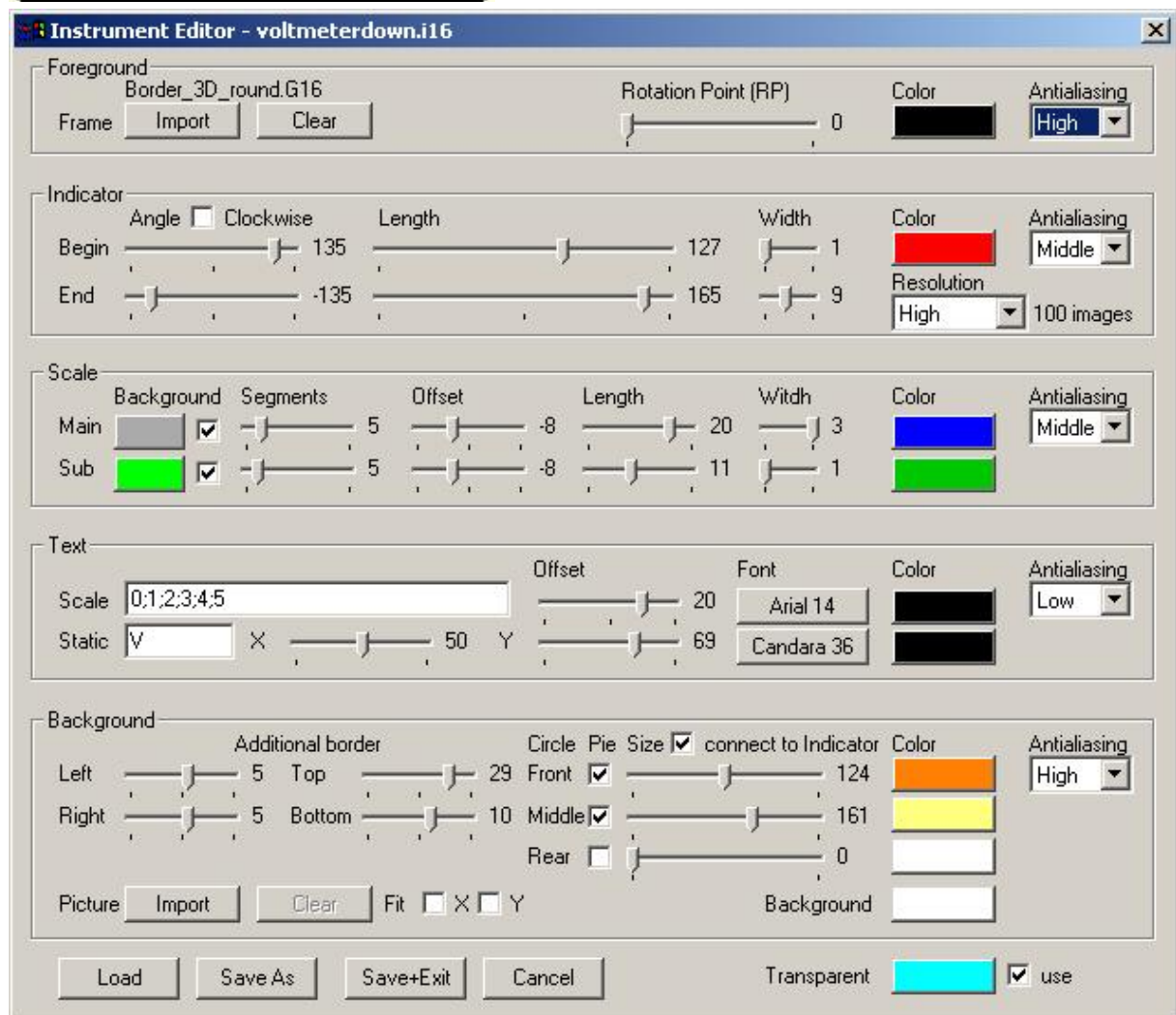
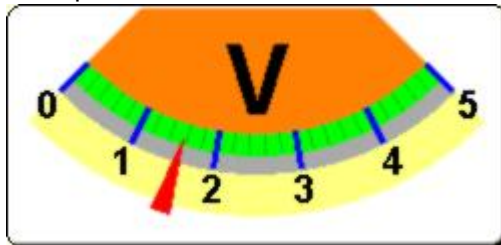
A instrument is a serie of pictures which shows e.g. a panelmeter. The statement INSTRUMENT defines an instrument image with nr (0..255). After DoubleClick the <instrument.I16> an DialogBox appears for edit/change the instrument.

The instrument images can be used with the [Instrument commands](#)<sup>[40]</sup>. Note that max. 4 instruments can used at the same time.

You can use the [Compiler Functions](#)<sup>[6]</sup> INSTRUMENT\_W and INSTRUMENT\_H to get the outline in pixels of the instrument.

(see How-to-use example [Instrument by touch - BEGINNER](#)<sup>[97]</sup>)

Example "voltmeterdown.i16":



further examples:



## 4.6 Macros

### 4.6.1 ExportMacro

```
EXPORTMACRO: n1 [,"chartyp"] [,<filename>]
              n1=0: no export
              n1=1: export all following Macros as a include-File *.h for C;
              n1=2: export all following Macros as a binary-File *.bin;
              n1=3: export both a include-File *.h and a binary-File *.bin;
              "chartyp": optionally another variable type for the byte-array (default
              is "unsigned char")
              <filename>: optionally another filename (default is
              "macroname_macronumber")
```

---

#### Example:

```
ExportMacro: 1, "char flash"

Macro: 5
#TA
#DF BLUE

#FZ WHITE,TRANSPARENT
#ZF FONT4x6
#ZL 12,10, "Font4x6: 0123456789"
#ZF FONT6x8
#ZL 12,20, "Font6x8: Schriftprobe"
#ZF FONT7x12
#ZL 12,30, "Font7x12: Schriftprobe"
```

#### Output in Logfile "Macro\_5.h":

```
/* Macro 5 as include */

#define MACRO_5_LEN 110

char flash MACRO_5[MACRO_5_LEN] =
{
    27, 84, 65, 27, 68, 70, 2, 27, 70, 90, 8, 0, 27, 90, 70, 1, 27, 90, 76, 12,
    0, 10, 0, 70,111,110,116, 52,120, 54, 58, 32, 48, 49, 50, 51, 52, 53, 54, 55,
    56, 57, 0, 27, 90, 70, 2, 27, 90, 76, 12, 0, 20, 0, 70,111,110,116, 54,120,
    56, 58, 32, 83, 99,104,114,105,102,116,112,114,111, 98,101, 0, 27, 90, 70, 3,
    27, 90, 76, 12, 0, 30, 0, 70,111,110,116, 55,120, 49, 50, 58, 32, 83, 99,104,
    114,105,102,116,112,114,111, 98,101, 0
};
```

### 4.6.2 SystemMacros

<b>POWERONMACRO:</b>	All commands defined in this macro will be automatically executed when the power supply is switched on.
----------------------	---

---

<b>RESETMACRO:</b>	All commands defined in this macro will be automatically executed when an external reset on Pin 5 is done.
--------------------	--

---

<b>WATCHDOGMACRO:</b>	All commands defined in this macro will be automatically executed when the display hangs up.
-----------------------	--

---

<b>BROWNOUTMACRO:</b>	All commands defined in this macro will be automatically executed when VDD brakes down to 3.0V or lower.
-----------------------	--

### 4.6.3 Macro

```
MACRO: nr
MACRO: nr[page]
```

Defines a normal macro with number nr (0..255). This macro will be executed with the command [#MN nr](#)<sup>[41]</sup>.

Optionally different normal macros can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

### 4.6.4 TouchMacro

```
TOUCHMACRO: nr
TOUCHMACRO: nr[page]
```

Defines a touch macro with number nr (0..255). This macro will be executed if a touch key / switch with the return code nr is defined and the touch key /switch is pressed or by command [#MT nr](#)<sup>[41]</sup>.

Optionally different touch macros can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

(see How-to-use example [3 simple touch buttons - BEGINNER](#)<sup>[77]</sup>)

### 4.6.5 BitMacro

```
BITMACRO: nr
BITMACRO: nr[page]
```

Defines a bit macro with number nr (0..255). bitmacros will start voltage at a single line IN 1..8 (bit) will change or by command [#MB nr](#)<sup>[41]</sup>.

BitMacro 1..8 are good for falling edge at input 1..8.

BitMacro 9..16 are good for rising edge at input 1..8.

It is possible to change the assignment between BitMacro and input with command [#YD n1,n2,n3](#)<sup>[47]</sup>.

Optionally different bit macros can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

(see How-to-use example [Bit Macro - BEGINNER](#)<sup>[109]</sup>)

### 4.6.6 PortMacro

```
PORTMACRO: nr
PORTMACRO: nr[page]
```

Defines a port macro with number nr (0..255). This macro will be executed if the matching binary bit code is put on the pins IN1..IN8 or by command [#MP nr](#)<sup>[41]</sup>.

Optionally different port macros can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

(see How-to-use example [Port Macro - EXPERT](#)<sup>[111]</sup>)

#### 4.6.7 MatrixMacro

MATRIXMACRO: nr

MATRIXMACRO: nr[page]

Defines a matrix macro with number nr (0..255). This macro will be executed if the one of the connected key pad is pressed or by command [#MX nr](#)<sup>[41]</sup>.

Matrix Macro 1..64: start when keypressed.

Matrix Macro 0: start after release of key.

It is possible to change the assignment between keynumber and matrixmacro with command [#YX n1,n2,n3](#)<sup>[47]</sup>.

The relating pins for matrix keyboard need to be defined with the command [#YM n1,n2,n3](#)<sup>[47]</sup>.

Optionally different matrix macro can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

#### 4.6.8 ProcessMacro

PROCESSMACRO: nr

PROCESSMACRO: nr[page]

Defines a process macro with number nr (0..255). This macro will be executed automatically (see command [#MD no,type,n3,n4,zs](#)<sup>[41]</sup>) or by command [#MC nr](#)<sup>[41]</sup>.

Optionally different process macros can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. screens in different languages.

(see How-to-use example [Process Macro - BEGINNER](#)<sup>[115]</sup>)

### 4.6.9 AnalogMacro

`ANALOGMACRO: nr`  
`ANALOGMACRO: nr[page]`

Defines an analogue macro with number nr (0..255). The macro will be executed automatically when the relating voltage is on the pins AIN1 and AIN2 (see table below) or by command `#MV nr`<sup>[4†]</sup>.

It is possible to change the assignment between `analogurmacrofunction` 0..19 and `analogmacronumber` with command `#VM n1,n2`<sup>[48]</sup>.

Optionally different analog macros can be stored for different pages [0..15]. If no page is selected it is set to 0. The 16 pages are helpful to realize e.g. reens in different languages.

(see How-to-use example [Analogue Macro - Beginner](#)<sup>[107]</sup>)

Macro nr		
AIN1	AIN2	Macro starts at
0	10	every change of input voltage
1	11	falling input voltage
2	12	rising input voltage
3	13	below lower limit
4	14	above lower limit
5	15	below upper limit
6	16	above upper limit
7	17	outside of both limits
8	18	inside of both limits
9	19	lower than other channel

## 5 EA eDIPTFT32-A commands

### 5.1 Terminal

#### Terminal definition:

Set terminal color	#FT fg,bg	Preset color 1..32 for terminal mode (see <a href="#">default colors</a> <sup>[67]</sup> ) fg=foreground color; bg=background color;
Define window	#TW n1,C,L,W,H	The terminal output is executed with font n1: 1=8x8; 2=8x16 only within the window from column C and line L (=upper-left corner) with a width of W and a height of H (specifications in characters) C=1..40; L=1..30/15
Terminal off	#TA	Terminal display is switched off; outputs are rejected
Terminal on	#TE	Terminal display is switched on;

#### Cursor commands:

Position cursor	#TP C,L	C=column; L=line; origin upper-left corner (1,1)
Cursor on/off	#TC n1	n1=0: Cursor is invisible; n1=1: Cursor flashes;
Save cursor position	#TS	The current cursor position is saved
Restore cursor position	#TR	The last saved cursor position is restored

#### Terminal output:

String for terminal	#ZT "text..."	Command for outputting a string (text...) from a macro to the terminal
Output version	#TV	The version no. is output in the terminal e.g. "EA eDIPTFT32-A V1.0 Rev.A"
Output projectname	#TJ	The macrofile-projectname is output in the terminal e.g. "init / delivery state"
Output interface	#TQ	The used interface is output in the terminal e.g. "RS232,115200 baud, ADR \$07"
Output informationen	#TI	The terminal is initialized and cleared; the software version, hardware revision, macrofile-projectname and CRC-checksum are output in the terminal

(see How-to-use example [Keypad - EXPERT](#)<sup>[84]</sup>)

#### Special ASCII-characters:

Form feed	FF (dec:12)	The contents of the screen are deleted and the cursor is placed at pos. (1,1)
Carriage return	CR (dec:13)	Cursor to the beginning of the line on the extreme left
Line feed	LF (dec:10)	Cursor 1 line lower, if cursor in last line then scroll



## 5.2 Display

### Display commands (effect on the entire display):

Set display color	#FD fg,bg	Defines color 1..32 for display and areas fg=foreground color; bg=background color; (see <a href="#">default colors</a> <sup>[6†]</sup> )
Delete display	#DL	Delete display contents (all pixels to background color)
Fill display	#DS	Fill display contents (all pixels to foreground color)
Fill display with color	#DF n1	Fill complete display content with color n1=1..32 (see <a href="#">default colors</a> <sup>[6†]</sup> )
Invert display	#DI	Invert display content

## 5.3 Draw

### Draw straight lines and points:

Set color for lines	#FG fg,bg	Colors 1..32 (0=transparent) fg=color for line; bg=pattern background; (see <a href="#">default colors</a> <sup>[6†]</sup> )
Point size/line thickness	#GZ n1,n2	n1=X-point size (1 to 15) n2=Y-point size (1 to 15)
Pattern	#GM n1	Set line/point pattern no n1=1..255; 0=do not use pattern (see compiler option <a href="#">PATTERN</a> <sup>[22†]</sup> : )
Draw point	#GP x1,y1	Set a point at coordinates x1, y1
Draw rectangle	#GR x1,y1,x2,y2	Draw four straight lines as a rectangle from x1,y1 to x2,y2
Draw straight line	#GD x1,y1,x2,y2	Draw straight line from x1,y1 to x2,y2
Continue straight line	#GW x1,y1	Draw a straight line from last end point to x1, y1
Set start point (firmware V1.2)	#GS x1,y1	Set the last end point at coordinates x1,y1 for commands #GW, #GX and #GY
Draw X-graph (firmware V1.2)	#GX step,y1,...	Draw lines with fix X-steps=0..127 (add 128 for neg.steps) and variable count of Y-values 1..255
Draw Y-graph (firmware V1.2)	#GY step,x1,...	Draw lines with fix Y-steps=0..127 (add 128 for neg.steps) and variable count of X-values 1..255

### Change/draw rectangular areas:

Delete area	#RL x1,y1,x2,y2	Delete an area from x1,y1 to x2,y2 (fill with background color)
Fill area	#RS x1,y1,x2,y2	Fill an area from x1,y1 to x2,y2 (fill with foreground color)
Fill area with color	#RF x1,y1,x2,y2,n1	Fill an area from x1,y1 to x2,y2 with color n1=1..32 (see <a href="#">default colors</a> <sup>[6†]</sup> )
Invert area	#RI x1,y1,x2,y2	Invert an area from x1,y1 to x2,y2
Copy area	#RC x1,y1,x2,y2,x3,y3	Copy an area from x1,y1 to x2,y2 to new position x3,y3

**Draw rectangular areas with pattern:**

Pattern color	#FM fg,bg	Color 1..32 (0=transparent) for monochrome pattern fg=foreground; bg=background color; (see <a href="#">default colors</a> <sup>[6†]</sup> )
Area with fill pattern	#RM x1,y1,x2,y2,nr	Draw an area from x1,y1 to x2,y2 with pattern nr (see compiler option <a href="#">PATTERN</a> <sup>[22]</sup> : )
Draw box	#RO x1,y1,x2,y2,nr	Draw a rectangle x1,y1 to x2,y2 and fill with pattern nr (see compiler option <a href="#">PATTERN</a> <sup>[22]</sup> : )

**Draw frames/borders:**

Set color for border	#FR c1,c2,c3	Set color 1..32 (0=transparent) for border segments c1=frame outside; c2=frame inside; c3=filling; (see <a href="#">default colors</a> <sup>[6†]</sup> )
Set border type	#RE nr,n2	Set border type nr=1..255 border angle: n2=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270° (see compiler option <a href="#">BORDER</a> <sup>[23]</sup> : )
Draw border box	#RR x1,y1,x2,y2	Draw a border box from x1,y1 to x2,y2

(see How-to-use example [Frame - BEGINNER](#)<sup>[9†]</sup>)

