EA eDIPTFT32-A compiler manual

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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

ESC
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.

Comma
The comma is used to separate the parameters of a macro.

Numbers
All numbers are converted to binary values. Decimal, hexadecimal and binary
numbers can be written.
Example: \texttt{163} (dez) = \$A3 \texttt{(hex)} = %10100011 \texttt{(bin)}

Comments
Comments must begin with a semicolon.
Example: ; this is a comment

Text
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"): #ZL, 0, "abc", 45, 'def', (2D78797A)

KitEditor: 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')

Commands
Command letters and parameters specified in the EA eDIP T32-A data sheet
are valid. Two exceptions facilitate the creation of command lines:

1. The <NUL> is appended automatically by the compiler. This means
commands in which a string is output, the <NUL> no longer has to be entered
as the end identifier.
Example: #ZL 0, 0, "Text"

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"

Constants
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. \texttt{INFO} or \texttt{MACRO} can not be used.
Example: \texttt{CORNER\_X}=5;
the word \texttt{CORNER\_X} is replaced with immediate effect by the value 5.

String Constants
A string-constant is a constant name between two exclamation marks
Example1: \texttt{!NAME!} = "example text"
Example2: \texttt{!NAME!} = "abc", 45, 'def', (2D78797A)

Upper / lower case
No difference is made between upper case and lower case.
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.

Following functions are available:

\textbf{LO} (value) \quad \text{returns the Low-Byte}
\textbf{HI} (value) \quad \text{returns the High-Byte}

\textbf{SET_RGB}(r,g,b) \quad \text{returns a color constant with the three } r, g, b \text{ values}

\textbf{GET_R}(c) \quad \text{etc. \text{color} = \text{SET_RGB}($1E$,$20$,$3F$)}

\textbf{GET_B}(c) \quad \#FP 16, \text{GET_R(color), GET_G(color), GET_B(color)}

\textbf{MIN} (value1, value2,...) \quad \text{returns the minimum value}
\textbf{MAX} (value1, value2,...) \quad \text{returns the maximum value}
\textbf{AVG} (value1, value2,...) \quad \text{returns the average value}

\textbf{RANDOM} (min, max) \quad \text{returns a random value from the range min..max}
\textbf{RANDOM} (min, max, delta) \quad \text{delta = maximum difference to the last random value}

\textbf{MOD} (v, d) \quad \text{the modulo function returns the remainder of the division } v/d

\textbf{SIN} (w, a) \quad \text{w = angle in tenth of degree}
\textbf{COS} (w, a) \quad \text{a = amplitude}
\textbf{TAN} (w, a)

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

\textbf{PICTURE_W} (nr) \quad \textbf{PICTURE_H} (nr) \quad \text{for Images}\]
\textbf{BUTTON_W} (nr) \quad \textbf{BUTTON_H} (nr) \quad \text{for Touchbuttons}[3]
\textbf{ANIMATION_W} (nr) \quad \textbf{ANIMATION_H} (nr) \quad \text{for Animations}[3]
\textbf{INSTRUMENT_W} (nr) \quad \textbf{INSTRUMENT_H} (nr) \quad \text{for Instruments}[3]
to calculate the bounding box of strings following functions are available:

\[ \text{STRING}_W(n, \text{par}, \text{font}) \quad \text{STRING}_H(n, \text{par}, \text{font}) \quad \text{for} \quad \text{internal Strings} \]

\[ \text{STRING}_W(n, \text{par}, \text{font}, \text{page}) \quad \text{STRING}_H(n, \text{par}, \text{font}, \text{page}) \]

\[ \text{STRING}_W(\text{!NAME!}, \text{par}, \text{font}) \quad \text{STRING}_H(\text{!NAME!}, \text{par}, \text{font}) \quad \text{for} \quad \text{String constants} \]

\[ \text{STRING}_W(\text{!NAME!}, \text{par}, \text{font}, \text{page}) \quad \text{STRING}_H(\text{!NAME!}, \text{par}, \text{font}, \text{page}) \]

\[ \text{nr} = \text{internal string number} \quad (\text{see compiler option STRING}) \]

\[ \text{font} = \text{font number} \quad (\text{eDIP command #ZF}) \]

\[ \text{par} = \text{STRING}_P(\text{zoomX, zoomY, width, height, space, code}) \]

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

\[ \text{zoomX, zoomY} = \text{zoom factor 1..8} \quad (\text{eDIP command #ZZ}) \]

\[ \text{width, height} = \text{additional width/height 0..15} \quad (\text{eDIP command #ZY}) \]

\[ \text{space} = \text{spacewidth} \quad (\text{eDIP command #ZJ}) \]

\[ \text{code} = \text{stringcode} \quad (\text{eDIP command #ST}) \]

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:

\[ \text{!STR(value, digits)!} \quad \text{for} \quad \text{decimal numbers} \]

\[ \text{!HEXSTR(value, digits)!} \quad \text{for} \quad \text{hexadecimal numbers} \]

\[ \text{!BINSTR(value, digits)!} \quad \text{for} \quad \text{binary numbers} \]

\[ \text{digits} = 0: \text{variable length} \]

\[ \text{digits} > 0: \text{fix numbers of digits with leading zeros} \]

\[ \text{digits} < 0: \text{fix numbers of digits with leading spaces} \]
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>  INCLUDE <file>,number  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. The optional parameter (number) defines how often the file will be included.

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
'äöüßäöüß' = $84,$94,$81,$8E,$99,$9A,$E1
### 4.2 Transfer

**AUTOSCANN**: $n_1$

Scan baudrate for connected eDIP on COM/USB before programming

- $n_1=0$: autoscan off, use `baud` for connecting and programming
- $n_1=1$: 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 EVALeDIPTFT43 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`)

**VERIFY**

Verifies the complete contents of the FLASH memory after upload.

**DISABLEBIGIMAGES**: `size`, "**types**"

With this statement it is possible to replace big images with a placeholder. This is useful during development to reduce transfer time.