## 5.4 Text

### Text settings:

Set text color	#FZ fg,bg	Color 1..32 (0=transparent) for string and character fg=text color; bg=background color; (see <a href="#">default colors</a> <sup>[64]</sup> )
Set font	#ZF n1	Set font with the number nr (see compiler option <a href="#">FONT</a> <sup>[14]</sup> : or <a href="#">WINFONT</a> <sup>[12]</sup> : )
Font zoom factor	#ZZ n1,n2	n1 = X-zoom factor (1x to 8x) n2 = Y-zoom factor (1x to 8x)
Additional width/height	#ZY n1,n2	n1=0..15: additional width left/right n2=0..15: additional height top/bottom
Spacewidth	#ZJ n1	n1=0: use spacewidth from font n1=1: same width as a number n1>=2: width in dot
Text angle	#ZW n1	Text output angle n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°

### Text output:

Output string left justified	#ZL x,y,"text..."	A string (text...) is output left justified to x,y several lines are separated by the character ' ' (\$7C, pipe) character '\' (\$5C, backslash) cancels the special function of ' ' and '\'
Output string centered	#ZC x,y,"text..."	A string (text...) is output centered to x,y several lines are separated by the character ' ' (\$7C, pipe) character '\' (\$5C, backslash) cancels the special function of ' ' and '\'
Output string right justified	#ZR x,y,"text..."	A string (text...) is output right justified to x,y several lines are separated by the character ' ' (\$7C, pipe) character '\' (\$5C, backslash) cancels the special function of ' ' and '\'
Output string in an area	#ZB x1,y1,x2,y2, n1,"text..."	Output a string (...) inside area from x1,y1 to x2,y2 at position n1=1..9; the area will be filled with background color; n1=1: Top Left; n1=2: Top Center; n1=3: Top Right n1=4: Middle Left; n1=5: Middle Center; n1=6: Middle Right n1=7: Bottom Left; n1=8: Bottom Center; n1=9: Bottom Right
String for terminal	#ZT "text..."	Command for outputting a string (text...) from a macro to the terminal

(see How-to-use example [Place Strings - BEGINNER](#)<sup>[70]</sup>)

(see How-to-use example [Cyrillic font - BEGINNER](#)<sup>[74]</sup>)

## 5.5 Bitmap

### Bitmap settings:

Set bitmap colors	#FU fg,bg	painting color 1..32 (0=transparent) for monochrome bitmaps fg=foreground color; bg=background color; (see <a href="#">default colors</a> <sup>[67]</sup> )
Image zoom factor	#UZ n1,n2	n1 = X-zoom factor (1x to 8x) n2 = Y-zoom factor (1x to 8x)
Image angle	#UW n1	output angle of the image n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°
Mirror Image	#UX n1	n1=0: normal display n1=1: the image is mirrored horizontally
Transparency for color bitmaps	#UT n1	n1=0: no transparency; show picture with all colors rectangular n1=1: color of the first dot at top left side will be defined as transparent (like a mask) n1=2: if defined - use transparent color from bitmap-file (GIF,TGA,PNG,G16) n1=3: replace transparent color from bitmap-file (GIF,TGA,PNG,G16) with actually background color

### Output bitmaps:

Load internal image	#UI x1,y1,nr	Load internal image with the no (0 to 255) from the data flash memory to x1,y1 (see compiler option <a href="#">PICTURE</a> <sup>[24]</sup> : )
Load image	#UL x1,y1,data...	Load an image to x1,y1; data... = image in <a href="#">G16</a> <sup>[62]</sup> format This command is only for serial interface, do not use this command in a macro !

(see How-to-use example [BMP file - BEGINNER](#) <sup>[73]</sup>)

### Hardcopy:

RLE compression (firmware V1.2)	#UR	the next hardcopy (#UH xx1,yy1,xx2,yy2) will be sent with RLE compression
Send hardcopy	#UH x1,y1,x2,y2	After this command, the image extract is sent (to sendbuffer) in G16 format. With the program "BitmapEdit.exe" from the LCD-Tools you can convert the G16 format to a Windows *.BMP image

## 5.6 Animation

### Animation settings:

Set animation colors	#FW fg,bg	color for 1..32 monochrome animation images fg=foreground color; bg=background color; (see <a href="#">default colors</a> <sup>[6†]</sup> )
Animation zoom factor	#WZ n1,n2	n1 = X-zoom factor (1x to 8x) n2 = Y-zoom factor (1x to 8x)
Animation angle	#WW n1	output angle of the animation image n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°
Mirror animation	#WX n1	n1=0: normal display n1=1: the animation image is mirrored horizontally
Transparency for color animation	#WT n1	n1=0: no transparency; show animation with all colors rectangular n1=1: color of the first dot at top left side will be defined as transparent (like a mask) n1=2: if defined - use transparent color from animation-file (.GIF.G16) n1=3: replace transparent color from animation-file with actually background color

### Animation bitmap:

Load single image	#WI x1,y1,nr,n2	Load from animation image nr=0..255 the sub image n2 to x1,y1(see <a href="#">ANIMATION</a> <sup>[28†]</sup> : )
-------------------	-----------------	--

### Animation process:

Define animation process	#WD no,x1,y1,nr,type,time	Define an animationprocess no=1..4 at position x1,y1 (=left top edge) with animation image nr=0..255. (see <a href="#">ANIMATION</a> <sup>[28†]</sup> : ) type: 1=run once; 2=cyclically; 3=pingpong; 4=once backwards; 5=cyclic backwards; 6=pingpong backwards; 7=manually (use command ESC W N P F M) time: 0=stop; 1..254=time in in 1/10 sec; 255=use time from animation-file
Change animation type	#WY no,type	Assign a new type=1..7 to animationprocess no=1..4
Change animation time	#WC no,time	Assign a new time=0..255 to animationprocess no=1..4
Next animation image	#WN no	Show the next image from animationprocess no=1..4
Previous animation image	#WP no	Show the previous image from animationprocess no=1..4
Show animation image	#WF no,n2	Show image n2 from animationprocess no=1..4
Run to animation image	#WM no,n2	Run animationprocess no=1..4 from actually image to image n2
Stop animationprocess	#WL no	Stop animationprocess no=1..4 and clear last image with actually background color

(see How-to-use example [Animated gif - BEGINNER](#) <sup>[78†]</sup>)

## 5.7 Bargraph

### Bargraph settings:

Set color for bargraph	#FB fg,bg,fc	Set colors 1..32 for bargraph (see <a href="#">default colors</a> <sup>[6†]</sup> ) fg=foreground; bg=background; fc=color for frame
Bargraph pattern	#BM nr	Pattern for bargraph nr=1..255; nr=0 no pattern/solid (valid for type=0..3) (see <a href="#">PATTERN</a> <sup>[22†]</sup> : )
Bargraph border	#BE nr	Border for bargraph nr=0..255 (valid for type=4..7) (see compiler option <a href="#">BORDER</a> <sup>[23†]</sup> : )
Bargraph linewidth	#BB n1	Linewidth for bargraph n1=1..255; n1=0 automatic (valid for type=2,3,6,7)

### Define/use bargraphs:

Define bargraph	#BR #BL #BO #BU no,x1,y1,x2,y2, sv,ev,type	Define bargraph no=1..20 to L(ef), R(ight), O(up), U(down) x1,y1,x2,y2 rectangle enclosing the bar graph; sv, ev are the values for 0% and 100% type: 0=pattern bar; 1=pattern bar in rectangle type: 2=pattern line; 3=pattern line in rectangle type: 4=border bar; 5=border bar in rectangle type: 6=border line; 7=border line in rectangle
Update bargraph	#BA no,value	Set and draw the bar no=1..20 to the new value
Draw bargraph	#BN no	Entirely redraw the bar with the number no=1..20
Send bargraph value	#BS no	Send the current value of bar no=1..20 to sendbuffer
Delete bargraph	#BD no,n2	The definition of the bar with the number no=1..20 becomes invalid. If the bar graph was defined as input with touch, this touch field will also be deleted. n2=0: Bar remains visible; n2=1: Bar is deleted

(see How-to-use example [Bargraph by touch - BEGINNER](#)<sup>[93†]</sup>)

### Bargraph user values - Format text output:

User value color	#FX fg,bg	Set color 1..32 for bargraph user value fg=foreground; bg=background color; (see <a href="#">default colors</a> <sup>[6†]</sup> )
User value font	#BF nr	Set font nr for bargraph user value (see compiler option <a href="#">FONT</a> <sup>[1†]</sup> : or <a href="#">WINFONT</a> <sup>[12†]</sup> : )
User value zoom	#BZ n1,n2	Set zoom factor for bargraph user value n1=X-Zoom 1x..8x; n2=Y-Zoom 1x..8x
User value additional width/height	#BY n1,n2	n1=0..15: additional width left/right; n2=0..15: additional height top/bottom for user value
User value angle	#BW n1	Set writing angle for bargraph user value n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°;
User values / scaling	#BX no,x1,y1, "FormatString"	Define user value for bargraph no=1..20. Output is always right justified to x1,y1 Format String: "bv1=uservalue1;bv2=uservalue2" Assign two bar values (bv1,bv2 =0..254) to user defined values max. range: 4 1/2 digits 19999 + decimal point (',' oder '.') + sign e.g. display "-123.4" for bar value bv1=0 and "567.8" for bar value bv2=100 Format String: "0=-123.4;100=567.8"

## 5.8 Instrument

### Define/use instruments:

Define instrument	# IP no, x1,y1, n2,n3, sv,ev	Define instrument no=1..4 at position x1,y1 (=left top edge) with instrument image n2=0..255 Instrument angle: n3=0: 0°; n3=1: 90°; n3=2: 180°; n3=3: 270°; sv, ev are the values for 0% and 100% (see compiler option <a href="#">INSTRUMENT</a> <sup>[28]</sup> : )
Update instrument	# IA no,value	Set and draw the instrument no=1..4 to the new value
Draw instrument	# IN no	Entirely redraw the instrument with the number no=1..4
Send instrument value	# IS no	Send the current value of instrument no=1..20 to sendbuffer
Delete instrument	# ID no,n2	The definition of the instrument with the number no=1..4 becomes invalid. n2=0: Instrument remains visible; n2=1: Instrument is deleted

(see How-to-use example [Instrument by touch - BEGINNER](#)<sup>[97]</sup>)

### Instrument user values - Format text output:

User value color	# FI fg,bg	Set color 1..32 for instrument user value fg=foreground; bg=background color; (see <a href="#">default colors</a> <sup>[67]</sup> )
User value font	# IF nr	Set font nr for instrument user value (see compiler option <a href="#">FONT</a> <sup>[17]</sup> : or <a href="#">WINFONT</a> <sup>[12]</sup> : )
User value zoom	# IZ n1,n2	Set zoom factor for instrument user value n1=X-Zoom 1x..8x; n2=Y-Zoom 1x..8x
User value additional width/height	# IY n1,n2	n1=0..15: additional width left/right; n2=0..15: additional height top/bottom for instrument user value;
User value angle	# IW n1	Set writing angle for instrument user value n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°;
User values / scaling	# IX no,x1,y1, "FormatString"	Define user value for instrument no=1..4. Output is always right justified to x1,y1 Format String: "iv1=uservalue1;iv2=uservalue2" Assign two instrument values (iv1,iv2 =0..254) to user defined values max. range: 4 1/2 digits 19999 + decimal point (',' or '.') + sign e.g. display "-123.4" for iv1=0 and "567.8" for iv2=100 Format String: "0=-123.4;100=567.8"



## 5.9 Macros

### Run macros:

Run macro	#MN nr	Call the (normal) macro with the number nr (max. 7 levels) (see compiler option <a href="#">MACRO</a> <sup>[29]</sup> : )
Run touch macros	#MT nr	Call the touch macro with the number nr (max. 7 levels) (see compiler option <a href="#">TOUCHMACRO</a> <sup>[29]</sup> : )
Run port macro	#MP nr	Call the port macro with the number nr (max. 7 levels) (see compiler option <a href="#">PORTMACRO</a> <sup>[29]</sup> : )
Run bit macro	#MB nr	Call the bit macro with the number nr (max. 7 levels) (see compiler option <a href="#">BITMACRO</a> <sup>[29]</sup> : )
Run matrix macro	#MX nr	Call the matrix macro with the number nr (max. 7 levels) (see compiler option <a href="#">MATRIXMACRO</a> <sup>[30]</sup> : )
Run process macro	#MC nr	Call the process macro with the number nr (max. 7 levels) (see compiler option <a href="#">PROCESSMACRO</a> <sup>[30]</sup> : )
Run analogue macro	#MV nr	Call the analogue macro with the number nr (max. 7 levels) (see compiler option <a href="#">ANALOGMACRO</a> <sup>[31]</sup> : )

### Macro settings:

Disable macros	#ML type,n1,n2	Macros of the type 'N','T','P','B','X','C' or 'V' (type 'A' = all macro types) are disabled from the number n1 to n2; i.e. no longer run when called.
Enable macros	#MU type,n1,n2	Macros of the type 'N','T','P','B','X','C' or 'V' (type 'A' = all macro types) are enabled from number n1 to n2; i.e. run again when called.
Select macro/image page	#MK n1	A page is selected for macros and images n1=0 to 15 if a macro/image is not defined in the current page 1 to 15, this macro/image is taken from page 0 (e.g. to switch languages or for horizontal/vertical installation).
Save macro/image page	#MW	the current macro/image page is saved (when used in process macros)
Restore macro/image page	#MR	the last saved macro/image page is restored

(see How-to-use example [Languages/Macro Pages - BEGINNER](#)<sup>[103]</sup>)

**Automatic (normal-) macros:**

Macro with delay	#MG n1,n2	Call the (normal) macro with the number n1 in n2/10s Execution is stopped by commands (e.g. receipt or touch macros).
Autom. macros once only	#ME n1,n2,n3	Automatically run macros n1 to n2 once only; n3=pause in 1/10s Execution is stopped by commands (e.g. receipt or touch macros).
Autom. macros cyclical	#MA n1,n2,n3	Automatically run macros n1 to n2 cyclically; n3=pause in 1/10s Execution is stopped by commands (e.g. receipt or touch macros).
Autom. macros ping pong	#MJ n1,n2,n3	Automatically run macros n1 to n2 to n1 (ping pong); n3=pause in 1/10s Execution is stopped, for example, by receipt or touch macros

(see How-to-use example [Automatic Macro - EXPERT](#) <sup>[113]</sup>)

**Macro processes:**

Define macro process	#MD no,type,n3,n4,zs	A macro process with the number no (1 to 4) is defined (1=highest priority). The process macros n3 to n4 are run successively every zs/10s. type: 1=once only; 2=cyclical; 3=ping pong n3 to n4 to n3
Macro process interval	#MZ no,zs	a new time zs in 1/10s is assigned to the macro process with the number no (1 to 4). if the time zs=0, execution is stopped.
Stop macro processes	#MS n1	All macro processes and animations are stopped with n1=0 and restarted with n1=1 in order, for example, to execute settings and outputs via the interface undisturbed

(see How-to-use example [Process Macro - BEGINNER](#) <sup>[113]</sup>)

## 5.10 Touch

### Touch presets:

Touch border colors	#FE n1,n2,n3, s1,s2,s3	Set the colors 1..32 (0=transparent) for touch border (#AT #AK) n=normal; s=selected; 1=frame outside; 2=frame inside; 3=filling (see <a href="#">default colors</a> <sup>[6†]</sup> )
Touch border form	#AE nr,n2	nr=1..255 border number (see compiler option <a href="#">BORDER</a> <sup>[23†]</sup> : ) nr=0 no border n2=angle 0=0°; 1=90°; 2=180°; 3=270°
Touch button colors	#FC nf,nb, sf,sb	Set the colors 1..32 for monochrome touch buttons (#AU #AJ) n=normal; s=selected; f=foreground; b=background (see <a href="#">default colors</a> <sup>[6†]</sup> )
Touch button number	#AC nr,n2,n3,n4	nr=0..255 button number (see compiler option <a href="#">BUTTON</a> <sup>[24†]</sup> : ) n2=button angle 0=0°; 1=90°; 2=180°; 3=270° n3=X-Zoom 1..8; n4=Y-Zoom 1..8
Radio group for switches	#AR n1	n1=0: newly defined switches do not belong to a group n1=1..255: newly defined switches belong to the group with the number n1. Only 1 switch in a group is active at any one time; all the others are deactivated. In the case of a switch in a group, only the down code is applicable. the up code is ignored.

(see How-to-use example [Radio group - BEGINNER](#)<sup>[82†]</sup>)

### Label font presets:

Font color	#FA nf,sf	Color 1..32 for touch labeling (see <a href="#">default colors</a> <sup>[6†]</sup> ) nf=normal fontcolor; sf= fontcolor for selection
Label font	#AF nr	Set font with the number nr for touch key label (see compiler option <a href="#">FONT</a> <sup>[14†]</sup> : or <a href="#">WINFONT</a> <sup>[12†]</sup> : )
Label zoom factor	#AZ n1,n2	n1=X-zoom factor (1x to 8x); n2=Y-zoom factor (1x to 8x)
Additional width/height	#AY n1,n2	n1=0..15: additional width left/right n2=0..15: additional height top/bottom
Label angle	#AW n1	Label output angle: n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°
Offset for selected label	#AO n1,n2	n1=X-offset; n2=Y-offset n1,n2=0..7 (add +8 for negative direction)

**Define touch key/switches:**

Define touch key	#AT x1,y1,x2,y2, downCode,upCode, "text..." #AU x,y, downCode,upCode, "text..."	key remains depressed as long as there is contact
Define touch switch	#AK x1,y1,x2,y2, downCode,upCode, "text..." #AJ x,y, downCode,upCode, "text..."	status of the switch toggles after each contact

#AT: The area from x1,y1 to x2,y2 is drawn with actual border and defined as a key  
 #AK: The area from x1,y1 to x2,y2 is drawn with actual border and defined as a switch  
 #AU: The actual button is loaded to x,y and defined as a key  
 #AJ: The actual button is loaded to x,y and defined as a switch  
 'downCode': (1-255) return/touchmacro when key pressed  
 'upCode': (1-255) return/touchmacro when key released  
 (downCode/upCode = 0 press/release not reported).  
 "text...": this is a string that is placed in the key with the current touch font.  
 The first character determines the alignment of the text (C=centered, L=left justified, R=right justified)  
 Multiline texts are separated with the character '|' (\$7C, dec: 124)  
 optional: after the character '~' (\$7E, dec: 126) you can write a 2nd text for a selected touch key/switch  
 e.g. "LED|on~LED|off"

(see How-to-use example [3 simple touch buttons - BEGINNER](#) <sup>[77]</sup>)

(see How-to-use example [Glass button - EXPERT](#) <sup>[79]</sup>)

**Define touch areas:**

Define drawing area	#AD x1,y1,x2,y2, n1,fg	A drawing area is defined. You can then draw with a line width of n1 and color fg within the corner coordinates x1,y1 and x2,y2. (see <a href="#">default colors</a> <sup>[67]</sup> )
Define free touch area	#AH x1,y1,x2,y2	A freely usable touch area is defined. Touch actions (down, up and drag) within the corner coordinates x1,y1 and x2,y2 are sent.
Set bar by touch	#AB no	The bargraph with no=1..20 is defined for input by touch panel.
Set instrument by touch	#A+ no	The instrument with no=1..4 is defined for input by touch panel.

(see How-to-use example [Free draw area - BEGINNER](#) <sup>[88]</sup>)

(see How-to-use example [Bargraph by touch - BEGINNER](#) <sup>[93]</sup>)

(see How-to-use example [Instrument by touch - BEGINNER](#) <sup>[97]</sup>)

**Global settings:**

Touch query on/off	#AA n1	Touch query is n1=0: deactivated n1=1: activated
Touch key response	#AI n1	Automatic inversion when touch key touched n1=0: OFF n1=1: ON
Touch key response buzzer	#AS n1	Tone sounds briefly when a touch key is touched n1=0: OFF n1=1: ON
Send bar value on/off	#AQ n1	Automatic transmission of a new bar graph value by touch input n1=0: deactivated n1=1: is placed in the sendbuffer once at the end of input n1=2: changes are placed continuous into sendbuffer during input

**Other touch functions:**

Invert touch key	#AN code	The touch key with the assigned return code is inverted manually
Set touch switch	#AP code,n1	The status of the switch with the return code is changed to n1=0: OFF n1=1: ON
Query touch switch	#AX code	The status of the switch with the return code is placed in the sendbuffer (off=0; on=1)
Query radio group	#AG n1	down code of the activated switch from the radio group n1 is placed in the sendbuffer
Delete touch area by up- or down-code	#AL code, n1	The touch area with the return code is removed from the touch query (code=0: all touch areas). When n1=0, the area remains visible on the display When n1=1, the area is deleted
Delete touch area by coordinates	#AV x,y,n1	Remove the Touch area that includes the coordinates x1,y1 from the touch query. When n1=0, the area remains visible on the display When n1=1, the area is deleted

## 5.11 Backlight

### LED backlight:

Illumination brightness	#YH n1	Set brightness of the LED illumination n1=0 to 100%.
Increase brightness	#YN	Increase brightness of the LED illumination (one step=1%)
Decrease brightness	#YP	Decrease brightness of the LED illumination (one step=1%)
Brightness changetime	#YZ n1	Time n1=0..31 in 1/10sec for changing brightness from 0 to 100%
Illumination on/off	#YL n1	LED n1=0: OFF; n1=1: ON n1=2 to 255: LED switched ON for n1/10sec
Assign bar with backlight	#YB no	Assign bar no=1..20 for changing brightness of the backlight
Assign instrument with backlight	#Y+ no	Assign instrument no=1..4 for changing brightness of the backlight
Save parameter	#Y@	Save the actual brightness and changetime for poweron to EEPROM

(see How-to-use example [Bargraph by touch - BEGINNER](#) <sup>[93]</sup>)

## 5.12 Digital IO-Port

### I/O-ports:

Write output port	#YW n1,n2	n1=0: Set all 8 output ports in accordance with n2 (=8-bit binary) n1=1..8: Reset output port n1 (n2=0); set (n2=1); invert (n2=2)
Read input port	#YR n1	n1=0: Read all 8 input ports as 8-bit binary value (to sendbuffer) n1=1..8: Read input port <n1> (1=H-level=VDD, 0=L-level=0V)
Port scan on/off	#YA n1	The automatic scan of the input port is n1=0: deactivated n1=1: activated
Invert input port	#YI n1	The input port is n1=0: evaluated normal n1=1: evaluated inverted
Redefine input bitmacro	#YD n1,n2,n3	n1=1..8: input port n2=0: falling-edge or n2=1: rising-edge n3=0..255: new BitMacro number

(see How-to-use example [Bit Macro - BEGINNER](#)<sup>[109]</sup>)

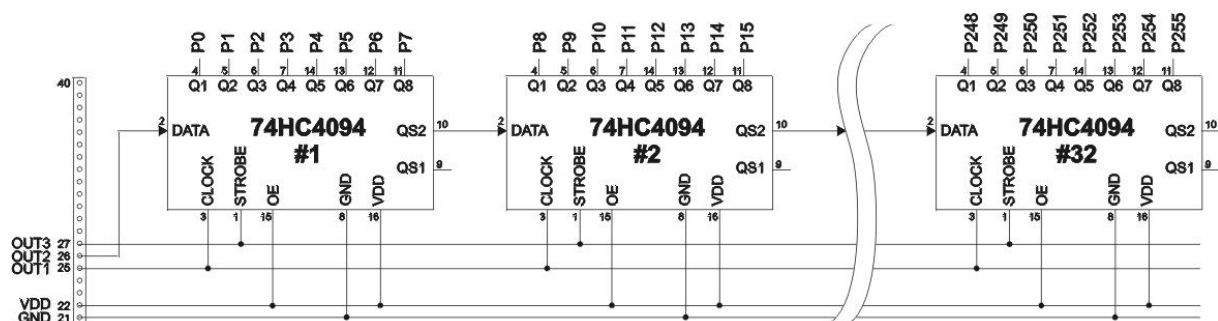
(see How-to-use example [Port Macro - EXPERT](#)<sup>[111]</sup>)

### External matrix keyboard:

Matrix keyboard	#YM n1,n2,n3	Specifies an external matrix keyboard at the inputs and outputs n1=number of inputs (1..8) n2=number of outputs (0..8) n3=debouncing (0..7)
Redefine matrixmacro for keys	#YX n1,n2	Assign keynumber n1=1..65 with matrixtmacro n2=0..255 After release the key n1=0 run matrixtmacro n2=0..255

### Additional Outputs:

Write extended ports (with 74HC4094)	#YE n1,n2,n3	write from output port n1=0..255 to port n2=0..255 n3=0 Reset ports n3=1 Set ports n3=2 Invert ports
--------------------------------------	--------------	---



## 5.13 Analogue Input

### Analogue inputs:

Calibration	#V@ ch,x1	Calibration procedure is as follows: 1.) Apply defined voltage (2..VDD) to AIN1 or AIN2 2.) Run this command with channel information ch=1..2 and x1=voltage value in [mV] e.g. 3.0V on AIN1 command: #V@1,3000
Enable/disable AIN scan	#VA n1	n1=0 disables input scan for AIN1 and AIN2 n1=1 enable input scan
Send analog value	#VD ch	Voltage in [mV] will be sent (to sendbuffer) for channel ch=1..2
Limit for analog macro	#VK ch,n1,n2,n3	Sets two limits for channel ch=1..2 n1=lower limit [mV/20] n2=upper limit [mV/20] n3=hysteresis [mV] Related to this limits serveral analogmacros can be started automatically.
Redefine analogmacro	#VM n1,n2	Assign analogmacrofunction n1=0..19 with analogmacronumber n2=0..255
Bargraph for AIN1/AIN2	#VB ch,no	Assigns bargraph no=1..20 to analogue input ch=1..2 (it is possible to assign more than one bargraph to an anlogue input). Define start- endvalues for bargraph ( <a href="#">see #B RLOU</a> <sup>[39]</sup> ) in [mV/20]
Instrument for AIN1/AIN2	#V+ ch,no	Assigns instrument no=1..4 to analogue input ch=1..2 Define start- endvalues for instrument ( <a href="#">see #IP</a> <sup>[40]</sup> ) in [mV/20]
Redraw bar/instrument	#VR ch	Redraw all bargraphs and instruments defined for channel ch=1..2

(see How-to-use example [Analogue Macro - Beginner](#)<sup>[108]</sup>)

(see How-to-use example [Instrument by analogue input - BEGINNER](#)<sup>[98]</sup>)



**Analogue in user values - Format text output:**

User value color	#FV ch,fg,bg	Set color 1..32 for string output of channel ch=1..2 fg=foreground; bg=background color; (see <a href="#">default colors</a> <sup>[67]</sup> )
User value Font	#VF ch,nr	Set font nr for channel ch=1..2 (see compiler option <a href="#">FONT</a> <sup>[17]</sup> : or <a href="#">WINFONT</a> <sup>[12]</sup> : )
User value zoom	#VZ ch,n1,n2	Set zoom factor for channel ch=1..2 n1=X-Zoom 1x..8x n2=Y-Zoom 1x..8x
User value additional width/height	#VY ch,n1,n2	n1=0..15: additional width left/right n2=0..15: additional height top/bottom for channel ch=1..2;
User value angle	#VW ch,n1	Set writing angle for channel ch=1..2 n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°;
User values / scaling	#VE ch,"FmtStr"	Set user value for channel ch=1..2 Format String: "mV1=uservalue1;mV2=uservalue2" Assign two voltages in [mV] to user defined values max. range: 4 1/2 digits 19999 + decimal point (',' oder ',') + sign e.g. display for 2000mV should be "-123.45" and "0.00" for 1000mV Format String: "2000=- 123.45;1000=0"
Send user value	#VS ch	This will send current voltage as formatted string for channel ch=1..2 to sendbuffer
Display on terminal	#VT ch	Show formatted string of channel ch=1..2 on terminal window
Display user value	#VG ch,x1,y1	Show formatted string of channel ch=1..2 at coordinate x1,y1

## 5.14 Other commands

### Use string table:

String table code (firmware V1.2)	#ST n1	n1=0: no use of internal strings n1>0: after code n1 appears following codes are internal string numbers (see compiler option <a href="#">STRING</a> : <sup>[107]</sup> )
--------------------------------------	--------	--

(see How-to-use example [String tables - EXPERT](#) <sup>[108]</sup>)

### Send functions:

Send bytes	#SB data...	bytes are sent to the sendbuffer data... can be numbers or strings e.g #SB "Test",10,13
Send version	#SV	The version is sent as a string to sendbuffer e.g. "EA eDIPTFT32-A V1.0 Rev.A TP+"
Send projectname	#SJ	The macro-projectname is sent as a string to the sendbuffer e.g. "init / delivery state"
Send internal infos	#SI	Internal information about the eDIP is sent to the sendbuffer.

### Other functions:

Define color	#FP no, R5,G6,B5	Set a new RGB value for color no. n1=1..32 R5:Bit7..3; G6:Bit7..2; B5:Bit7..3; (see <a href="#">default colors</a> <sup>[67]</sup> )
Wait (pause)	#X n1	Wait n1/10sec before the next command is executed.
Set RS485 address	#KA adr	For RS232/RS485 operation only and only possible when Hardware address is 0. The eDIP is assigned a new address adr (in the Power-On macro). (see compile option <a href="#">RS485ADR</a> <sup>[94]</sup> ) (see example <a href="#">INIT_with_RS485_address.KMC</a> <sup>[68]</sup> )
Tone on/off	#YS n1	The tone output (pin 16) becomes n1=0:OFF; n1=1:ON; n1=2 to 255:ON for n1/10s

## 6 Default Fonts

### 6.1 Terminal 8x8

+ Lower Upper	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$00 (dez: 0)	o	↑	↓	↻	↻	✓	♪	♯	←	→	LF	⌥	FF	CR	S <sub>O</sub>	S <sub>I</sub>
\$10 (dez: 16)	□	!	2	3	4	5	6	7	8	9	0	E <sub>S</sub>	↑	↓	→	←
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez: 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez: 96)	˘	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	Δ
\$80 (dez: 128)	ç	ü	é	â	ä	à	á	ç	ê	ë	è	ï	î	ì	ä	å
\$90 (dez: 144)	é	æ	Æ	ô	ö	ò	û	ù	ÿ	ö	ü	ç	£	¥	β	f
\$A0 (dez: 160)	á	í	ó	ú	ñ	ñ	æ	ø	¿	¡	½	¼	¡	«	»	
\$B0 (dez: 176)	::	∴	☒	l	†	‡	§	¶	¶	¶	¶	¶	¶	¶	¶	¶
\$C0 (dez: 192)	L	⊥	T	†	+	+	+	+	+	+	+	+	+	+	+	+
\$D0 (dez: 208)	μ	τ	π	μ	ε	F	π	π	π	π	π	π	π	π	π	π
\$E0 (dez: 224)	α	β	Γ	π	Σ	σ	μ	τ	ϕ	θ	η	δ	φ	φ	Ε	Π
\$F0 (dez: 240)	≡	±	≥	≤	ρ	J	÷	≈	°	*	.	√	n	2	3	—

## 6.2 Terminal 8x16

+ Lower Upper	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$00 (dez: 0)	N <sub>U</sub> <sub>L</sub>	↑	↓	↕	↔	✓	♪	♯	+	⇒	L <sub>F</sub>	↓	F <sub>F</sub>	C <sub>R</sub>	S <sub>O</sub>	S <sub>I</sub>
\$10 (dez: 16)	0	1	2	3	4	5	6	7	8	9	⓪	E <sub>S</sub>	↑	↓	→	←
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez: 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez: 96)	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	Δ
\$80 (dez: 128)	Ç	ü	é	â	ä	à	ã	ç	ê	ë	è	ï	î	ì	ñ	ñ
\$90 (dez: 144)	É	æ	Æ	ô	ö	ò	û	ù	ÿ	ö	Ü	¢	£	¥	β	f
\$A0 (dez: 160)	á	í	ó	ú	ñ	ñ	ä	ö	í	í	½	¼	í	«	»	
\$B0 (dez: 176)	⋮	⋮	⋮		†	‡		π	¶			¶	¶	¶	¶	¶
\$C0 (dez: 192)	L	L	T	†	-	†	†		¶	¶	¶	¶	¶	=	¶	¶
\$D0 (dez: 208)	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶
\$E0 (dez: 224)	α	β	Γ	π	Σ	σ	μ	τ	Ω	θ	Ω	δ	φ	φ	€	Π
\$F0 (dez: 240)	≡	±	≥	≤	∫	J	÷	≈	°	•	•	√	π	2	3	-

## 6.3 Font 4x6

<div>+ Lower</div> <div>Upper</div>	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	Q	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez: 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez: 96)	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	Δ
\$80 (dez: 128)	€	ü			ö										ä	
\$90 (dez: 144)					ö				ø	ü					ß	

## 6.4 Font 6x8

+ Lower Upper	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez: 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez: 96)	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
\$80 (dez: 128)																
\$90 (dez: 144)	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	­	®	¯	°
\$A0 (dez: 160)	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿	
\$B0 (dez: 176)																
\$C0 (dez: 192)																
\$D0 (dez: 208)																
\$E0 (dez: 224)																
\$F0 (dez: 240)	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	­	®	¯	°

## 6.5 Font 7x12

<div>+ Lower</div> <div>Upper</div>	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
\$50 (dez: 80)	p	q	r	s	t	u	v	w	x	y	z	[	\	]	^	_
\$60 (dez: 96)	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	Δ
\$80 (dez: 128)	€	ü	é	â	ä	à	ã	ç	ê	ë	è	ï	î	ì	ñ	â
\$90 (dez: 144)	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	¢	£	¥	ß	f
\$A0 (dez: 160)	á	í	ó	ú	ñ	ñ	ä	ø	¿	¬	½	¼	¡	«	»	
\$B0 (dez: 176)																
\$C0 (dez: 192)																
\$D0 (dez: 208)																
\$E0 (dez: 224)	α	β	Γ	π	Σ	σ	μ	τ	ϋ	θ	Ω	δ	φ	φ	ε	π
\$F0 (dez: 240)	≡	±	≥	≤	Γ	J	÷	≈	°	•	•	√	n	2	3	—