- `size`: Image witch are greater than size [in KB] will be replaced by an rectangle
- "**types**": replace only following types: `F`=font, `P`=picture, `B`=button, `A`=animation, `I`=instrument

Example:

DisableBigImages: 10,"FPBAI" ; all fonts, pictures, buttons, animations and instruments greater than 10 kB are replaced with an rectangle
4.3 String

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

The statement STRING defines and stores internal strings nr (1..255 without 10+13 because these codes are end of string codes).
The internal strings can be used with any command that uses strings e.g. #ZL,#ZC,#ZR,#ZB,#AT,#AK,#AU,#AJ,#BX,#IX,#VE

After the stringcode, defined with #ST n1, 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 STRING_W, STRING_H and STRING_P to get the outline in pixels of the string.

(see How-to-use example String tables - EXPERT)

---

Example 1:

StringCode = $01

STRING: 1, "Hello World"

MACRO: MnPowerOn

#ST StringCode
#ZL 10, 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, StringCode, 1

#MK 1
#ZL 10, StringCode, 1

#MK 2
#ZL 10, 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\emph{\texttt{\textbackslash{}F}}. 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 \texttt{Place Strings - BEGINNER\texttt{\textbackslash{}F}})

\vspace{1em}

predifined fonts (\texttt{include \texttt{\textbackslash{}default\_font.kmi}}):

; default fonts
FONT4x6  = 1
FONT6x8  = 2
FONT7x12 = 3
GENEVA10 = 4
CHICAGO14 = 5
SWISS30B = 6
BIGZIF50 = 7
BIGZIF100 = 8

Path: <..\Fonts> see Character Table

\begin{verbatim}
Terminal 8x8  \texttt{\textbackslash{}F}
Terminal 8x16 \texttt{\textbackslash{}F}
Font 4x6  \texttt{\textbackslash{}F}
Font 6x8  \texttt{\textbackslash{}F}
Font 7x12 \texttt{\textbackslash{}F}
Geneva 10 \texttt{\textbackslash{}F}
Chicago 14\texttt{\textbackslash{}F}
Swiss 30 \texttt{\textbackslash{}F}
BigZif 50 \texttt{\textbackslash{}F}
BigZif 100 \texttt{\textbackslash{}F}
\end{verbatim}

\vspace{1em}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{example.png}
\caption{Example of fonts and their appearances.}
\end{figure}
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)
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
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
56: '8' = 13 57: '9' = 13 58: ':' = 7 59: ';' = 7
76: 'M' = 17 77: 'N' = 17 78: 'O' = 19 79: 'P' = 19
80: 'Q' = 19 81: 'R' = 17 82: 'S' = 16 83: 'T' = 16
84: 'U' = 17 85: 'V' = 17 86: 'W' = 15 87: 'X' = 13
88: 'Y' = 16 89: 'Z' = 16 90: 'a' = 13 91: 'b' = 12
92: 'c' = 12 93: 'd' = 12 94: 'e' = 12 95: 'f' = 12
96: 'g' = 12 97: 'h' = 12 98: 'i' = 12 99: 'j' = 12
100: 'k' = 12 101: 'l' = 12 102: 'm' = 12 103: 'n' = 12
104: 'o' = 12 105: 'p' = 12 106: 'q' = 12 107: 'r' = 12
112: 'w' = 12 113: 'x' = 12 114: 'y' = 12 115: 'z' = 12
120: '|' = 6 121: '\' = 6 122: ':' = 6 123: ';' = 6
124: '=' = 6 125: ';' = 6 126: ':' = 6 127: '1' = 8
128: '2' = 8 129: '3' = 8 130: '4' = 8 131: '5' = 8
132: '6' = 8 133: '7' = 8 134: '8' = 8 135: '9' = 8
136: ':' = 8 137: ';' = 8 138: '=' = 8 139: '\' = 8
140: '|' = 8 141: '\' = 8 142: ':' = 8 143: ';': = 8
144: '1': = 8 145: '2': = 8 146: '3': = 8 147: '4': = 8
148: '5': = 8 149: '6': = 8 150: '7': = 8 151: '8': = 8
152: '9': = 8 153: '0': = 8 154: 'a': = 8 155: 'b': = 8
156: 'c': = 8 157: 'd': = 8 158: 'e': = 8 159: 'f': = 8
160: 'g': = 8 161: 'h': = 8 162: 'i': = 8 163: 'j': = 8
164: 'k': = 8 165: 'l': = 8 166: 'm': = 8 167: 'n': = 8
168: 'o': = 8 169: 'p': = 8 170: 'q': = 8 171: 'r': = 8
172: 's': = 8 173: 't': = 8 174: 'u': = 8 175: 'v': = 8
176: 'w': = 8 177: 'x': = 8 178: 'y': = 8 179: 'z': = 8
180: ':' = 8 181: ';' = 8 182: '=' = 8 183: '\' = 8
184: '|' = 8 185: '\' = 8 186: ':' = 8 187: ';' = 8
188: '=' = 8 189: '\' = 8 190: ':' = 8 191: ';' = 8
192: '=' = 8 193: '\' = 8 194: ':' = 8 195: ';': = 8
196: '1': = 8 197: '2': = 8 198: '3': = 8 199: '4': = 8
200: '5': = 8 201: '6': = 8 202: '7': = 8 203: '8': = 8
204: '9': = 8 205: '0': = 8 206: 'a': = 8 207: 'b': = 8
208: 'c': = 8 209: 'd': = 8 210: 'e': = 8 211: 'f': = 8
212: 'g': = 8 213: 'h': = 8 214: 'i': = 8 215: 'j': = 8
216: 'k': = 8 217: 'l': = 8 218: 'm': = 8 219: 'n': = 8
220: 'o': = 8 221: 'p': = 8 222: 'q': = 8 223: 'r': = 8
224: 's': = 8 225: 't': = 8 226: 'u': = 8 227: 'v': = 8
228: 'w': = 8 229: 'x': = 8 230: 'y': = 8 231: 'z': = 8
232: ':' = 8 233: ';' = 8 234: '=' = 8 235: '\' = 8
236: '|' = 8 237: '\' = 8 238: ':' = 8 239: ';' = 8
240: '=' = 8 241: '\' = 8 242: ':' = 8 243: ';' = 8
244: '=' = 8 245: '\' = 8 246: ':' = 8 247: ';' = 8
248: '=' = 8 249: '\' = 8 250: ':' = 8 251: ';' = 8
252: '=' = 8 253: '\' = 8 254: ':' = 8 255: ';' = 8
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:

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

Animation1_Erde_G16_1-8.bmp:

<table>
<thead>
<tr>
<th>$1$ (1)</th>
<th>$2$ (2)</th>
<th>$3$ (3)</th>
<th>$4$ (4)</th>
<th>$5$ (5)</th>
<th>$6$ (6)</th>
<th>$7$ (7)</th>
<th>$8$ (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="image" /></td>
<td><img src="image2.png" alt="image" /></td>
<td><img src="image3.png" alt="image" /></td>
<td><img src="image4.png" alt="image" /></td>
<td><img src="image5.png" alt="image" /></td>
<td><img src="image6.png" alt="image" /></td>
<td><img src="image7.png" alt="image" /></td>
<td><img src="image8.png" alt="image" /></td>
</tr>
</tbody>
</table>
4.4.5 ExportWinfont

EXPORTWINFONT: \( n_1 \)

\( n_1 = 1 \): 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.
\( n_1 = 0 \): 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:

<table>
<thead>
<tr>
<th>First Nr</th>
<th>Last Nr</th>
<th>Typ</th>
<th>width</th>
<th>height</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>67</td>
<td>monospaced</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>24-bit original BMP</th>
<th>dithering = 1</th>
<th>dithering = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>115254 Byte</td>
<td>DoRLE=0: 76830 Byte</td>
<td>DoRLE=0: 76830 Byte</td>
</tr>
<tr>
<td></td>
<td>DoRLE=1: 49502 Byte</td>
<td>DoRLE=1: 12443 Byte</td>
</tr>
</tbody>
</table>
4.5.4 MakeTransparent

MAKETRANSPARENT: 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

With this compiler option it is possible to remove an additionally not used border:

- n1=0: off
- n1=1: cut a single color boundary
- n1=2: cut a single color boundary only before resize (see MAXSIZE)
- n1=3: cut only a transparency boundary
- n1=4: cut transparency boundary only before resize (default) (see MAXSIZE)

Examples:

<table>
<thead>
<tr>
<th>MakeTransparent</th>
<th>RemoveBorder</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1, &lt;toucan.BMP&gt;</td>
</tr>
<tr>
<td>MakeTransparent</td>
<td>RemoveBorder</td>
<td>Picture</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>MakeTransparent</td>
<td>RemoveBorder</td>
<td>Picture</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>1, &lt;toucan.BMP&gt;</td>
</tr>
<tr>
<td>MaxSize</td>
<td>MakeTransparent</td>
<td>RemoveBorder</td>
</tr>
<tr>
<td>100,100,1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MaxSize</td>
<td>MakeTransparent</td>
<td>RemoveBorder</td>
</tr>
<tr>
<td>100,100,1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>MaxSize</td>
<td>MakeTransparent</td>
<td>RemoveBorder</td>
</tr>
<tr>
<td>100,100,1</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>
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`, `#WF`).

- 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, a bargraph or to draw a line. 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.

predifined 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[^3], bargraph[^3] and touch key/switch[^3], 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[^3])

predifined 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: 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). 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 BUTTON_W and BUTTON_H to get the outline in pixels of the buttons.

(see How-to-use example Glass button - EXPERT)

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
- G16: internal eDIPTFT format, incl. RLE and transparency

All pictures are converted into internal G16 format with RLE encoding (Compileroption DORLE). Too big pictures are resized proportional (Compileroption MAXSIZE). It is also possible to reduce the colordepth (Compileroption MAXCOLORDEPTH). One Color can be defined as transparent for bitmaps without transparency (Compileroption MAKETRANSPARENT). It is possible to cut a single color or transparency border (Compileroption REMOVEBORDER). You can use the Compiler Functions PICTURE_W and PICTURE_H to get the outline in pixels of the picture.

The pictures can be used with the Bitmap commands.

(see How-to-use example BMP file - BEGINNER)
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).
The compiler can create an animation from single images:
- <file1>,<file2>,... two or more single images BMP, GIF, JPG, TGA, PNG or G16
- <file??> the questionmarks are interpreted as placeholder for numbered single images.
Note that max. 4 animations can run at the same time.
The animation images can be used with the Animation commands. 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).
You can use the Compiler Functions ANIMATION_W and ANIMATION_H to get the outline in pixels of the animation.

(see How-to-use example Animated gif - BEGINNER)
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. Note that max. 4 instruments can used at the same time. You can use the Compiler Functions INSTRUMENT_W and INSTRUMENT_H to get the outline in pixels of the instrument.

(see How-to-use example Instrument by touch - BEGINNER)

INSTRUMENT: nr <file??>
The compiler can create an instrument from single bitmaps, the questionmarks are interpreted as placeholder for numbered images (BMP, GIF, JPG, TGA, PNG or G16). The image with number 00 is defined as background image only - without the indicator. Image 1..n are the animations with indicator. If the background image 00 is not available it is not possible to compress the animation and the execution time is longer.

INSTRUMENTPARAM: bA eA
INSTRUMENTPARAM: bA eA rpPos
INSTRUMENTPARAM: bA eA rpX rpY

InstrumentParam is used to set the range and position of the indicator for imported animations.

bA, eA = Indicator begin- and end-Angle -180°..+180° (0°=to TOP, Y-axis, see "InstrumentEdit.exe")

rpPos = Rotationpoint position 1..9 (see MAKETRANSPARENT)(default=5=middle center of the image)

rpX, rpY = Rotationpoint coordinates in dots

Example "voltmeterdown.i16":

![Diagram of a voltage meter instrument](image)
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, 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

```
POWERONMACRO:
  All commands defined in this macro will be automatically executed when the power supply is switched on.

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

WATCHDOGMACRO:
  All commands defined in this macro will be automatically executed when the display hangs up.

BROWNOUTMACRO:
  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[page]. 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[page]. 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)

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[page]. 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[page]. 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)

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[page]. 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)
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. 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. The relating pins for matrix keyboard need to be defined with the command #YM n1,n2,n3. 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) or by command #MC nr. 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)
4.6.9 **AnalogMacro**

**ANALOGMACRO: nr**

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. It is possible to change the assignment between analogurmacrofunction 0..19 and analogmacronumber with command \#VM n1,n2.

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](#))

<table>
<thead>
<tr>
<th>Macro nr</th>
<th>AIN1</th>
<th>AIN2</th>
<th>Macro starts at</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
<td></td>
<td>every change of input voltage</td>
</tr>
<tr>
<td>1</td>
<td>11</td>
<td></td>
<td>falling input voltage</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td></td>
<td>rising input voltage</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td></td>
<td>below lower limit</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td></td>
<td>above lower limit</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td></td>
<td>below upper limit</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
<td></td>
<td>above upper limit</td>
</tr>
<tr>
<td>7</td>
<td>17</td>
<td></td>
<td>outside of both limits</td>
</tr>
<tr>
<td>8</td>
<td>18</td>
<td></td>
<td>inside of both limits</td>
</tr>
<tr>
<td>9</td>
<td>19</td>
<td></td>
<td>lower than other channel</td>
</tr>
</tbody>
</table>
5  EA eDIPTFT32-A commands

5.1  Terminal

Terminal definition:

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set terminal color</td>
<td>#FT fg.bg</td>
<td>Preset color 1..32 for terminal mode (see default colors)</td>
</tr>
<tr>
<td>Define window</td>
<td>#TW n1,C,L,W,H</td>
<td>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</td>
</tr>
<tr>
<td>Terminal off</td>
<td>#TA</td>
<td>Terminal display is switched off; outputs are rejected</td>
</tr>
<tr>
<td>Terminal on</td>
<td>#TE</td>
<td>Terminal display is switched on;</td>
</tr>
</tbody>
</table>

Cursor commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position cursor</td>
<td>#TP C,L</td>
<td>C=column; L=line; origin upper-left corner (1,1)</td>
</tr>
<tr>
<td>Cursor on/off</td>
<td>#TC n1</td>
<td>n1=0: Cursor is invisible; n1=1: Cursor flashes;</td>
</tr>
<tr>
<td>Save cursor position</td>
<td>#TS</td>
<td>The current cursor position is saved</td>
</tr>
<tr>
<td>Restore cursor position</td>
<td>#TR</td>
<td>The last saved cursor position is restored</td>
</tr>
</tbody>
</table>

Terminal output:

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

(see How-to-use example Keypad - EXPERT)

Special ASCII-characters:

<table>
<thead>
<tr>
<th>ASCII</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF (dec:12)</td>
<td>The contents of the screen are deleted and the cursor is placed at pos. (1,1)</td>
</tr>
<tr>
<td>CR (dec:13)</td>
<td>Cursor to the beginning of the line on the extreme left</td>
</tr>
<tr>
<td>LF (dec:10)</td>
<td>Cursor 1 line lower, if cursor in last line then scroll</td>
</tr>
</tbody>
</table>
## 5.2 Display

Display commands (effect on the entire display):

<table>
<thead>
<tr>
<th>Command</th>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set display color</td>
<td>#FD fg,bg</td>
<td>Defines color 1..32 for display and areas fg=foreground color; bg=background color; (see default colors)</td>
</tr>
<tr>
<td>Delete display</td>
<td>#DL</td>
<td>Delete display contents (all pixels to background color)</td>
</tr>
<tr>
<td>Fill display</td>
<td>#DS</td>
<td>Fill display contents (all pixels to foreground color)</td>
</tr>
<tr>
<td>Fill display with color</td>
<td>#DF n1</td>
<td>Fill complete display content with color n1=1..32 (see default colors)</td>
</tr>
<tr>
<td>Invert display</td>
<td>#DI</td>
<td>Invert display content</td>
</tr>
</tbody>
</table>
## 5.3 Draw

### Draw straight lines and points:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#FG fg,bg</td>
<td>Set color for lines&lt;br&gt;Colors 1..32 (0=transparent)&lt;br&gt;fg=color for line; bg=pattern background; (see default colors)</td>
</tr>
<tr>
<td>#GZ n1,n2</td>
<td>Point size/line thickness&lt;br&gt;n1=X-point size (1 to 15)&lt;br&gt;n2=Y-point size (1 to 15)</td>
</tr>
<tr>
<td>#GM n1</td>
<td>Pattern&lt;br&gt;Set line/point pattern no n1=1..255; 0=do not use pattern (see compiler option PATTERN)</td>
</tr>
<tr>
<td>#GP x1,y1</td>
<td>Draw point&lt;br&gt;Set a point at coordinates x1, y1</td>
</tr>
<tr>
<td>#GR x1,y1,x2,y2</td>
<td>Draw rectangle&lt;br&gt;Draw four straight lines as a rectangle from x1,y1 to x2,y2</td>
</tr>
<tr>
<td>#GD x1,y1,x2,y2</td>
<td>Draw straight line&lt;br&gt;Draw straight line from x1,y1 to x2,y2</td>
</tr>
<tr>
<td>#GW x1,y1</td>
<td>Continue straight line&lt;br&gt;Draw a straight line from last end point to x1, y1</td>
</tr>
<tr>
<td>#GS x1,y1</td>
<td>Set start point&lt;br&gt;Set the last end point at coordinates x1,y1 for commands #GW, #GX and #GY</td>
</tr>
<tr>
<td>#GX step,y1,...</td>
<td>Draw X-graph&lt;br&gt;Draw lines with fix X-steps=0..127 (add 128 for neg.steps) and variable count of Y-values 1..255</td>
</tr>
<tr>
<td>#GY step,x1,...</td>
<td>Draw Y-graph&lt;br&gt;Draw lines with fix Y-steps=0..127 (add 128 for neg.steps) and variable count of X-values 1..255</td>
</tr>
</tbody>
</table>

### Change/draw rectangular areas:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#RL x1,y1,x2,y2</td>
<td>Delete area&lt;br&gt;Delete an area from x1,y1 to x2,y2 (fill with background color)</td>
</tr>
<tr>
<td>#RS x1,y1,x2,y2</td>
<td>Fill area&lt;br&gt;Fill an area from x1,y1 to x2,y2 (fill with foreground color)</td>
</tr>
<tr>
<td>#RF x1,y1,x2,y2,n1</td>
<td>Fill area with color&lt;br&gt;Fill an area from x1,y1 to x2,y2 with color n1=1..32 (see default colors)</td>
</tr>
<tr>
<td>#RI x1,y1,x2,y2</td>
<td>Invert area&lt;br&gt;Invert an area from x1,y1 to x2,y2</td>
</tr>
<tr>
<td>#RC x1,y1,x2,y2,x3,y3</td>
<td>Copy area&lt;br&gt;Copy an area from x1,y1 to x2,y2 to new position x3,y3</td>