## 6.6 Geneva 10

+ Lower Upper	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez: 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez: 96)	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	Δ
\$80 (dez: 128)	€	ü	é	â	ä	à	â	ç	ê	ë	è	ï	î	ì	Ä	Å
\$90 (dez: 144)	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü					
\$A0 (dez: 160)	á	í	ó	ú	ñ	ñ	ä	ö								
\$B0 (dez: 176)																
\$C0 (dez: 192)																
\$D0 (dez: 208)																
\$E0 (dez: 224)		ß														
\$F0 (dez: 240)									ø							



## 6.7 Chicago 14

+ Lower Upper	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez: 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez: 64)	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez: 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez: 96)	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez: 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	Δ
\$80 (dez: 128)	€	ü	é	â	ä	à	ã	ç	ê	ë	è	ï	î	ì	Ä	Å
\$90 (dez: 144)	É	æ	Æ	ô	ö	ò	û	ù	ÿ	ö	Ü					
\$A0 (dez: 160)	á	í	ó	ú	ñ	Ñ	ä	ö								
\$B0 (dez: 176)																
\$C0 (dez: 192)																
\$D0 (dez: 208)																
\$E0 (dez: 224)		ß														
\$F0 (dez: 240)									°							

## 6.8 Swiss 30

+ Lower Upper	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez. 32)		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
\$30 (dez. 48)	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
\$40 (dez. 64)	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
\$50 (dez. 80)	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
\$60 (dez. 96)	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
\$70 (dez. 112)	p	q	r	s	t	u	v	w	x	y	z	{		}	~	↓
\$80 (dez. 128)	€	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
\$90 (dez. 144)	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü					
\$A0 (dez. 160)	á	í	ó	ú	ñ	Ñ	ä	ö								
\$B0 (dez. 176)																
\$C0 (dez. 192)																
\$D0 (dez. 208)																
\$E0 (dez. 224)		ß														
\$F0 (dez. 240)									°							

## 6.9 BigZif 50

<div>+ Lower</div> <div>Upper</div>	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)												+		-	.	
\$30 (dez: 48)	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	:					

## 6.10 BigZif 100

<div>+ Lower</div> <div>Upper</div>	\$0 (0)	\$1 (1)	\$2 (2)	\$3 (3)	\$4 (4)	\$5 (5)	\$6 (6)	\$7 (7)	\$8 (8)	\$9 (9)	\$A (10)	\$B (11)	\$C (12)	\$D (13)	\$E (14)	\$F (15)
\$20 (dez: 32)												+		-	.	
\$30 (dez: 48)	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	:					

## 7 Default Colors

EA eDIPTFT32-A is able to work with 65,536 colors. For an easy use there exists a color palette with 32 entries (16 colors are predefined after PowerOn). This color palette can be redefined at any time without changing the content of the display (command: `#FnoRGB[50]`). To use a color for text and graphic functions you set only a number between 1..32. The dummy color number 255 means that the actual color is not changed e.g you want only to change the foreground- and not the background color. The color number 0=transparent is special and can be used for background of character e.g. that means placing a character no rectangular field will be deleted around the character itself.

predfined constants (`include <..\default_constant.kmi>`)

```

;-----
; color constants

```

```
TRANSPARENT = 0
```

```

BLACK      = 1      ; RGB:  0  0  0
BLUE       = 2      ; RGB:  0  0 255
RED        = 3      ; RGB: 255 0  0
GREEN      = 4      ; RGB:  0 255 0
MAGENTA    = 5      ; RGB: 255 0 255
CYAN       = 6      ; RGB:  0 255 255
YELLOW     = 7      ; RGB: 255 255 0
WHITE      = 8      ; RGB: 255 255 255
DARKGREY   = 9      ; RGB: 111 111 111
ORANGE     = 10     ; RGB: 255 143  0
PURPLE     = 11     ; RGB: 143  0 255
DEEPPINK   = 12     ; RGB: 255  0 143
MINT       = 13     ; RGB:  0 255 143
LAWNGREEN  = 14     ; RGB: 143 255  0
SKYBLUE    = 15     ; RGB:  0 143 255
GREY       = 16     ; RGB: 175 175 175

```

```
NOCHANGE = 255
```



## 8 G16FORMAT

Use 'BitmapEdit.exe' from the LCD-Tools package to convert \*.BMP, \*.JPG, \*.GIF, \*.TGA or \*.PNG into internal G16-format.

Structure of an image file in the G16 format:

This format handles both a single picture, and several pictures (e.g. containing fonts or animations). A transparency color is supported.

---

### Structure of the picture header:

Byte	value	description
1.	\$1b	ESC An image file always begins with
2.	\$55	' U ' the imag load instruction
3.	\$4c	' L '
4.	\$00	X-coordinate LOW byte
5.	\$00	X-coordinate HIGH byte
6.	\$00	Y-coordinate LOW byte
7.	\$00	Y-coordinate HIGH byte
8.	\$47	'G' identification for a picture -, Font-,
9.	\$31	'1' or animation-file in the G16 format
10.	\$36	'6'
11.	Bits per pixel	1=Monochrome; 4=16 colors; 8=256 colors; 16=65536 colors High Color RGB565
12.	Transparency	0=none, 1=the following vaild transparency color
		4/8-bit: 16-Bit:
13.		Pallet No. of the transparency color \ RGB565-WORD that
14.		Number of existing color palette (0=256) / transparency color
15.		reserved
16.	Size of the pictures	0=different dimensions 1=equal width 2=qual height (e.g. proportional Fonts) 3=equal dimensions
17.	First	First picture / characters number
18.	Last	Last picture / characters number
19.	Width	\ Width of the broadest picture/character Low byte
20.		/ High byte
21.	Height	\ Height of the highest picture/character Low byte
22.		/ High byte

---

After the header, the color palette entries follow (only for 4 or 8-bits of pictures)

Palette entry: 16-Bit RGB565-WORD

1. Byte: \ Low byte
2. Byte: / High byte

Palette entry: RGB565-WORD

Bit NR. 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0  
           R4 R3 R2 G1 R0 G5 G4 G3 G2 G1 G0 B4 B3 B2 B1 B0

After the color palette, the picture table follows, 8 bytes per picture

- | Byte | value               | description  |
|------|---------------------|--|
| 1.   | Width               | \ Width of the picture in pixel Low byte                             |
| 2.   |                     | / High byte  |
| 3.   | Height              | \ Height of the picture in pixel Low byte                            |
| 4.   |                     | / High byte  |
| 5.   | Offset              | \ offset of the graphic data Low byte                                |
| 6.   |                     | > Mid byte   |
| 7.   |                     | / High byte (starting from file beginning)                           |
| 8.   | BIT D6..D0 = 0,,127 | waiting period for animations (in 0.1 secs)                          |
|      | BIT D7              | = 0: uncompressed graphic data<br>= 1: RLE compressed character rows |

According to the picture table, the actual graphic data follows  
 The lines are always put down from above downward  
 The arrangement of the pixels in a line is from left to the right

#### Structure of a line of the picture (uncompressed):

- |                                     |   |
|-------------------------------------|---|
| 1 bit per pixel:<br>(monochrome)    | the first pixel is the data bit D7<br>Number of Bytes per Line = (Width+7) / 8  |
| 4 bits per pixel:<br>(16-color)     | the first pixel is the HI Nibble (D7..D4)<br>the second pixel is the LO Nibble (D3..D0)<br>Number of Bytes per Line = (Width+1) / 2 |
| 8 bits per pixel:<br>(256-color)    | the first pixel is the first byte<br>Number of Bytes per Line = width   |
| 16 bits per pixel:<br>(65636-color) | the first pixel is the first RGB565-WORD<br>Number of Bytes per Line = width * 2  |

**Structure of a RLE compressed line:**

first the Number-byte is read

BIT D6..D0 = 0..127; +1 = number of 1..128

BIT D7 = 0 the following are uncompressed bytes/pixels

BIT D7 = 1 the following byte/pixel is repeated this number of times

Next, the repeating byte/repeating pixel or the uncompressed bytes/pixels follow.

For pictures with 1 -, 4 and 8-bits per pixel, the data is treated byte by byte.

For High Color 16-Bit picture, the data are treated pixel-wise.

Example monochrome line with 128 pixels:

00 00 00 00 00 12 34 56 78 FF FF FF FF FF FF FF

compresses to

84 00 03 12 34 56 78 86 ff

Example 16-Bit RGB565 line with 16 pixels:

0000 0000 0000 0000 0000 1234 5678 ABCD FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF

compresses to

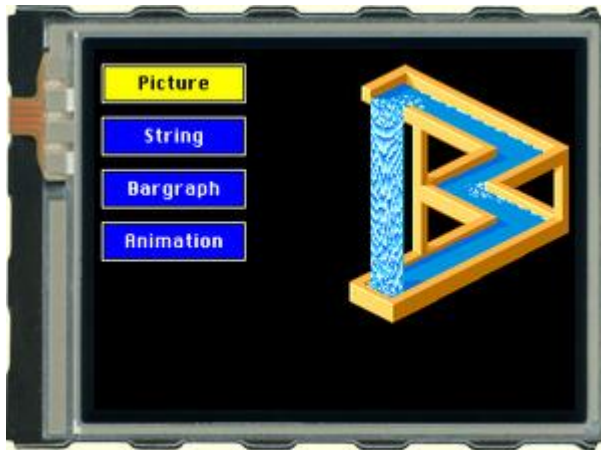
84 0000 02 1234 5678 ABCD 87 FFFF



## 9 How-to-use

To find an easy start, you will find a project under "..\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\My first project\my\_first\_project.KMC". In that example all main commands are used.

There are two different classes of examples. The ones starting with "BEGINNER.." are good to get an easy start. The ones starting with "EXPERT" describe special functions, such as using constants, definitions and compiler functions.



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\My first project

### File:

my\_first\_project.kmc

### Commands:

#AT, #BR, #ZL, #UI, #WD

Open file in KitEditor

```
eDIPTFT32-A    "First project"
...
...
...
;-----
;Include picture
Picture: 1, <..\..\BITMAPS\color\ESCHER_9_15.bmp> ;store as picture 1
Animation: 1, <..\..\BITMAPS\color\Animation\horse.gif> ;store as animation 1

;-----
;start of macro programming
;Normal Macros:

Macro: 0 ;define macro 0, called after power on, reset, watchdog reset
    #TA                                ; terminal off
    #AF CHICAGO14 ; set touch label font, the font is defined in include file
    "default_font.kmi"
    #AT 5,10,100,35,1,0, "Picture"      ; place 3 touchbuttons at x1,y1 to x2,y2,
Touchmacro 1 is called
    #AT 5,45,100,70,2,0, "String"       ; touchmacro 2 is called
    #AT 5,80,100,105,3,0, "Bargraph"    ; touchmacro 3 is called
    #AT 5,115,100,140,4,0, "Animation"  ; touchmacro 3 is called

;Touch Macros:
TouchMacro: 1 ;Picture
    #BD 1, 0                            ; delete bargraph 1, because of touchmacro 3 ("Bargraph"), it
can stay visible,
                                           ; because pixels are deleted with next command
    #WL 1                                ; stop animation process
    #RL 170,0,319,239                    ; delete area on the right (to delete pixels of other
touchmacros)
    #UI 170,10, 1 ;load internal picture 1

TouchMacro: 2 ;String
    #BD 1, 0                            ; delete bargraph 1, because of touchmacro 3 ("Bargraph"), it
can stay visible,
```

```

; because pixels are deleted with next command
#WL 1 ;stop animation process
#RL 170,0,319,239 ; delete area on the right (to delete pixels of other
touchmacros)
#ZF SWISS30B ;set font for strings (font is defined in "default_font.kmi")
#ZC 210,40, "Hello|World" ;write string centered, '|' means next line

TouchMacro: 3 ;Bargraph
#BD 1, 0 ; delete bargraph 1, because of touchmacro 3 ("Bargraph"), it
can stay visible,

; because pixels are deleted with next command
#WL 1 ;stop animation process
#RL 170,0,319,239 ; delete area on the right (to delete pixels of other
touchmacros)
#AQ 0 ; deactivate sending barvalues into sendbuffer
#FB RED, BLACK, WHITE ; set colors for bargraph
#BM 2 ; set pattern
#BO 1,190,190,220,10,0,100,1 ; define bargraph and show it
#BA 1,75 ; set bar 1 to new val of 75
#AB 1 ; set bar 1 with touch

TouchMacro: 4 ;Animation
#BD 1, 0 ; delete bargraph 1, because of touchmacro 3 ("Bargraph"), it
can stay visible,

; because pixels are deleted with next command
#RL 170,0,319,239 ; delete area on the right (to delete pixels of other
touchmacros)
#WD 1, 170,30, 1,2,255 ; show animation 1, with picture 1 (see definition above,
cyclically with the time stored within the gif-file

```

## 9.1 Factory Setting

This macrofile sets the display back to factory setting.


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\Init\\

**File:**

Init.kmc

**Commands:**

---

Open file in KitEditor

```
eDIPTFT32-A "Status on delivery" ; define eDIP, "Projectname" max. 32 character
;brings the display back to ex-works condition with it's standard-fonts 1..8, standard-
pattern and standard-border
```

```
AutoScan: 1 ; autoscan for correct baud rate to connect to eDIP on
COM/USB
```

```
;COM1: 115200 ; program eDIP on COMx with 115200 Baud
USB: 230400, "eDIP Programmer" ; use EA 9777-USB eDIP Programmer and program eDIP
with 230400 baud
```

```
;VERIFY ; verify after program
```

```
;-----
; load defaults
```

```
include <..\default_constant.kmi> ; double click to open
include <..\default_font.kmi>
include <..\default_pattern.kmi>
include <..\default_border.kmi>
```

```
;-----
```

```
MnAutoStart = 0
```

```
PowerOnMakro: ; runs after power-on
#MN MnAutoStart
```

```
ResetMakro: ; runs after external reset
#MN MnAutoStart
```

```
WatchdogMakro: ; runs after a crash (>500ms)
#MN MnAutoStart
```

```
BrownOutMakro: ; runs when supply voltage drops <3V
#MN MnAutoStart
```

```
;-----
```

```
Makro: MnAutoStart
```

## 9.2 RS485 - Factory Setting

This macrofile uses RS485 addressing and sets the display back to factory setting.


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\Init\

**File:**

INIT\_with\_RS485\_address.KMC

**Commands:**

---

Open file in KiTeditor

```
eDIPTFT32-A "Status on delivery" ; define eDIP, "Projectname" max. 32 character
; brings the display back to ex-works condition with it's standard-fonts 1..8, standard-
pattern and standard-border
```

```
AutoScan: 1 ; autoscan for correct baud rate to connect to eDIP on
COM/USB
```

```
; COM1: 115200 ; program eDIP on COMx with 115200 Baud
USB: 230400, "eDIP Programmer" ; use EA 9777-USB eDIP Programmer and program eDIP
with 230400 baud
```

```
; VERIFY ; verify after program
```

```
progadr = 0 ; Constant for program address
RS485ADR: progadr ; program only eDIP with address xx (possible addresses: 0..255)
```

```
; newadr = 10 ; Constant for new software address, see Makro 0 (#KA newadr)
; (software address only possible for hardware address 0)
newadr = progadr ; do not change the address
```

```
; -----
; load defaults
```

```
include <..\default_constant.kmi> ; double click to open
include <..\default_font.kmi>
include <..\default_pattern.kmi>
include <..\default_border.kmi>
```

```
; -----
```

```
MnAutoStart = 0
```

```
PowerOnMakro: ; runs after power-on
#MN MnAutoStart
```

```
ResetMakro: ; runs after external reset
#MN MnAutoStart
```

```
WatchdogMakro: ; runs after a crash (>500ms)
#MN MnAutoStart
```

```
BrownOutMakro: ; runs when supply voltage drops <3V
#MN MnAutoStart
```

;------

Makro: MnAutoStart  
#KA newadr

## 9.3 Place Strings - BEGINNER

Place different strings with different fonts and orientation. This example is available as an EXPERT-version ([EXPERT - Place text.kmc](#)<sup>[72]</sup>). In addition you will find help to include WinFonts under [BEGINNER - Cyrillic Font.kmc](#)<sup>[74]</sup>.


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Font\\

**File:**

BEGINNER - Place text.kmc

**Commands:**

WinFont, #ZL, #ZF, #ZW

Open file in KitEditor

```
eDIPTFT32-A "Place text"
...
...
...
;
-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;
-----
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line

;---- left justified text ----
#FZ MAGENTA,BLACK ; set text colour no. 5 and background no. 1
; same as "#FZ 5,1"
#ZF 3 ; set font no. 3
#ZZ 2,2 ; set zoom factor 2 in x and y direction
#ZL 5,100,"left justified" ; place text "left justified" at the left frame
in line 100

;---- centered text ----
#FZ RED,WHITE ; set text colour
#ZF 5 ; set font no. 5
#ZZ 2,1 ; set zoom factor 2 in x and 1 in y direction
#ZC 140,150,"centered text" ; place text "centered text" in the center in
line 150

;---- right justified text ----
#FZ YELLOW,BLUE ; set text colour
#ZF 2 ; set font no. 2
#ZZ 2,2 ; set zoom factor 2 in x and y direction
#ZR 260,200,"right justified" ; place text "right justified" at the left
frame in line 200

;---- vertical centered text ----
#FZ GREEN,BLACK ; set text colour
#ZF 6 ; set font no. 6
#ZZ 1,1 ; set zoom factor 1 in x and 1 in y direction
```

```
#ZW 1 ; rotate text 90°
#ZC 280,120,"vertical centered" ; place text "vertical centered" in the center
in row 280
```

## 9.4 Place Strings - EXPERT

Place different strings with different fonts and orientation. This example is available as a BEGINNER-version ([BEGINNER - Place text.kmc](#)<sup>[70]</sup>). In addition you will find help to include WinFonts under [BEGINNER - Cyrillic Font.kmc](#)<sup>[74]</sup>.