</tr>
</tbody>
</table>
### Draw rectangular areas with pattern:

| Pattern color | #FM fg,bg | Color 1..32 (0=transparent) for monochrome pattern. fg=foreground; bg=background color; (see default colors)
| 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 PATTERN)
| Draw box | #RO x1,y1,x2,y2,nr | Draw a rectangle x1,y1 to x2,y2 and fill with pattern nr (see compiler option PATTERN)

### 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 default colors)
| Set border type | #RE nr,n2 | Set border type nr=1..255. border angle: n2=0°; n1=1: 90°; n1=2: 180°; n1=3: 270° (see compiler option BORDER)
| 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)

(see How-to-use example Frame - BEGINNER)
5.4 Text

Text settings:

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

Text output:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#ZL x,y,&quot;text...&quot;</td>
<td>Output string left justified. A string (text...) is output left justified to x,y. several lines are separated by the character '</td>
</tr>
<tr>
<td>#ZC x,y,&quot;text...&quot;</td>
<td>Output string centered. A string (text...) is output centered to x,y. several lines are separated by the character '</td>
</tr>
<tr>
<td>#ZR x,y,&quot;text...&quot;</td>
<td>Output string right justified. A string (text...) is output right justified to x,y. several lines are separated by the character '</td>
</tr>
<tr>
<td>#ZB x1,y1,x2,y2, n1,&quot;text...&quot;</td>
<td>Output string in an area. 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</td>
</tr>
<tr>
<td>#ZT &quot;text...&quot;</td>
<td>String for terminal. Command for outputting a string (text...) from a macro to the terminal</td>
</tr>
</tbody>
</table>

(see How-to-use example Place Strings - BEGINNER)
(see How-to-use example Cyrillic font - BEGINNER)
## 5.5 Bitmap

### Bitmap settings:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
</table>
| Set bitmap colors             | #FU fg,bg | Painting color 1..32 (0=transparent) for monochrome bitmaps. fg=foreground color; bg=background color. (see default colors)
| Image zoom factor             | #UZ n1,n2 | n1 = X-zoom factor (1x to 8x) n2 = Y-zoom factor (1x to 8x) |
| Image angle                   | #UW n1  | 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:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load internal image</td>
<td>#UI x1,y1,nr</td>
<td>Load internal image with the no (0 to 255) from the data flash memory to x1,y1 (see compiler option PICTURE)</td>
</tr>
<tr>
<td>Load image</td>
<td>#UL x1,y1,data...</td>
<td>Load an image to x1,y1; data... = image in G16 format. This command is only for serial interface, do not use this command in a macro!</td>
</tr>
</tbody>
</table>

(see How-to-use example BMP file - BEGINNER)

### Hardcopy:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLE compression (firmware V1.2)</td>
<td>#UR</td>
<td>the next hardcopy (#UH xx1,yy1,xx2,yy2) will be sent with RLE compression</td>
</tr>
<tr>
<td>Send hardcopy</td>
<td>#UH x1,y1,x2,y2</td>
<td>After this command, the image extract is sent (to sendbuffer) in G16 format. With the program &quot;BitmapEdit.exe&quot; from the LCD-Tools you can convert the G16 format to a Windows *.BMP image</td>
</tr>
</tbody>
</table>
5.6 Animation

**Animation settings:**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#FW fg,bg</td>
<td>Set animation colors (median for 1..32 monochrome animation images)</td>
</tr>
<tr>
<td>#WZ n1,n2</td>
<td>Animation zoom factor (x1 to 8x)</td>
</tr>
<tr>
<td>#WW n1</td>
<td>Animation angle (0°, 90°, 180°, 270°)</td>
</tr>
<tr>
<td>#WX n1</td>
<td>Mirror animation (normal display or mirrored horizontally)</td>
</tr>
<tr>
<td>#WT n1</td>
<td>Transparency for color animation (no transparency, first dot at top left side defined as transparent, transparent color from animation file, replace transparent color with background color)</td>
</tr>
</tbody>
</table>

**Animation bitmap:**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#WI x1,y1,nr,n2</td>
<td>Load single image from animation image nr=0..255</td>
</tr>
</tbody>
</table>

**Animation process:**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#WD no,x1,y1,nr,type,time</td>
<td>Define an animation process no=1..4 at position x1,y1 with animation image nr=0..255.</td>
</tr>
<tr>
<td>#WY no,type</td>
<td>Change animation type to new type=1..7</td>
</tr>
<tr>
<td>#WC no,time</td>
<td>Change animation time to new time=0..255</td>
</tr>
<tr>
<td>#WN no</td>
<td>Next animation image</td>
</tr>
<tr>
<td>#WP no</td>
<td>Previous animation image</td>
</tr>
<tr>
<td>#WF no,n2</td>
<td>Show animation image n2</td>
</tr>
<tr>
<td>#WM no,n2</td>
<td>Run animation process no=1..4 from actual image to image n2</td>
</tr>
<tr>
<td>#WL no</td>
<td>Stop animation process and clear last image with actual background color</td>
</tr>
</tbody>
</table>

(see How-to-use example Animated gif - BEGINNER)
### 5.7 Bargraph

**Bargraph settings:**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set color for bargraph</td>
<td>#FB fg,bg,fc</td>
<td>Set colors 1..32 for bargraph (see default colors)</td>
</tr>
<tr>
<td>Bargraph pattern</td>
<td>#BM nr</td>
<td>Pattern for bargraph nr=1..255; nr=0 no pattern/solid (valid for type=0..3)</td>
</tr>
<tr>
<td>Bargraph border</td>
<td>#BE nr</td>
<td>Border for bargraph nr=0..255 (valid for type=4..7) (see compiler option)</td>
</tr>
<tr>
<td>Bargraph linewidth</td>
<td>#BB n1</td>
<td>Linewidth for bargraph n1=1..255; n1=0 automatic (valid for type=2,3,6,7)</td>
</tr>
</tbody>
</table>

#### Define/use bargraphs:

<table>
<thead>
<tr>
<th>Action</th>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define bargraph</td>
<td>#BR #BL #BO #BU no,x1,y1,x2,y2, sv,ev,type</td>
<td>Define bargraph no=1..20 to L(eft), R(right), O(up), U(down) x1,y1,x2,y2 rectangle enclosing the bargraph; 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</td>
</tr>
<tr>
<td>Update bargraph</td>
<td>#BA no,value</td>
<td>Set and draw the bar no=1..20 to the new value</td>
</tr>
<tr>
<td>Draw bargraph</td>
<td>#BN no</td>
<td>Entirely redraw the bar with the number no=1..20</td>
</tr>
<tr>
<td>Send bargraph value</td>
<td>#BS no</td>
<td>Send the current value of bar no=1..20 to sendbuffer</td>
</tr>
<tr>
<td>Delete bargraph</td>
<td>#BD no,n2</td>
<td>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</td>
</tr>
</tbody>
</table>

(see How-to-use example Bargraph by touch - BEGINNER)

#### Bargraph user values - Format text output:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User value color</td>
<td>#FX fg,bg</td>
<td>Set color 1..32 for bargraph user value</td>
</tr>
<tr>
<td>User value font</td>
<td>#BF nr</td>
<td>Set font nr for bargraph user value (see compiler option)</td>
</tr>
<tr>
<td>User value zoom</td>
<td>#BZ n1,n2</td>
<td>Set zoom factor for bargraph user value</td>
</tr>
<tr>
<td>User value additional width/height</td>
<td>#BY n1,n2</td>
<td>n1=0..15: additional width left/right; n2=0..15: additional height top/bottom for user value</td>
</tr>
<tr>
<td>User value angle</td>
<td>#BW n1</td>
<td>Set writing angle for bargraph user value</td>
</tr>
<tr>
<td>User values / scaling</td>
<td>#BX no,x1,y1, &quot;FormatString&quot;</td>
<td>Define user value for bargraph no=1..20. Output is always right justified to x1,y1 Format String: &quot;bv1=uservalue1;bv2=uservalue2&quot; Assign two bar values (bv1,bv2 =0..254) to user defined values max. range: 4 1/2 digits 19999 + decimal point (&quot;,&quot; oder &quot;) + sign e.g. display &quot;-123.4&quot; for bar value bv1=0 and &quot;567.8&quot; for bar value bv2=100 Format String: &quot;0=-123.4;100=567.8&quot;</td>
</tr>
</tbody>
</table>
### 5.8 Instrument

#### Define/use instruments:

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define instrument</td>
<td>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 INSTRUMENT: )</td>
</tr>
<tr>
<td>Update instrument</td>
<td>Set and draw the instrument no=1..4 to the new value</td>
</tr>
<tr>
<td>Draw instrument</td>
<td>Entirely redraw the instrument with the number no=1..4</td>
</tr>
<tr>
<td>Send instrument value</td>
<td>Send the current value of instrument no=1..4 to sendbuffer</td>
</tr>
<tr>
<td>Delete instrument</td>
<td>The definition of the instrument with the number no=1..4 becomes invalid. n2=0: Instrument remains visible; n2=1: Instrument is deleted</td>
</tr>
</tbody>
</table>

(see How-to-use example Instrument by touch - BEGINNER)

#### Instrument user values - Format text output:

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
</table>
| User value color        | Set color 1..32 for instrument user value fg=foreground; bg=background color; (see default colors)
| User value font         | Set font nr for instrument user value (see compiler option FONT: or WINFONT: )                                                           |
| User value zoom         | Set zoom factor for instrument user value n1=X-Zoom 1x..8x; n2=Y-Zoom 1x..8x                                                              |
| User value additional width/height | n1=0..15: additional width left/right; n2=0..15: additional height top/bottom for instrument user value; |
| User value angle        | Set writing angle for instrument user value n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°;                                                                 |
| User values / scaling   | 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:

<table>
<thead>
<tr>
<th>Run macro</th>
<th>#MN nr</th>
<th>Call the (normal) macro with the number nr (max. 7 levels) (see compiler option MACRO: )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run touch macros</td>
<td>#MT nr</td>
<td>Call the touch macro with the number nr (max. 7 levels) (see compiler option TOUCHMACRO: )</td>
</tr>
<tr>
<td>Run port macro</td>
<td>#MP nr</td>
<td>Call the port macro with the number nr (max. 7 levels) (see compiler option PORTMACRO: )</td>
</tr>
<tr>
<td>Run bit macro</td>
<td>#MB nr</td>
<td>Call the bit macro with the number nr (max. 7 levels) (see compiler option BITMACRO: )</td>
</tr>
<tr>
<td>Run matrix macro</td>
<td>#MX nr</td>
<td>Call the matrix macro with the number nr (max. 7 levels) (see compiler option MATRIXMACRO: )</td>
</tr>
<tr>
<td>Run process macro</td>
<td>#MC nr</td>
<td>Call the process macro with the number nr (max. 7 levels) (see compiler option PROCESSMACRO: )</td>
</tr>
<tr>
<td>Run analogue macro</td>
<td>#MV nr</td>
<td>Call the analogue macro with the number nr (max. 7 levels) (see compiler option ANALOGMACRO: )</td>
</tr>
</tbody>
</table>

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: )
### Automatic (normal-) macros:

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

(see How-to-use example [Automatic Macro - EXPERT](#))

### Macro processes:

<table>
<thead>
<tr>
<th>Define macro process</th>
<th>#MD no,type,n3,n4,zs</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro process interval</td>
<td>#MZ no,zs</td>
<td>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.</td>
</tr>
<tr>
<td>Stop macro processes</td>
<td>#MS n1</td>
<td>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.</td>
</tr>
</tbody>
</table>

(see How-to-use example [Process Macro - BEGINNER](#))
## 5.10 Touch

### Touch presets:

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

### Label font presets:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Syntax</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Font color</td>
<td>#FA nf, sf</td>
<td>Color 1..32 for touch labeling (see <em>default colors</em>)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>nf=normal fontcolor; sf= fontcolor for selection</td>
</tr>
<tr>
<td>Label font</td>
<td>#AF nr</td>
<td>Set font with the number nr for touch key label (see compiler option <em>FONT</em> or <em>WINFONT</em>)</td>
</tr>
<tr>
<td>Label zoom factor</td>
<td>#AZ n1,n2</td>
<td>n1=X-zoom factor (1x to 8x); n2=Y-zoom factor (1x to 8x)</td>
</tr>
<tr>
<td>Additional width/height</td>
<td>#AY n1,n2</td>
<td>n1=0..15: additional width left/right</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n2=0..15: additional height top/bottom</td>
</tr>
<tr>
<td>Label angle</td>
<td>#AW n1</td>
<td>Label output angle: n1=0: 0°; n1=1: 90°; n1=2: 180°; n1=3: 270°</td>
</tr>
<tr>
<td>Offset for selected label</td>
<td>#AO n1,n2</td>
<td>n1=X-offset; n2=Y-offset</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n1,n2=0.7 (add +8 for negative direction)</td>
</tr>
</tbody>
</table>
Define touch key/switches:

<table>
<thead>
<tr>
<th>Define touch key</th>
<th>#AT x1,y1,x2,y2, downCode,upCode, &quot;text...&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#AU x,y, downCode,upCode, &quot;text...&quot;</td>
</tr>
<tr>
<td></td>
<td>key remains depressed as long as there is contact</td>
</tr>
<tr>
<td>Define touch switch</td>
<td>#AK x1,y1,x2,y2, downCode,upCode, &quot;text...&quot;</td>
</tr>
<tr>
<td></td>
<td>#AJ x,y, downCode,upCode, &quot;text...&quot;</td>
</tr>
<tr>
<td></td>
<td>status of the switch toggles after each contact</td>
</tr>
</tbody>
</table>

#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)
(see How-to-use example Glass button - EXPERT)

Define touch areas:

<table>
<thead>
<tr>
<th>Define drawing area</th>
<th>#AD x1,y1,x2,y2, n1,fg</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 default colors)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Define free touch area</th>
<th>#AH x1,y1,x2,y2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A freely usable touch area is defined. Touch actions (down, up and drag) within the corner coordinates x1,y1 and x2,y2 are sent.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set bar by touch</th>
<th>#AB no</th>
</tr>
</thead>
<tbody>
<tr>
<td>The bargraph with no=1..20 is defined for input by touch panel.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set instrument by touch</th>
<th>#A+ no</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instrument with no=1..4 is defined for input by touch panel.</td>
<td></td>