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Font\

**File:**

EXPERT - Place text.kmc

**Commands:**

WinFont, #ZL, #ZF, #ZW

Open file in KitEditor

```
eDIPTFT32-A "Place text"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
LOGO = 1 ; using constants makes it easier
Picture LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open

;-----
;using string-constants
!TEXT1! = "left justified"
!TEXT2! = "centered text"
!TEXT3! = "right justified"
!TEXT4! = "vertical centered"

;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

;---- left justified text ----
#FZ MAGENTA,BLACK ; set text colour no. 5 and background no. 1
; same as "#FZ 5,1"
#ZF 3 ; set font no. 3
#ZZ 2,2 ; set zoom factor 2 in x and y direction
#ZL 5,100, !TEXT1! ; place text "left justified" at the left frame
in line 100

;---- centered text ----
#FZ RED,WHITE ; set text colour
#ZF 5 ; set font no. 5
#ZZ 2,1 ; set zoom factor 2 in x and 1 in y direction
#ZC 140,150, !TEXT2! ; place text "centered text" in the center in
line 150
```



```
;---- right justified text ----
#FZ YELLOW,BLUE                ; set text colour
#ZF 2                          ; set font no. 2
#ZZ 2,2                        ; set zoom factor 2 in x and y direction
#ZR 260,200, !TEXT3!          ; place text "right justified" at the left
frame in line 200

;---- vertical centered text ----
#FZ GREEN,BLACK                ; set text colour
#ZF 6                          ; set font no. 6
#ZZ 1,1                        ; set zoom factor 1 in x and 1 in y direction
#ZW 1                          ; rotate text 90°
#ZC 280,120, !TEXT4!          ; place text "vertical centered" in the center
in row 280
```

## 9.5 Cyrillic font - BEGINNER

Show the use of Windows fonts, in this case Cyrillic font. Two examples of placing strings are available (see [BEGINNER - Place text.kmc](#)<sup>[70]</sup>, [EXPERT - Place text.kmc](#)<sup>[72]</sup>).


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Font\\

**File:**

BEGINNER - Cyrillic Font.kmc

**Commands:**

WinFont, #ZL, #ZF, #ZW

Open file in KitEditor

```
eDIPTFT32-A "Cyrillic Font"
...
...
...
;
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;-----
ExportOverview: 1 ; creates the file "Font9_Arial_RUSSIAN_N_32-
255_48.bmp"
WinFont 9, "Arial", 204, 0, 32, 255, 28 ; double click to open (on Fontname)
; select regions and characters by pressing
shift and mark them with the mouse ; be sure that the box "use Font for EditBox"
is activated
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line

;---- Place cyrillic text ----
#FZ YELLOW, BLACK ; set text color and background color
; YELLOW is defined as 7 (compare with line 12:
"include <..\..\default_constant.kmi>"
#ZF 9 ; set font to no. 9 (the above, line 38, defined Font)
#ZC 160,100, {CFD0C8C2C5D28220CAC0CA20C4C5CBC03F} ; character table: see file
"Font9_Arial_RUSSIAN_N_32-255_48.bmp"

; double click between the
curly brackets to open EditBox for fonts
; use mouse to select
characters
; You have to select Font no.9
for EditBox to see the characters correctly
; by clicking right on the
Fontname and "Select Font for EditBox"
```

## 9.6 BMP file - BEGINNER

Show simple pictures inverted and normal. If you want to show an animation, please refer to [BEGINNER - Show an animated gif file.kmc](#)<sup>[78]</sup>.



**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIP-TFT32-A\How to use\Picture\

**File:**

BEGINNER – show a bmp file.kmc

**Commands:**

#UI

Open file in KitEditor

```
eDIP-TFT32-A "Show a bmp File"
```

```
...
...
...
```

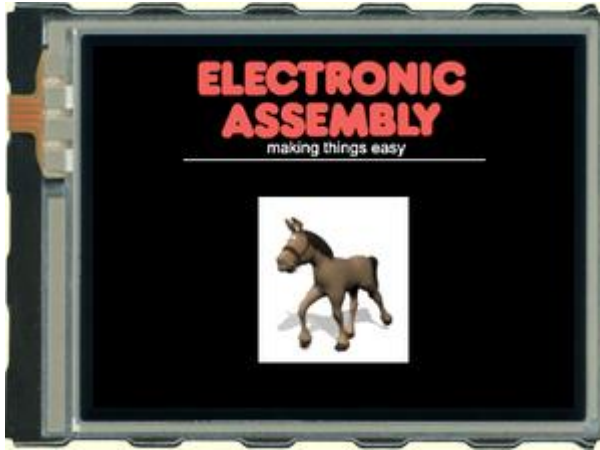
```
;-----
Path: <..\..\..\bitmaps\color\> ; set path, where pictures are located
Picture 1 <ea logo making things easy black.bmp> ; double click to open
;-----
```

```
Macro: MnAutoStart
```

```
;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 40,70,1 ; place Picture no. 1
```

## 9.7 Animated gif - BEGINNER

Example of a little animation. The animation is a gif-file. If you want to show a simple picture, please refer to [BEGINNER – show a bmp\\_file.kmc](#)<sup>[78]</sup>.


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Picture\\

**File:**

BEGINNER - Show an animated gif file.kmc

**Commands:**

#WD

Open file in KitEditor

```
eDIPTFT32-A "Show an animated gif file"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;-----
;
Animation 5 <Animation\horse.gif> ; double click to open
;-----

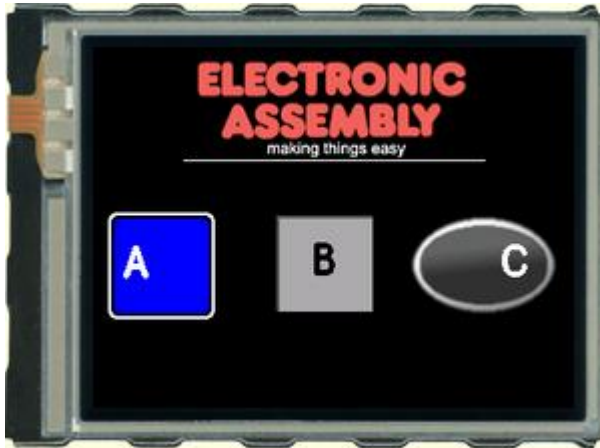
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line

;---- Place Animation ----
#WD 1,110,100,5,2,1 ; place Animation no. 5 (process no. 1), cyclically
```

## 9.8 3 simple touch buttons - BEGINNER

Explanation of general use of TouchButtons and TouchMacros. There are further examples available, containing information about Bargraph (see [BEGINNER - bargraph by touch.kmc](#)<sup>[93]</sup>), Radiogroups (see [BEGINNER - radiogroup.kmc](#)<sup>[82]</sup>) and another Example with touch buttons (see [EXPERT - numbers to terminal with autorepeat.kmc](#)<sup>[84]</sup>).



### Folder:

\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Touch\

### File:

BEGINNER - 3 simple touch areas.kmc

### Commands:

#AU, #AT

Open file in KitEditor

```
eDIPTFT32-A "3 simple touch areas"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
Button 1 <button\Button34x34_0.bmp>, <button\Button34x34_1.bmp>
Button 2 <button\andromeda0.gif>, <button\andromeda1.gif>
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line

;---- Place the left touch ----
#AE 14,0 ; set Frame style no. 14 and rotation for Touch
(1..20)
#AF 6 ; set font no. 6 for Touch area
#AT 10,110,80,180,65,0 "L A" ;draw Touch area - this will put a $41 (65
dec.) into send buffer ; the first "L" means left justify text

;---- Place the middle touch as a bitmap ----
#AF 6 ; set font no. 6for Touch area
#AC 1,0,2,2 ; set Button no.1 , rotation and size
#AU 120,110,66,0 "CB" ;draw Touch area - this will put a $42 (66 dec.) into
send buffer ;the first "c" means centered text

;---- Place the right touch as a bitmap ----
#AF 6 ; set font no. 6for Touch area
#AC 2,0,1,1 ; set Button no.2 , rotation and size
#AU 210,110,67,68 "RC " ; draw Touch area - this will run TouchMacro 67
(button down) and ; afterwards TouchMacro 68 (button up)
```

```
                                ; the first "R" means righth justify text

;---- Touch Macro for the right touch ----
TouchMacro: 67
    #FZ 3,0                    ; set color for text
    #ZF 6                      ; set font no. 6
    #ZC 160,200 "Macro #67"    ; place text

;---- Release the right touch ----
TouchMacro: 68
    #RL 60,190,260,240        ; delete area (text)
```

## 9.9 Glass button - EXPERT

Example of using pictures as buttons. There are further examples available, containing information about Bargraph (see [BEGINNER - bargraph by touch.kmc](#)<sup>[93]</sup>) and another Example with touch buttons (see [BEGINNER - 3 simple buttons.kmc](#)<sup>[77]</sup>)


**Folder:**

\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Touch\

**File:**

EXPERT - Glass buttons.kmc

**Commands:**

#AU

Open file in KitEditor

```
eDIPTFT32-A "Glas buttons"
...
...
...
;-----
Path <..\..\..\bitmaps\color\glas-button\>
LOGO = 1
BACKGROUND = 2
Picture: LOGO <ea_transparent.g16> ; double click to open
MaxSize XPIXEL,YPIXEL,1 ;maximum size of pictures
Picture: BACKGROUND <background.g16>

;--- define picture button ---
GLASBUT = 1
Button: GLASBUT <circle-green_40x40-trans.g16>,<circle-green_40x40-trans2.g16> ; double
click to open Bitmap Editor

;--- define Unicode Font ---
; double click to open (on Fontname)
; select regions and characters by pressing shift and mark them with the mouse
; be sure that the box "use Font for EditText" is activated, if you want to edit strings
(refer to 1.20)
WEB = 1
DAUPHIN = 2
WinFont: WEB "Webdings",-52,0, 52 + 55-60 + $F058 + $F0AF + $F0B2-$F0B3, 22
WinFont: DAUPHIN "Dauphin",-32,1, 32-125, 36

;-----
;define string-constants for webdings
; double click between the curly brackets to open EditText for fonts
; use mouse to select characters
; You have to select Font no.9 for EditText to see the
characters correctly
; by clicking right on the Fontname and "Select Font
for EditText"
!PLAY! = {34}
!PAUS! = {39}
!REW! = {37}
!FOW! = {38}
!STOP! = {3A}
!EARCD! = {3D3C3E}
```

```

;-----
;define coinstant for touch-macros
play = 1
paus = 2
rew = 3
fow = 4
stop = 5

;define constants for normal-macros
delete = 10

;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo with background ----
#TC 0 ; Cursor invisible
#FD BLACK,BLACK ; set display colors
#UI 0,0,BACKGROUND ; place background
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

;---- Place buttons ----
xs = 120
pitch = 10
xw = BUTTON_W(GLASBUT)
ys = 150

#AC GLASBUT,0,1,1 ; use Picturebutton 1
#AF WEB ; set Fontlabel for Touchbuttons (refer to 1.16Webdings)
x=xs
#AU x,ys,0,play,!PLAY! ; define Picture Button with call touchmacro 1
x+=pitch+xw
#AU x,ys,0,rew,!REW!
x+=pitch+xw
#AU x,ys,0,fow,!FOW!
x+=pitch+xw
#AU x,ys,0,stop,!STOP!

#ZF WEB ; select Font 1 (Webdings)
#FZ WHITE,transparent ; set fontcolors
#ZL 5,150,!EARCD! ; place earphone, cd...

x=xs
st_x=x
st_y=200
TouchMacro: play ;called by Button Play
#MN DELETE ; dedlete old string and set font
#ZL st_x,st_y, "Pressed play" ; place description
#AU x,ys,0,5,!PAUS! ; replace play button as pause button

TouchMacro: rew ;called by Button rewind
#MN DELETE ; dedlete old string and set font
#ZL st_x,st_y, "Pressed rewind" ; place description
#AU x,ys,0,1,!PLAY! ; replace pause button as play button

TouchMacro: fow ;called by Button forward
#MN DELETE ; dedlete old string and set font
#ZL st_x,st_y, "Pressed forward" ; place description
#AU x,ys,0,1,!PLAY! ; replace pause button as play button

TouchMacro: stop ;called by Button stop
#MN DELETE ; dedlete old string and set font
#ZL st_x,st_y, "Pressed stop" ; place description
#AU x,ys,0,1,!PLAY! ; replace pause button as play button

TouchMacro: paus ;called by Button rewind
#MN DELETE ; dedlete old string and set font
#ZL st_x,st_y, "Pressed pause" ; place description
#AU x,ys,0,1,!PLAY! ; replace pause button as play button

Macro: DELETE

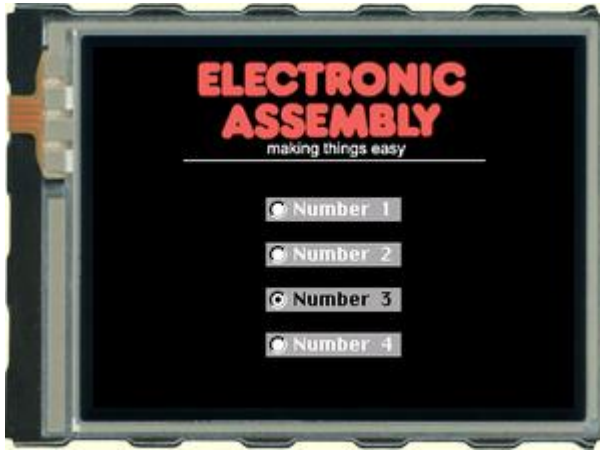
```



```
#RL st_x,st_y,,XMAX,YMAX      ; delete area to have clear background
#ZF DAUPHIN                   ; set font to Dauphin
#FZ WHITE,transparent ; set fontcolors
```

## 9.10 Radio group - BEGINNER

Explanation of general use of TouchButtons and TouchMacros. There are further examples available, containing information about Bargraph (see [BEGINNER - bargraph by touch.kmc](#)<sup>[93]</sup>), Buttons (see [BEGINNER - 3 simple buttons.kmc](#)<sup>[77]</sup>) and another Example with touch buttons (see [EXPERT - numbers to terminal with autorepeat.kmc](#)<sup>[84]</sup>)



**Folder:**

\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Touch\

**File:**

BEGINNER - touch as radio button.kmc

**Commands:**

#AR, #AJ

Open file in KitEditor

```
eDIPTFT32-A "Touch as Radio Button"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
Button 1 <button\RadioButton90x16_0.bmp>, <button\RadioButton90x16_1.bmp>
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line

;---- Place some buttons as a radio group ----

OriginX = 115 ; using a constant makes it more easy to move the
group later
OriginY = 100
PitchY = 30

#AF 5 ; set font no. 5 for
Touch area
#FA 8,1 ; define color for font (same as
#FA WHITE,BLACK)
#AR 1 ; put the following
defined touch switches into the group no. 1
#AC 1,0,1,1 ; use Button 1, no Zoom

#AJ OriginX,OriginY+0*PitchY,'1',0 "L Number 1" ; draw Touch switch - this will
put a "1" ($31, 49 dec.) into send buffer ; the first "L" means
"left aligned text"
#AJ OriginX,OriginY+1*PitchY,'2',0 "L Number 2" ; draw Touch switch - this will
put a "2" ($32, 50 dec.) into send buffer
#AJ OriginX,OriginY+2*PitchY,'3',0 "L Number 3" ; draw Touch switch - this will
```

```
put a "3" ($33, 51 dec.) into send buffer
  #AJ OriginX,OriginY+3*PitchY,'4',0 "L  Number 4" ; draw Touch switch - this will
put a "4" ($34, 52 dec.) into send buffer

  #AP '1',1 ; preset switch no. 1 to
ON
  #AR 0 ; next Buttons are free
of groups
```

## 9.11 Keypad - EXPERT

Place a keypad (0..9) and send the numbers to the terminal. There are further examples available, containing information about Bargraph (see [BEGINNER - bargraph\\_by\\_touch.kmc](#)<sup>[93]</sup>), Buttons (see [BEGINNER - 3 simple buttons.kmc](#)<sup>[77]</sup>) and Radio groups (see [BEGINNER - radiogroup.kmc](#)<sup>[82]</sup>).


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Touch\

**File:**

EXPERT - numbers to terminal with autorepeat.kmc

**Commands:**

#AT

Open file in KitEditor

```
eDIPTFT32-A "numbers to terminal with autorepeat"
...
...
...
;-----
; load bitmaps
Path <..\..\..\bitmaps\color\>
LOGO = 1 ; using constants makes it easier
Picture: LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor

;-----
; Information about macro definition
; Content:
; 1. Place ELECTRONIC ASSEMBLY Logo
; 2. Define the small blue terminal window
; 3. Define a keypad with numbers 0..9
; 4. Define 10 touch macros for the touch keys 0..9 (key pressed)
; 5. Define one touch macro if any touch key 0..9 is released
; 6. Define 10 process macros for repeat function
;-----

; define constants for touchmacros
Nb1 = 1
Nb2 = Nb1+1
Nb3 = Nb2+1
Nb4 = Nb3+1
Nb5 = Nb4+1
Nb6 = Nb5+1
Nb7 = Nb6+1
Nb8 = Nb7+1
Nb9 = Nb8+1
Nb0 = Nb9+1

Stop = 20

; define constants for processmacros
Pm1 = 1
Pm2 = Pm1+1
Pm3 = Pm2+1
Pm4 = Pm3+1
Pm5 = Pm4+1
Pm6 = Pm5+1
```

```

Pm7 = Pm6+1
Pm8 = Pm7+1
Pm9 = Pm8+1
Pm0 = Pm9+1

;-----

Macro: MnAutoStart

;-----
;---- 1. Place ELECTRONIC ASSEMBLY Logo ----
;-----

      #TC 0                      ; Cursor invisible
yoff = 10
      #UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO          ; place Picture no. 1
      ; draw a centered line directly beneath the picture:
      #GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

;-----
;---- 2. Define the small blue terminal window ----
;-----

      #FT YELLOW,BLUE           ; define terminal colors
t_y = 7
ft = 2
t_x = 4
lines=7
column=20
      #TW ft,t_x,t_y,column,lines      ; define the font (8x16), origin
(5x8=40,7x16=112), width (20 character) and height (7 lines)
      ; note: origin is defined as column no.7 and line
no.10 (not dots)
      #TC 1                      ; Terminal on

;-----
;---- 3. Define a keypad with numbers 0..9 ----
;-----

      #FA YELLOW,BLACK           ; define color for touch font
      #AF SWISS30B                ; set font for touch area
      #AE 20,0                   ; set border no. 20
      #FE WHITE,BLACK,BLUE, WHITE,BLACK,YELLOW ; set border colors normal and for
selection

; using a constant for (touch)size and (touch)pitch makes it more easy to move the whole
key group later
; XPIXEL=320 and YPIXEL=240 are defined in the file <..\..\default_constant.kmi>, see line
12
; YPIXEL-80 to have enough space for the header
pitch = 2
ys=(t_y-1)*ft*8                  ;terminal is organised in lines 1..30/15, depending on
selected font -> to calculate pixelpostion, decrement line and multiplay with font height
yh=(YPIXEL-ys-3*pitch)/4
xw = yh
xs = XPIXEL-(3*xw+2*pitch)

x=xs
y=ys
      #AT x,y,x+xw,y+yh, Nb1,Stop, "1"          ; define a touchkey with number "1".
When pressed, touchmacro no. 1 will be executed
x+=pitch+xw                                ; while release, touchmacro no. 20 will
be executed
      #AT x,y,x+xw,y+yh, Nb2,Stop, "2"
x+=pitch+xw
      #AT x,y,x+xw,y+yh, Nb3,Stop, "3"

x=xs
y+=pitch+yh
      #AT x,y,x+xw,y+yh, Nb4,Stop, "4"
x+=pitch+xw
      #AT x,y,x+xw,y+yh, Nb5,Stop, "5"

```

```

x+=pitch+xw
    #AT x,y,x+xw,y+yh, Nb6,Stop, "6"

x=xs
y+=pitch+yh
    #AT x,y,x+xw,y+yh, Nb7,Stop, "7"
x+=pitch+xw
    #AT x,y,x+xw,y+yh, Nb8,Stop, "8"
x+=pitch+xw
    #AT x,y,x+xw,y+yh, Nb9,Stop, "9"

x=xs
y+=pitch+yh
;    #AT x,y,x+xw,y+yh, 0,0, ""
x+=pitch+xw
    #AT x,y,x+xw,y+yh, Nb0,Stop, "0"
x+=pitch+xw
;    #AT x,y,x+xw,y+yh, 0,0, ""

;-----
;---- 4. Define 10 touch macros for the touch keys 0..9 (key pressed) ----
;-----

DelayTime = 7                ; define a constant for DelayTime (autorepeat process)
RepeatTime = 1               ; define a constant for RepeatTime (autorepeat process)
Pronumber = 1

TouchMacro: Nb1
    #ZT "1"                  ; sends number "1" to terminal window
    #MD Pronumber,2, Pm1,Pm1, DelayTime    ; defines a process for autorepeating
touchkey "1",
                                ; macro process no.1, type is "run cyclical", run from
processmacro no.1 to processmacro no.1 (see line 171)
TouchMacro: Nb2
    #ZT "2"
    #MD Pronumber,2, Pm2,Pm2, DelayTime

TouchMacro: Nb3
    #ZT "3"
    #MD Pronumber,2, Pm3,Pm3, DelayTime

TouchMacro: Nb4
    #ZT "4"
    #MD Pronumber,2, Pm4,Pm4, DelayTime

TouchMacro: Nb5
    #ZT "5"
    #MD Pronumber,2, Pm5,Pm5, DelayTime

TouchMacro: Nb6
    #ZT "6"
    #MD Pronumber,2, Pm6,Pm6, DelayTime

TouchMacro: Nb7
    #ZT "7"
    #MD Pronumber,2, Pm7,Pm7, DelayTime

TouchMacro: Nb8
    #ZT "8"
    #MD Pronumber,2, Pm8,Pm8, DelayTime

TouchMacro: Nb9
    #ZT "9"
    #MD Pronumber,2, Pm9,Pm9, DelayTime

TouchMacro: Nb0
    #ZT "0"
    #MD Pronumber,2, Pm0,Pm0, DelayTime

;-----
;---- 5. Define one touch macro if any touch key 0..9 is released ----
;-----

TouchMacro: Stop
    #MZ Pronumber,0          ; stop autorepeat process (= macro process no.
1) after touchkey release

```

```

;-----
;---- 6. Define 10 process macros for repeat function ----
;-----

ProcessMacro: Pm1
    #ZT "1"                ; sends number "1" to terminal window
    #MZ Pronumber,RepeatTime ; for macro process no.1 change process time to
RepeatTime                ; (was originally DelayTime)

ProcessMacro: Pm2
    #ZT "2"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm3
    #ZT "3"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm4
    #ZT "4"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm5
    #ZT "5"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm6
    #ZT "6"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm7
    #ZT "7"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm8
    #ZT "8"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm9
    #ZT "9"
    #MZ Pronumber,RepeatTime

ProcessMacro: Pm0
    #ZT "0"
    #MZ Pronumber,RepeatTime

```

## 9.12 Free draw area - BEGINNER

Define a free drawing area. There is a an EXPERT example available, too. Please have a look at [EXPERT – free draw area.kmc](#)<sup>[89]</sup>


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Draw\

**File:**

BEGINNER – free\_draw\_area.kmc

**Commands:**

#AD

Open file in KitEditor

```
eDIPTFT32-A    "Free drawing area"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp>      ; double click to open
;-----
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0                      ; Cursor invisible
#UI 70,10,1                ; place Picture no. 1
#GD 60,75,260,75          ; draw a Line

;--- Place information ---
#FZ WHITE, BLACK          ; set color for text
#ZF CHICAGO14             ; set font no.5
#ZL 10, 90,"Drawing area:"

;---- Place buttons ----
#FA WHITE, BLUE           ; set color for touchstring
#AE 10, 0                 ; touch frame and angle 0°
#FC BLUE, WHITE, BLUE, YELLOW; set color for button
#AF CHICAGO14             ; set font no. 5 for Touch area
#AT 200,120,310,150,1,0, "CClear" ; place touchbutton 1

;---- Place drawing area ----
#FG YELLOW, BLACK         ; set color for drawing box
#GR 10,110,180,239        ; place rectangle around drawing area
#AD 11,111,179,238,1, GREEN ; place drawing area, linewidth 1 and green drawingline

;-----
TouchMacro: 1
#RL 11,111,179,238      ; clear drawing area
```



## 9.13 Free draw area - EXPERT

Define a free drawing area. There is a an BEGINNER example available, too. Please have a look at [BEGINNER – free draw area.kmc](#)<sup>[88]</sup>



**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Draw\

**File:**

EXPERT – free\_draw\_area.kmc

**Commands:**

#AD

Open file in KitEditor

```
eDIPTFT32-A    "Free drawing area"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
LOGO = 1 ; using constants makes it easier
Picture LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open

;-----
;define constants for Touchmacro
CLEAR = 1
;-----
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

;---- Place drawing area ----
dw_xs = 10
dw_xw = 170
dw_ys = 110
dw_yh = YMAX-dw_ys
#FG YELLOW, BLACK ; set color for drawing box
#GR dw_xs,dw_ys,dw_xs+dw_xw,dw_ys+dw_yh ; place rectangle around drawing area
#AD dw_xs+1,dw_ys+1,dw_xs+dw_xw-1,dw_ys+dw_yh-1,1, GREEN ; place drawing area,
linewidth 1 and green drawingline

;--- Place information ---
#FZ WHITE, BLACK ; set color for text
#ZF CHICAGO14 ; set font no.5
#ZL dw_xs, dw_ys-14-5,"Drawing area:"

;---- Place buttons ----
#FA WHITE, BLUE ; set color for touchstring
#AE 10, 0 ; touch frame and angle 0°
#FC BLUE, WHITE, BLUE, YELLOW; set color for button
#AF CHICAGO14 ; set font no. 5 for Touch area
xs = 30+dw_xs+dw_xw
```

```
xw = 100
ys = dw_ys
yh = 20
    #AT xs,ys,xs+xw,ys+yh,CLEAR,0, "CClear"    ; place touchbutton 1 (C=centered)

;-----
TouchMacro: CLEAR
    #RL dw_xs+1,dw_ys+1,dw_xs+dw_xw-1,dw_ys+dw_yh-1    ; clear drawing area
```

## 9.14 Frame - BEGINNER

Show the different borders.



**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Frame\

**File:**

BEGINNER – frame.kmc

**Commands:**

#RT, #RR

Open file in KitEditor

```
eDIPTFT32-A "Different Borders"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line
;--- Place 5 Buttons to select different Boarders ---
; use default paramters for Border, color and font of Touchbuttons
#AT 5, 90,80,110,1,0,"Border1"
#AT 5,120,80,140,2,0,"Border2"
#AT 5,150,80,170,3,0,"Border3"
#AT 5,180,80,200,4,0,"Border4"
#AT 5,210,80,230,5,0,"Border5"

#MT 2 ; run a TouchMacro to show something on the screen at startup

TouchMacro 1: ; Called by Button Border1
#FR GREEN, GREEN, TRANSPARENT ; set color for border
#RE 2,0 ; set border no. 2
#MN 1 ; call Macro 1 (draw frame)

TouchMacro 2: ;Called by Button Border2
#FR RED, RED, TRANSPARENT ; set color for border
#RE 15,0 ; set border
#MN 1 ; call Macro 1 (draw frame)

TouchMacro 3: ; Called by Button Border3
#FR BLUE, WHITE, BLUE ; set color for border
#RE 18,0 ; set border no. 18
#MN 1 ; call Macro 1 (draw frame)

TouchMacro 4: ;Called by Button Border4
#RL 150,90,300,230 ; delete area, to draw button
```

```

#FE BLUE,WHITE,BLUE, YELLOW,WHITE,YELLOW ; set colors for touchbutton
#AE 18, 0 ; set touchframe no. 18
#FA YELLOW,BLUE ; set colors for fontcolor of touchbutton
#AT 150,90,300,120,6,0,"Border-Button" ; define button

TouchMacro 5: ;Called by Button Border5
#RL 150,90,300,230
#BM 0 ; set fill pattern for bargraph (none)
#FB GREEN,BLACK,TRANSPARENT ; set colour for bargraph pattern, background
and frame
#BE 18 ; set the bargraph frame
type
#BR 1,150,90,300,120,0,100,5 ; define bargraph no. 1 with size, value and type
#AB 1 ; define bargraph no. 1 to be adjusted by the
touch
#BA 1,75 ; set bargraph no. 1 to value 75
#ZL 150,140,"Bargraph with border"; place info-text

Macro 1: ; Draw Rectangel with selected Border
#RL 150,90,300,230 ; delete area, to draw new frame
#RR 150,90,300,230 ; draw new frame

TouchMacro 6: ; called by Boder-Button
#ZL 150,130,"Border Button was|pressed" ; place text, that Border-Button was
touched ; '|' means new line

```

## 9.15 Bargraph by touch - BEGINNER

Place a bargraph, that is adjustable by touch and controls the backlight. There is an EXPERT example available, too. Please have a look at [EXPERT - 2 Bargraphs with backlight dimming.kmc](#)<sup>[95]</sup>. If you need help using touch functions, please refer to [BEGINNER - 3 simple buttons.kmc](#)<sup>[77]</sup>.



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Bargraph\

### File:

BEGINNER - 2 Bargraphs with backlight dimming.kmc

### Commands:

#BR, #YB

Open file in KitEditor

```
eDIPTFT32-A "2 Bargraphs with backlight dimming"
...
...
...

;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open

;-----
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line

;---- Place a bargraph no. 1 ----
#BM 0 ; set fill pattern for bargraph (none)
#FB GREEN,BLACK,WHITE ; set colour for bargraph pattern, background and
frame ; same as "#FB 4,1,8"
#BE 114 ; set the bargraph frame type
#BR 1,20,150,250,170,0,100,5 ; define bargraph no. 1 with size, value and type
#BA 1,57 ; actualize bargraph no. 1 value
#AB 1 ; define bargraph no. 1 to be adjusted by the
touch

;---- show the value of the bargraph 1 on the display ----
#FX GREEN,BLACK ; set the colour of the value text and the
background
#BF 7 ; set the textfont no.7
#BZ 1,1 ; set the zoom for the text size 1 in horizontal and
vertical
#BX 1,160,95,"0=0;100=100" ; place the value of bargraph 1 to row 160 and
line 95
; set the bottom value to 0 and the top to 100

;---- writing "%" as Text to the display ----
#ZF 6 ; set the textfont no.6;
#FZ GREEN,BLACK ; set the colour of the value text and the
```

```

background
#ZZ 1,1 ; set the zoom for the text size 1 in horizontal and
vertical
#ZR 190,120,"%" ; place the text "%" to row 190 and line 120

;---- Place another bargraph no. 2 ----
#FB YELLOW,BLACK,YELLOW ; set colour for bargraph pattern, background
and frame
#BE 123 ; set the bargraph frame type
#BO 2,290,230,310,90,0,100,5 ; define bargraph no. 2 with size, value and type
#BA 2,38 ; actualize bargraph no. 2 value
#AB 2 ; define bargraph no. 2 to be adjusted by the
touch

;---- show the value of the bargraph 2 on the display ----
#FX RED,BLACK ; set the colour of the value text and the
background
#BF 6 ; set the textfont no.6;
#BZ 1,1 ; set the zoom for the text size 1 in horizontal and
vertical
#BX 2,280,200,"0=-12,00;100=12,00" ; place the value of bargraph 2 to row 210 and
line 190
; set the bottom value to -12,00 and the top to
12,00
;---- Brightness adjustment by bargraph 1 ----
#YB 1 ; brightness is adjusted by bargraph no. 1
; the actual brightness value has higher
priority than the bargraph value ; in this example 100% brightness is adjusted
after the YB command ; actualize bargraph no. 1 value; now
#BA 1,79 ; actualize bargraph no. 1 value; now
brightness is set to 79%
;---- Deactivate transmission of bar ----

#AQ 0 ; deactivate transmission of bar-value to
display's sendbuffer

```

## 9.16 Bargraph by touch - EXPERT

Place a bargraph, that is adjustable by touch and controls the backlight. There is a a BEGINNER example available, too. Please have a look at [BEGINNER - 2 Bargraphs with backlight dimming.kmc](#)<sup>[93]</sup>. If you need help using touch functions, please refer to [BEGINNER - 3 simple buttons.kmc](#)<sup>[77]</sup>.