</tr>
</tbody>
</table>

(see How-to-use example Free draw area - BEGINNER)
(see How-to-use example Bargraph by touch - BEGINNER)
(see How-to-use example Instrument by touch - BEGINNER)
<table>
<thead>
<tr>
<th><strong>Global settings:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch query on/off</td>
<td>#AA n1</td>
</tr>
<tr>
<td></td>
<td>Touch query is</td>
</tr>
<tr>
<td></td>
<td>n1=0: deactivated</td>
</tr>
<tr>
<td></td>
<td>n1=1: activated</td>
</tr>
<tr>
<td>Touch key response</td>
<td>#AI n1</td>
</tr>
<tr>
<td></td>
<td>Automatic inversion when touch key touched</td>
</tr>
<tr>
<td></td>
<td>n1=0: OFF</td>
</tr>
<tr>
<td></td>
<td>n1=1: ON</td>
</tr>
<tr>
<td>Touch key response</td>
<td>#AS n1</td>
</tr>
<tr>
<td>buzzer</td>
<td>Tone sounds briefly when a touch key is touched</td>
</tr>
<tr>
<td></td>
<td>n1=0: OFF</td>
</tr>
<tr>
<td></td>
<td>n1=1: ON</td>
</tr>
<tr>
<td>Send bar/instrument</td>
<td>#AQ n1</td>
</tr>
<tr>
<td>value on/off</td>
<td>Automatic transmission of a new bargraph or instrument value by touch input</td>
</tr>
<tr>
<td></td>
<td>n1=0: deactivated</td>
</tr>
<tr>
<td></td>
<td>n1=1: is placed in the sendbuffer once at the end of input</td>
</tr>
<tr>
<td></td>
<td>n1=2: changes are placed continous into sendbuffer during input</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Other touch functions:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Invert touch key</td>
<td>#AN code</td>
</tr>
<tr>
<td></td>
<td>The touch key with the assigned return code is inverted manually</td>
</tr>
<tr>
<td>Set touch switch</td>
<td>#AP code,n1</td>
</tr>
<tr>
<td></td>
<td>The status of the switch with the return code is changed to</td>
</tr>
<tr>
<td></td>
<td>n1=0: OFF</td>
</tr>
<tr>
<td></td>
<td>n1=1: ON</td>
</tr>
<tr>
<td>Query touch switch</td>
<td>#AX code</td>
</tr>
<tr>
<td></td>
<td>The status of the switch with the return code is placed in the sendbuffer (off=0; on=1)</td>
</tr>
<tr>
<td>Query radio group</td>
<td>#AG n1</td>
</tr>
<tr>
<td></td>
<td>down code of the activated switch from the radio group n1 is placed in the sendbuffer</td>
</tr>
<tr>
<td>Delete touch area by up- or</td>
<td>#AL code, n1</td>
</tr>
<tr>
<td>down-code</td>
<td>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</td>
</tr>
<tr>
<td>Delete touch area by</td>
<td>#AV x,y,n1</td>
</tr>
<tr>
<td>coordinates</td>
<td>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</td>
</tr>
</tbody>
</table>
## 5.11 Backlight

### LED backlight:

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

(see How-to-use example Bargraph by touch - BEGINNER)
### 5.12 Digital IO-Port

#### I/O-ports:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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)  
(see How-to-use example Port Macro - EXPERT)

#### External matrix keyboard:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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 matrixmacro  
 n2=0..255  
 After release the key n1=0 run matrixmacro  
 n2=0..255 |

#### Additional Outputs:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
</table>
| Write extended ports             | #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:

<table>
<thead>
<tr>
<th>Field</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration</td>
<td>#V@ ch,x1</td>
<td>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</td>
</tr>
<tr>
<td>Enable/disable AIN scan</td>
<td>#VA n1</td>
<td>n1=0 disables input scan for AIN1 and AIN2 n1=1 enable input scan</td>
</tr>
<tr>
<td>Send analog value</td>
<td>#VD ch</td>
<td>Voltage in [mV] will be sent (to sendbuffer) for channel ch=1..2</td>
</tr>
<tr>
<td>Limit for analog macro</td>
<td>#VK ch,n1,n2,n3</td>
<td>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.</td>
</tr>
<tr>
<td>Redefine analog macro</td>
<td>#VM n1,n2</td>
<td>Assign analogmacrofunction n1=0..19 with analogmacronumber n2=0..255</td>
</tr>
<tr>
<td>Bargraph for AIN1/AIN2</td>
<td>#VB ch,no</td>
<td>Assigns bargraph no=1..20 to analogue input ch=1..2 (it is possible to assign more than one bargraph to an analogue input). Define start- endvalues for bargraph (see #B ROU) in [mV/20]</td>
</tr>
<tr>
<td>Instrument for AIN1/AIN2</td>
<td>#V+ ch,no</td>
<td>Assigns instrument no=1..4 to analogue input ch=1..2 Define start- endvalues for instrument (see #IP) in [mV/20]</td>
</tr>
<tr>
<td>Redraw bar/instrument</td>
<td>#VR ch</td>
<td>Redraw all bargraphs and instruments defined for channel ch=1..2</td>
</tr>
</tbody>
</table>

(see How-to-use example [Analogue Macro - Beginner](#))
(see How-to-use example [Instrument by analogue input - BEGINNER](#))
### Analogue in user values - Format text output:

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

#### Send functions:

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

#### 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 default colors) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait (pause)</td>
<td>#X n1</td>
<td>Wait n1/10sec before the next command is executed.</td>
</tr>
</tbody>
</table>
| 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 `RS485ADR`)  
(see example `INIT_with_RS485_address.KMC`) |
| 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 |
# Default Fonts

## Terminal 8x8

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| \$60 (dez: 70) |QRSTUVWXYZ[\]^_
| \$80 (dez: 96) | abcdefghijklmnop |
| \$10 (dez: 112) | pqrsuvwxyz{|(| |
| \$10 (dez: 132) | €Üä|
| \$10 (dez: 144) | öüß|
### 6.4 Font 6x8

| $20$ (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) | E e E æ å å æ æ æ æ Æ æ æ |
| $90$ (dez: 144) | Ë æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ |
| $A0$ (dez: 160) | Æ æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ |
| $B0$ (dez: 176) | |
| $C0$ (dez: 192) | |
| $D0$ (dez: 208) | |
| $E0$ (dez: 224) | Ë æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ Æ |
| $F0$ (dez: 240) | ± ÷ × ÷ ÷ \ |
## 6.5 Font 7x12

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<th>$E$</th>
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### 6.9 BigZif 50

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### 6.10 BigZif 100

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</table>


## Default Colors

EA eDIPFT32-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: `#FP no R G B`). 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.

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

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<td>Dark Grey</td>
<td>9</td>
<td>RGB: 111 111 111</td>
</tr>
<tr>
<td>Orange</td>
<td>10</td>
<td>RGB: 255 143 0</td>
</tr>
<tr>
<td>Purple</td>
<td>11</td>
<td>RGB: 143 0 255</td>
</tr>
<tr>
<td>Deep Pink</td>
<td>12</td>
<td>RGB: 255 0 143</td>
</tr>
<tr>
<td>Mint</td>
<td>13</td>
<td>RGB: 0 255 143</td>
</tr>
<tr>
<td>Lawn Green</td>
<td>14</td>
<td>RGB: 143 255 0</td>
</tr>
<tr>
<td>Sky Blue</td>
<td>15</td>
<td>RGB: 0 143 255</td>
</tr>
<tr>
<td>Grey</td>
<td>16</td>
<td>RGB: 175 175 175</td>
</tr>
</tbody>
</table>

NoChange = 255
```