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Bargraph\\

### File:

EXPERT - 2 Bargraphs with backlight dimming.kmc

### Commands:

#BR, #YB

Open file in KitEditor

```
eDIPTFT32-A "2 Bargraphs with backlight dimming"
...
...
...

;-----
Path <..\..\..\bitmaps\color\>
LOGO = 1 ; using constants makes it easier
Picture LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open

;-----
;define constants for bargraph numbers
BR1 = 1
BR2 = 2

;-----
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

;---- Place bargraph no. 1 ----
brlx = 20
brlw = 230
brly = 150
brlh = 20
#BM 0 ; set fill pattern for bargraph (none)
#FB GREEN,BLACK,WHITE ; set colour for bargraph pattern, background and
frame ; same as "#FB 4,1,8
#BE 114 ; set the bargraph frame type
#BR BR1,brlx,brly,brlx+brlw,brly+brlh,0,100,5 ; define bargraph no. 1 with
size, value and type
#AB BR1 ; define bargraph no. 1 to be adjusted by the touch

;---- show the value of the bargraph 1 on the display ----
```

```

        #FX GREEN,BLACK                ; set the colour of the value text and the
background
        #BF BIGZIF50                  ; set the textfont no.7
        #BZ 1,1                        ; set the zoom for the text size 1 in horizontal and
vertical
        #BX BR1,br1x+3*br1w/4,br1y-50-5,"0=0;100=100"    ; place the value of bargraph 1
right above the bar
                                                ; set the bottom value to 0 and the top to 100

;---- writing "%" as Text to the display ----
        #ZF SWISS30B                  ; set the textfont no.6;
        #FZ GREEN,BLACK              ; set the colour of the value text and the
background
        #ZZ 1,1                        ; set the zoom for the text size 1 in horizontal and
vertical
        #ZL br1x+3*br1w/4+5,br1y-30-5,"%"    ; place the text "%" next to the value of the
bar

;---- Brightness adjustment by bargraph 1 ----
        #YB BR1                        ; brightness is adjusted by bargraph no. 1
                                                ; the actual brightness value has higher
priority than the bargraph value
                                                ; in this example 100% brightness is adjusted
after the YB command
        #BA BR1,79                    ; actualize bargraph no. 1 value; now
brightness is set to 79%

;---- Place another bargraph no. 2 ----
br2x = XPIXEL-10-br1h
br2w = br1h    ;same thickness as bar1
br2y = 230
br2h = 140
        #FB YELLOW,BLACK,YELLOW        ; set colour for bargraph pattern, background
and frame
        #BE 123                        ; set the bargraph frame type
        #BO BR2,br2x,br2y,br2x+br2w,br2y-br2h,0,100,5    ; define bargraph no. 2 with
size, value and type
        #BA BR2,38                    ; actualize bargraph no. 2 value
        #AB BR2                        ; define bargraph no. 2 to be adjusted by the touch

;---- show the value of the bargraph 2 on the display ----
        #FX RED,BLACK                ; set the colour of the value text and the
background
        #BF SWISS30B                  ; set the textfont no.6;
        #BZ 1,1                        ; set the zoom for the text size 1 in horizontal and
vertical
        #BX BR2,br2x-5,br2y-30-10,"0=-12,00;100=12,00"    ; place the value of bargraph 2
to row 210 and line 190
                                                ; set the bottom value to -12,00 and the top to
12,00

;---- Deactivate transmission of bar ----

        #AQ 0                        ; deactivate transmission of bar-value to
display's sendbuffer

```



## 9.17 Instrument by touch - BEGINNER

Place an instrument adjustable by touch. Connect back light with instrument. Instruments can be connected to an analogue input (see [BEGINNER - instrument by analoginput.kmc](#)<sup>[98]</sup>). If you want an overview about all instruments, refer to [EXPERT - show some instruments.kmc](#)<sup>[99]</sup>.



**Folder:**

\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Instruments\

**File:**

BEGINNER - compass\_by\_touch.kmc

**Commands:**

#IP

Open file in KitEditor

```
eDIPTFT32-A "Compass as instrument"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
path <..\..\..\instruments>
;next line: defines an instrument with kompass.bmp as background, the scale is degree
;double click to open instrument preview and to edit/change instrument settings
Instrument: 1 <compass_small.i16>

;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 70,75,260,75 ; draw a Line

;---- Place Instrumnt ----
#IP 1, 85,85, 1,0, 0,100 ; place instrument no. 1 with angle and start/end
value
#A+ 1 ; instrument is controlled by touch
#Y+ 1 ; instrument is assigned to brightness
```

## 9.18 Instrument by analogue input - BEGINNER

Place instrument and connect them with the analogue input. Instruments can be connected to the backlight (see [BEGINNER - compass by touch.kmc](#)<sup>[97]</sup>). If you want an overview about all instruments, refer to [EXPERT - show some instruments.kmc](#)<sup>[98]</sup>.


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Instruments\\

**File:**

BEGINNER - instrument\_by\_analoginput.kmc

**Commands:**

#IP, #V+

Open file in KitEditor

```
eDIPTFT32-A "Instrument controlled by analog input"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
path <..\..\..\instruments\>
;next line: defines an instrument with kompass.bmp as background, the scale is degree
;double click to open instrument preview and to edit/change instrument settings
Instrument: 1 <voltmeter.il6>

;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 70,75,260,75 ; draw a Line

;---- Place Instrurment ----
#IP 1, 55,90, 1,0, 0,200 ; place insturment no. 1 with angle and start/end value

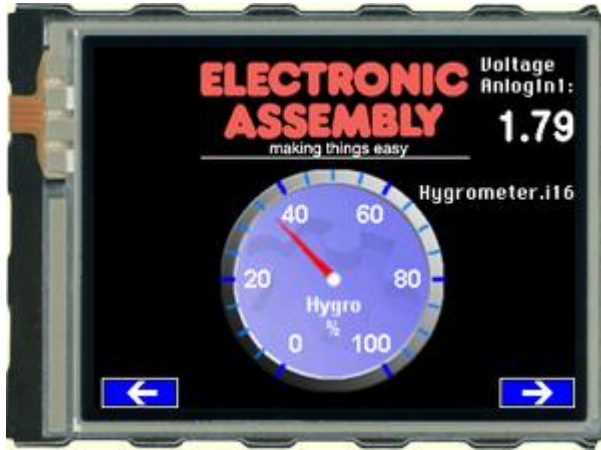
#V+ 1,1; connect instrument 1 and analog input 1 (AIN1)

#VK 1,0,0,5 ; set hysteresis to 100mV AIN1
#VA 1 ; enable analog inputs
#VR 1 ; redraw instrurment 1

;-----
AnalogeMacro: 1 ; rising analog input 1 (->hysteresis)
#VR 1 ; redraw instrurment 1 with new anlog value
AnalogeMacro: 2 ; falling analog input 1 (->hysteresis)
#VR 1 ; redraw instrurment 1 with new anlog value
```

## 9.19 Instrument slide show - EXPERT

Place many instruments and connect them with the analogue input.



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Instruments\

### File:

EXPERT - show some instruments.kmc

### Commands:

#IP, #V+

Open file in KitEditor

```
eDIPTFT32-A "Instruments controlled by analog input"
...
...
...
-----
Path <..\..\..\bitmaps\color\>
LOGO = 1 ; using constants makes it easier
Picture: LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
path <..\..\..\instruments>
!VOLTAGE! = "Voltage|AnalogIn1:"

; stringconstants makes it easier to calculate position/next line: defines an instrument
;double click to open instrument preview and to edit/change instrument settings
Instrument_1=1
Instrument_2=2
Instrument_3=3
Instrument_4=4
Instrument_5=5
Instrument_6=6

Instrument_max=20

Instrument: Instrument_1 <voltmeterdown.i16>
Instrument: Instrument_2 <green amperemeter.i16>
Instrument: Instrument_3 <handwheel4.i16>
Instrument: Instrument_4 <tachometer.i16>
Instrument: Instrument_5 <WattmeterOutside.i16>
Instrument: Instrument_6 <hygrometer.i16>
Instrument: Instrument_max <EA.i16>

Wingdings=9
WinFont: Wingdings,"Wingdings",1,0, 231-232, 18
;
-----
BT_width=50
BT_height=20

BT_Left_xstart=5
BT_Left_ystart=YPIXEL-BT_height
BT_Right_xstart=XPIXEL-BT_width
BT_Right_ystart=YPIXEL-BT_height

FN_x = XMAX ;position for file-name
FN_y = 90
```

```

;-----
; start of macro definitions
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

#VA 1 ; enable analog inputs
#VE "0=0.00;5000=5.00" ; set user string for analog output
#VF 1, SWISS30B ; set font for analog output

#ZF Chicagol4
#AF Wingdings

#MT Instrument_1

;-----
TouchMacro: Instrument_1
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width+1,76, BT_Right_xstart-1,YMax ; delete old instrument
including name
#RL 0,76,XMAX,BT_Right_ystart-1
#MV 0
;---- Place Instrument ----
#IP 1,34,80, 1,0, 0,250 ; place instument no. 1 with angle and start/end value
#ZC XPIXEL/2,BT_Left_ystart,"voltmeterdown.i16"

#V+ 1,1; connect instrument 1 and analog input 1 (AIN1)
#VR 1 ; redraw instrument 1 with new anlog value
;---- Place navigation buttons ----
#AT
BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrumen
t_max,{E7}
#AT
BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instr
ument_2,{E8}

TouchMacro: Instrument_2
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width+1,76, BT_Right_xstart-1,YMax ; delete old instrument
including name
#RL 0,76,XMAX,BT_Right_ystart-1
#RL BT_Left_xstart+BT_width,240,BT_right_xstart,271
#MV 0
;---- Place Instrument ----
#IP 1,35,80, 2,0, 0,250 ; place instument no. 1 with angle and start/end value
#ZC XPIXEL/2,BT_Left_ystart,"green amperemeter.i16"

#V+ 1,1; connect instrument 1 and analog input 1 (AIN1)
#VR 1 ; redraw instrument 1 with new anlog value
;---- Place navigation buttons ----
#AT
BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrumen
t_1,{E7}
#AT
BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instr
ument_3,{E8}

TouchMacro: Instrument_3
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width+1,76, BT_Right_xstart-1,YMax ; delete old instrument
including name
#RL 0,76,XMAX,BT_Right_ystart-1
#MV 0
;---- Place Instrument ----
#IP 1,85,80, 3,0, 0,250 ; place instument no. 1 with angle and start/end value
#ZR FN_x,FN_y,"handwheel4.i16"

#V+ 1,1; connect instrument 1 and analog input 1 (AIN1)
#VR 1 ; redraw instrument 1 with new anlog value
;---- Place navigation buttons ----
#AT

```

```
BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrument_2,{E7}
#AT
BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instrument_4,{E8}
```

#### TouchMacro: Instrument\_4

```
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width+1,76, BT_Right_xstart-1,YMax ; delete old instrument
including name
#RL 0,76,XMAX,BT_Right_ystart-1
#MV 0
;---- Place Instrument ----
#IP 1,82,80, 4,0, 0,250 ; place instrument no. 1 with angle and start/end value
#ZR FN_x,FN_y,"tachometer.i16"

#V+ 1,1; connect instrument 1 and analog input 1 (AIN1)
#VR 1 ; redraw instrument 1 with new analog value
;---- Place navigation buttons ----
#AT
BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrument_3,{E7}
#AT
BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instrument_5,{E8}
```

#### TouchMacro: Instrument\_5

```
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width+1,76, BT_Right_xstart-1,YMax ; delete old instrument
including name
#RL 0,76,XMAX,BT_Right_ystart-1
#MV 0
;---- Place Instrument ----
#IP 1,80,80, 5,0, 0,250 ; place instrument no. 1 with angle and start/end value
#ZR FN_x,FN_y,"Wattmeter|Outside.i16" ; | means CR LF

#V+ 1,1; connect instrument 1 and analog input 1 (AIN1)
#VR 1 ; redraw instrument 1 with new analog value
;---- Place navigation buttons ----
#AT
BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrument_4,{E7}
#AT
BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instrument_6,{E8}
```

#### TouchMacro: Instrument\_6

```
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width+1,76, BT_Right_xstart-1,YMax ; delete old instrument
including name
#RL 0,76,XMAX,BT_Right_ystart-1
#MV 0
;---- Place Instrument ----
#IP 1,84,80, 6,0, 0,250 ; place instrument no. 1 with angle and start/end value
#ZR FN_x,FN_y,"Hygrometer.i16"

#V+ 1,1; connect instrument 1 and analog input 1 (AIN1)
#VR 1 ; redraw instrument 1 with new analog value
;---- Place navigation buttons ----
#AT
BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrument_5,{E7}
#AT
BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instrument_max,{E8}
```

#### TouchMacro: Instrument\_max

```
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width+1,76, BT_Right_xstart-1,YMax ; delete old instrument
including name
#RL 0,76,XMAX,BT_Right_ystart-1
#MV 0
;---- Place Instrument ----
#IP 1,79,80, Instrument_max,0, 0,250 ; place instrument no. 1 with angle and
```

```

start/end value
    #ZR FN_x,FN_y, "EA.i16"

    #V+ 1,1; connect instrument 1 and analog input 1 (AIN1)
    #VR 1          ; redraw instrument 1 with new anlog value
;---- Place navigation buttons ----
    #AT
BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrument_6,{E7}
    #AT
BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instrument_1,{E8}

;-----
AnalogeMacro: 0          ; rising analog input 1 (->hysteresis)
    #VR 1          ; redraw instrument 1 with new anlog value
str_par=STRING_P(1,1,0,0,0,0) ; to understand the parameter you will find help by pressing F1. Please have a look at compiler functions
    #ZL XMAX-STRING_W(!VOLTAGE!, str_par, Chicago14) ,5, !VOLTAGE!
    #VG 1, XMAX,40; analog output

```

## 9.20 Languages/Macro Pages - BEGINNER

Describe the important function of different languages, with the help of MacroPages. If you want to use string tables, refer to [EXPERT - stringtable.kmc](#)<sup>[10]</sup>.



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Language\\

### File:

BEGINNER – multilingual.kmc

### Commands:

#MK

Open file in KitEditor

```
eDIPTFT32-A    "Multilingual Support"
...
...
...
;-----
; constants for language support
GERMAN        = 0
ENGLISH       = 1
FRENCH        = 2
ITALIAN       = 3

;-----
; Bilder einbinden max. 256 Bilder (0..255)
Path <..\..\..\bitmaps\color\>           ; specify path
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor

PATH: <..\Bitmap\>
Picture: 100[GERMAN] <SausageBeer.jpg>
Picture: 100[ENGLISH] <FishandChips.jpg>
Picture: 100[FRENCH] <Baguette.jpg>
Picture: 100[ITALIAN] <Pizza.jpg>

;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0                                ; Cursor invisible
#UI 70,10,1                          ; place Picture no. 1
#GD 60,75,260,75                    ; draw a line
#GD 200,75,200,240

;---- Place some text ----
#FZ WHITE, BLACK                    ;string color
#ZF CHICAGO14                       ;string font
#ZL 5,90, "Select Language:"

;--- 3 Touchbuttons (Language selection) ---
#AE 14,0                            ; set Frame style no. 14 and rotation
for Touch (1..20)
    #AF 5                            ; set font no. 5 for Touch area
    #AT 5,120,85,150,1,0 "Deutsch"  ; place button "German" and call
TouchMacro 1
```

```

    #AT 5,160,85,190,2,0 "English"           ; place button "English" and call
TouchMacro 2
    #AT 95,120,175,150,3,0 "Fran"135"ais"    ; place button "French" and call
TouchMacro 3
                                           ; the 135 is the decimal value for
cdille
    #AT 95,160,175,190,4,0 "Italiano"        ; place button "Italian" and call
TouchMacro 4

;--- Call standard language ---
    #MN 1 ; Call macro 1 with standard language (Page=0) i.e. German

;-----
TouchMacro 1:
    #MK GERMAN ; select page
    #MN 1 ; call macro 1

TouchMacro 2:
    #MK ENGLISH ; select page
    #MN 1 ; call macro 1

TouchMacro 3:
    #MK FRENCH ; select page
    #MN 1 ; call macro 1

TouchMacro 4:
    #MK ITALIAN ; select page
    #MN 1 ; call macro 1

;-----
Macro 1[GERMAN]:
    #FZ WHITE, BLACK ; string color
    #ZF CHICAGO14 ; string font
    #RL 210,90,320,120 ; delete area behind text
    #ZL 210,90, "Deutsch" ; write actual language
    #UI 210,120,100 ; place picture

Macro 1[ENGLISH]:
    #FZ WHITE, BLACK ; string color
    #ZF CHICAGO14 ; string font
    #RL 210,90,320,120 ; delete area behind text
    #ZL 210,90, "English" ; write actual language
    #UI 210,120,100 ; place picture

Macro 1[FRENCH]:
    #FZ WHITE, BLACK ; string color
    #ZF CHICAGO14 ; string font
    #RL 210,90,320,120 ; delete area behind text
    #ZL 210,90, "Fran"135"ais" ; write actual language
    #UI 210,120,100 ; place picture

Macro 1[ITALIAN]:
    #FZ WHITE, BLACK ; string color
    #ZF CHICAGO14 ; string font
    #RL 210,90,320,120 ; delete area behind text
    #ZL 210,90, "Italiano" ; write actual language
    #UI 210,120,100 ; place picture

```



## 9.21 String tables - EXPERT

Different languages, using string table, so you don't need macro pages. If you want to use MacroPages, refer to [BEGINNER – multilingual.kmc](#)<sup>[103]</sup>.



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Language\\

### File:

EXPERT - stringtable.kmc

### Commands:

#ST, #MK

Open file in KitEditor

```
eDIPTFT32-A    "Stringtable"
...
...
...
;-----
; Bilder einbinden max. 256 Bilder (0..255)
Path <..\..\..\bitmaps\color\>                ; specify path
LOGO = 1 ; unsing constants makes it easier
Picture: LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor

;-----
;define Stringtable (not Stringkonstants)
StringCode = $01 ; define String table code (see command #ST)

ENGLISH = 0
GERMAN   = 1
FRENCH   = 2
ITALIAN  = 3

HELLO = 1

STRING: HELLO[ENGLISH] "Hello World!"
STRING: HELLO[GERMAN]  "Hallo Welt!"
;you can use EditText to write your strings
;please select font (double click on default font.kmi)-> right click on CHICAG14.FXT and
select font for EditText
;double click on string below and the EditText will open.
STRING: HELLO[FRENCH]  {426F6E6A6F7572208520746F757321} ;same as "Bonjour à tous!"
STRING: HELLO[ITALIAN] "Ciao a tutti!"

;-----
;define constants for normal macros
SHOWSTR = 1

;define constants for touch macros
GER = 1
ENG = 2
FRE = 3
ITA = 4

;-----
```

```

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

;---- Use internal string table ----
#ST StringCode

;--- 3 Touchbuttons (Language selection) ---
xs = 5
xw = 80
ys = 120
yh = 30
pitch = 10
x = xs
y = ys
#AE 14,0 ; set Frame style no. 14 and rotation
for Touch (1..20)
#AF CHICAGO14 ; set font no. 5 for Touch area
#AT x,y,x+xw,y+yh,GER,0 "Deutsch" ; place button "German" and call
TouchMacro 1
y+=yh+pitch
#AT x,y,x+xw,y+yh,ENG,0 "English" ; place button "English" and call
TouchMacro 2
x+=xw+pitch
y=ys
#AT x,y,x+xw,y+yh,FRE,0 "Fran"135"ais" ; place button "French" and call
TouchMacro 3
y+=yh+pitch ; the 135 is the decimal value
for cdille
#AT x,y,x+xw,y+yh,ITA,0 "Italiano" ; place button "Italian" and call
TouchMacro 4

;---- Place some text ----
#FZ WHITE, BLACK ;string color
#ZF CHICAGO14 ;string font
#ZL xs,ys-2*pitch, "Select Language:"

;--- Call standard language ---
#MN SHOWSTR ; Call macro 1 with standard language (Page=0) i.e. ENGLISH

;-----
TouchMacro: GER
#MK GERMAN ; select page
#MN SHOWSTR ; call macro 1

TouchMacro: ENG
#MK ENGLISH ; select page
#MN SHOWSTR ; call macro 1

TouchMacro: FRE
#MK FRENCH ; select page
#MN SHOWSTR ; call macro 1

TouchMacro: ITA
#MK ITALIAN ; select page
#MN SHOWSTR ; call macro 1

;-----
Macro: SHOWSTR
#FZ WHITE, BLACK ; string color
#ZF CHICAGO14 ; string font
#RL 0,YMAX-30,XMAX,YMAX ; delete area behind text
#ZC XPIXEL/2,YMAX-30,StringCode,HELLO

```

## 9.22 Analogue Macro - Beginner

Show the use of analogue inputs and analogue macros. If you want to use I/Os please refer to [BEGINNER – Bit Macro.kmc](#)<sup>[109]</sup> or [EXPERT – Port Macro.kmc](#)<sup>[110]</sup>. In addition you will find help using ProcessMacros (see [BEGINNER - Prozess Macro.kmc](#)<sup>[111]</sup>) and AutomaticMacros (see [EXPERT – Automatic Macro.kmc](#)<sup>[112]</sup>).



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\DIP - intelligent graphic displays\eDIPTFT32-A\How to use\Macro\

### File:

BEGINNER - Analog Macro.kmc

### Commands:

#VG, #V@, #VE

Open file in KitEditor

```
eDIPTFT32-A "Analog Macro"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line
#GR 220,85,310,190 ; draw a rectangle

;---- Write some information ----
#FZ WHITE, BLACK ;string color
#ZF CHICAGO14 ;string font
#ZC 100,90, "Analog input (AIN1 Pin 23):"
#ZR 300,90, "Calibration:"

;---- Place a bargraph no. 1 ----
#BM 0 ; set fill pattern for bargraph (none)
#FB GREEN,BLACK,WHITE ; set colour for bargraph pattern, background and
frame ; same as "#FB 4,1,8"
#BE 114 ; set the bargraph frame type
#BR 1,10,200,310,230,0,250,5 ; define bargraph no. 1 with size, value and type (250
= Vdd)

;--- Analog input ---
#VB 1, 1 ; assign analog input 1 to bargraph 1
#VR 1 ; redraw bargraph analog input 1

;---- show the value of the analog input 1 on the display ----
#FV 1, GREEN, BLACK ; set the colour of the value text and the
background
#VF 1,7 ; set the textfont no.7
```

```

#VZ 1,1,1 ; set the zoom for the text size 1 in
horizontal and vertical
#VE 1,"0=0.000;5000=5.000" ; set new user format for AIN1
#VG 1,190,130 ; place the value of AIN 1 to row 190 and line
130

;---- writing "V" as Text to the display ----
#ZF 6 ; set the textfont no.6;
#FZ GREEN,BLACK ; set the colour of the value text and the
background
#ZZ 1,1 ; set the zoom for the text size 1 in horizontal and
vertical
#ZR 210,155,"V" ; place the text "%" to row 200 and line 145

;--- 2 Touchbuttons (Calibration) ---
#AE 14,0 ; set Frame style no. 14 and rotation for Touch
(1..20)
#AF 5 ; set font no. 5 for Touch area
#AT 235,110,295,140,1,0 "5V" ;
#AT 235,150,295,180,2,0 "3.3V"

;-----
AnalogMacro 0: ; this macro is called by evry change of input voltage AIN1
#VR 1 ; redraw bargraph analog input 1
#VG 1,190,130 ; refresh value
;#VD 1 ; send analog value

;-----
TouchMacro 1:
#V@ 1,5000 ; calibration procedure to set 5.0V
#VE 1,"0=0.000;5000=5.000" ; set new user format for AIN1

;-----
TouchMacro 2:
#V@ 1,3300 ; calibration procedure to set 3.3V
#VE 1,"0=0.000;3300=3.300" ; set new user format for AIN1

```

## 9.23 Bit Macro - BEGINNER

Get into the use of BitMacros, i.e. get an idea of working with I/Os. There are further examples available, containing information about AutomaticMacro (see [EXPERT – Automatic Macro.kmc<sup>\[113\]</sup>](#)), ProcessMacros (see [BEGINNER - Prozess Macro.kmc<sup>\[115\]</sup>](#)), PortMacros (see [BEGINNER - Port Macro.kmc<sup>\[117\]</sup>](#)) and AnalogueMacros (see [BEGINNER - Analog Macro.kmc<sup>\[107\]</sup>](#)).



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\DIIP - intelligent graphic displays\eDIPTFT32-A\How to use\Macro\

### File:

BEGINNER – Bit Macro.kmc

### Commands:

#YW

Open file in KitEditor

```
eDIPTFT32-A "Bit Macro"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line
#GD 170,75,170,240

;----- OUTPUTS ---
#FZ WHITE, BLACK ;String color
#ZF CHICAGO14 ;String font
#ZL 5,80, "OUTPUTS"
#ZL 5,100, "Port 1 (Pin 25):"
#ZL 5,150, "Port 2 (Pin 26):"
#ZL 5,200 "All ports (Pin 25-32):"

#FE BLUE, WHITE, BLUE, YELLOW, WHITE, YELLOW ; Define button colors
#FA YELLOW, BLUE ; Define text colors
#AF CHICAGO14 ; Touchfont

#AT 5,120,65,140,1,0,"CToggle" ; Define Button with TouchMacro 1
; "C" means alignment centered
#AT 5,170,65,190,2,0,"CSet" ; Define Button with TouchMacro 2(down
code) and 3 (up code)
#AT 75,170,125,190,3,0,"CReset" ; Define Button with TouchMacro 2(down
code) and 3 (up code)
#AT 5,220,65,240,4,0,"CSet" ; Define Button with TouchMacro 3
#AT 75,220,125,240,5,0,"CReset" ; Define Button with TouchMacro 4

;---- INPUTS ---
```

```

#FZ WHITE, BLACK      ;String color
#ZF CHICAGO14          ;String font
#ZL 190,80, "INPUTS"
#ZL 190, 100, "Port 1:"
#ZL 190, 150, "Port 2:"

;-----
TouchMacro 1:
#YW 1, 2              ; Toggle port 1

TouchMacro 2:
#YW 2, 1              ; Set port 2

TouchMacro 3:
#YW 2, 0              ; Reset port 2

TouchMacro 4:
#YW 0, $FF           ; Set all ports

TouchMacro 5:
#YW 0, 0              ; Reset all ports

;-----
BitMacro 9:
#FZ YELLOW, BLACK    ;Port 1 rising edge
#ZL 260, 120, "1"    ;String color
BitMacro 1:
#FZ YELLOW, BLACK    ;Port 1 falling edge
#ZL 260, 120, "0"    ;String color

BitMacro 10:
#FZ YELLOW, BLACK    ;Port 2 rising edge
#ZL 260, 170, "1"    ;String color
BitMacro 2:
#FZ YELLOW, BLACK    ;Port 2 falling edge
#ZL 260, 170, "0"    ;String color

```

## 9.24 Port Macro - EXPERT

Get into the use of PortMacros, i.e. get an idea of working with I/Os. There are further examples available, containing information about AutomaticMacro (see [EXPERT – Automatic Macro.kmc<sup>\[113\]</sup>](#)), ProcessMacros (see [BEGINNER - Prozess Macro.kmc<sup>\[115\]</sup>](#)), BitMacros (see [BEGINNER – Bit Macro.kmc<sup>\[109\]</sup>](#)) and AnalogueMacros (see [BEGINNER - Analog Macro.kmc<sup>\[107\]</sup>](#)).



### Folder:

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\DIP - intelligent graphic displays\eDIPTFT32-A\How to use\Macro\

### File:

EXPERT – Port Macro.kmc

### Commands:

#YW

Open file in KitEditor

```
eDIPTFT32-A "Port Macro"
...
...
...
;-----
Path <..\..\..\..\bitmaps\color\>
LOGO = 1 ; using constants makes it easier
Picture: LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor

;-----
;define constants for bit pattern
PATTERN1= $FE
PATTERN2= $7F

;-----
;define constans for touchmacros
PORT1TOG = 1
PORT2SET = 21
PORT2RES = PORT2SET+1
PORTALLSET = 100
PORTALLRES = PORTALLSET+1
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)
#GD XPIXEL/2,yoff+PICTURE_H(LOGO),XPIXEL/2,YMAX

;----- OUTPUTS ---
#FZ WHITE, BLACK ;String color
#ZF CHICAGO14 ;String font
xs=5
y_title = 80
#ZL xs,y_title, "OUTPUTS"
```

```

ys=y_title+20
y=ys
pitch=50
    #ZL xs,y, "Port 1 (Pin 25):"
y+=pitch
    #ZL xs,y, "Port 2 (Pin 26):"
y+=pitch
    #ZL xs,y "All ports (Pin 25-32):"

    #FE BLUE, WHITE, BLUE, YELLOW, WHITE, YELLOW    ; Define button colors
    #FA YELLOW, BLUE                                ; Define text colors
    #AF CHICAGO14                                    ; Touchfont

x=xs
bt_ypitch=18
y=ys+bt_ypitch
yh=20
xw=60
bt_xpitch = 10
x=xs
    #AT x,y,x+xw,y+yh,PORT1TOG,0,"CToggle"            ; Define Button with TouchMacro
1
                                                    ; "C" means alignment centered
y+=pitch
    #AT x,y,x+xw,y+yh,PORT2SET,0,"CSet"                ; Define Button with TouchMacro
2(down code) and 3 (up code)
x+=bt_xpitch+xw
    #AT x,y,x+xw,y+yh,PORT2RES,0,"CReset"              ; Define Button with TouchMacro
2(down code) and 3 (up code)
y+=pitch
x=xs
    #AT x,y,x+xw,y+yh,PORTALLSET,0,"CSet"              ; Define Button with
TouchMacro 3
x+=bt_xpitch+xw
    #AT x,y,x+xw,y+yh,PORTALLRES,0,"CReset"            ; Define Button with TouchMacro
4

;---- INPUTS ---
    #FZ WHITE, BLACK    ;String color
    #ZF CHICAGO14        ;String font
    #ZL XPIXEL/2+bt_xpitch,y_title, "INPUTS"

    #ZL XPIXEL/2+bt_xpitch, ys, "Port 0x" !HEXSTR(PATTERN1,2)! ':'      ; use
compiler funtion !HEXSTRING(value, digits)! to complete
    #ZL XPIXEL/2+bt_xpitch, ys+pitch, "Port 0x" !HEXSTR(PATTERN2, 2)! ':' ; the
string, even if Bit-patterns are changed (transform constant as hexstring)

;-----
TouchMacro: PORT1TOG
    #YW 1, 2            ; Toggle port 1

TouchMacro: PORT2SET
    #YW 2, 1            ; Set port 2

TouchMacro: PORT2RES
    #YW 2, 0            ; Reset port 2

TouchMacro: PORTALLSET
    #YW 0, $FF          ; Set all ports

TouchMacro: PORTALLRES
    #YW 0, 0            ; Reset all ports

;-----
PortMacro: PATTERN1
    #FZ YELLOW, BLACK    ;String color
    #ZL XPIXEL/2+bt_xpitch, ys+bt_ypitch, "Bit-pattern:|" !BINSTR(PATTERN1, 8)!

PortMacro: PATTERN2
    #FZ YELLOW, BLACK    ;String color
    #ZL XPIXEL/2+bt_xpitch, ys+bt_ypitch+pitch, "Bit-pattern:|" !BINSTR(PATTERN2, 8)!

```



## 9.25 Automatic Macro - EXPERT

A little animation with the help of automatic macros. There are further examples available, containing information about I/Os (see [BEGINNER - Analog Macro.kmc](#)<sup>[10]</sup>, [BEGINNER – Bit Macro.kmc](#)<sup>[10]</sup>, [EXPERT – Port Macro.kmc](#)<sup>[11]</sup>) and a ProcessMacro example (see [BEGINNER - Prozess Macro.kmc](#)<sup>[11]</sup>).


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\\Data\\eDIP - intelligent graphic displays\\eDIPTFT32-A\\How to use\\Macro\\

**File:**

EXPERT – Automatic Macro.kmc

**Commands:**

#MJ

Open file in KitEditor

```
eDIPTFT32-A "Automatic Macro"
...
...
...
;
Path <..\..\..\bitmaps\color\>
LOGO = 1 ; using constants makes it easier
Picture: LOGO <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;
;define constants for normal macros
Mn1 = 1
Mn2 = Mn1+1
Mn3 = Mn2+1
Mn4 = Mn3+1
Mn5 = Mn4+1
Mn6 = Mn5+1

;
Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
; draw a centered line directly beneath the picture:
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO),(XPIXEL-
PICTURE_W(LOGO))/2+PICTURE_W(LOGO),yoff+PICTURE_H(LOGO)

;---- Count up and down ----
#FZ YELLOW,BLACK ; set text color and background color
; YELLOW is defined as 7 (compare with line 12:
#include <..\..\default_constant.kmi>
#ZF BIGZIF100 ; set font to no. 8 (Big Numbers)
#MJ Mn1,Mn6,5 ; run macros 1..6 automatically
; MJ = Ping Pong Mode

;---- Place Digit ----
X = 160 ; defining a constant makes it more easy to move the whole
group later
Y = 120
```

Macro: Mn1  
#ZC X,Y "1"

Macro: Mn2  
#ZC X,Y "2"

Macro: Mn3  
#ZC X,Y "3"

Macro: Mn4  
#ZC X,Y "4"

Macro: Mn5  
#ZC X,Y "5"

Macro: Mn6  
#ZC X,Y "6"

## 9.26 Process Macro - BEGINNER

A little animation with the help of automatic macros. There are further examples available, containing information about I/Os (see [BEGINNER - Analog Macro.kmc](#)<sup>[107]</sup>, [BEGINNER – Bit Macro.kmc](#)<sup>[108]</sup>, [EXPERT – Port Macro.kmc](#)<sup>[111]</sup> ) and an AutomaticMacro example (see [EXPERT – Automatic Macro.kmc](#)<sup>[113]</sup>).


**Folder:**

\\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\\Data\\eDIP - intelligent graphic displays\\eDIP-TFT32-A\\How to use\\Macro\\

**File:**

BEGINNER - Prozess Macro.kmc

**Commands:**

#MD

Open file in KitEditor

```
eDIP-TFT32-A "Process Macro"
...
...
...
;-----
Path <..\..\..\bitmaps\color\>
Picture 1 <ea2_making_things_easy_178x63.bmp> ; double click to open Bitmap Editor
;-----

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
#UI 70,10,1 ; place Picture no. 1
#GD 60,75,260,75 ; draw a Line

;---- Count up and down ----
#FZ YELLOW,BLACK ; set text color and background color
; YELLOW is defined as 7 (compare with line 12:
"include <..\..\default_constant.kmi>"
#ZF 8 ; set font to no. 8 (Big Numbers)
#MD 1,3, 1,6, 5 ; define macro process 1, pingpong mode, call
automatic macro 1 to 6 delay 5/10s

;---- Place Digit ----
X = 160 ; defining a constant makes it more easy to move the whole
group later
Y = 120

ProcessMacro: 1
#ZC X,Y "1"

ProcessMacro: 2
#ZC X,Y "2"

ProcessMacro: 3
#ZC X,Y "3"

ProcessMacro: 4
#ZC X,Y "4"
```

```
ProcessMacro: 5  
#ZC X,Y "5"
```

```
ProcessMacro: 6  
#ZC X,Y "6"
```