### Color Palette

```
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
```

```
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:

<table>
<thead>
<tr>
<th>Byte</th>
<th>value</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$1b</td>
<td>ESC An image file always begins with</td>
</tr>
<tr>
<td>2.</td>
<td>$55</td>
<td>'U' the imag load instruction</td>
</tr>
<tr>
<td>3.</td>
<td>$4c</td>
<td>'L'</td>
</tr>
<tr>
<td>4.</td>
<td>$00</td>
<td>X-coordinate LOW byte</td>
</tr>
<tr>
<td>5.</td>
<td>$00</td>
<td>X-coordinate HIGH byte</td>
</tr>
<tr>
<td>6.</td>
<td>$00</td>
<td>Y-coordinate LOW byte</td>
</tr>
<tr>
<td>7.</td>
<td>$00</td>
<td>Y-coordinate HIGH byte</td>
</tr>
<tr>
<td>8.</td>
<td>$47</td>
<td>'G' identification for a picture -, Font-,</td>
</tr>
<tr>
<td>9.</td>
<td>$31</td>
<td>'1' or animation-file in the G16 format</td>
</tr>
<tr>
<td>10.</td>
<td>$36</td>
<td>'6'</td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td>Bits per pixel 1=Monochrome; 4=16 colors; 8=256 colors; 16=65536 colors High Color RGB565</td>
</tr>
<tr>
<td>12.</td>
<td></td>
<td>Transparency 0=none, 1=the following valid transparency color</td>
</tr>
<tr>
<td>13.</td>
<td></td>
<td>4/8-bit:</td>
</tr>
<tr>
<td>14.</td>
<td></td>
<td>16-Bit:</td>
</tr>
<tr>
<td>15.</td>
<td></td>
<td>Pallet No. of the transparency color \RGB565-WORD that</td>
</tr>
<tr>
<td>16.</td>
<td></td>
<td>Number of existing color palette (0=256) / transparency color</td>
</tr>
<tr>
<td>17.</td>
<td></td>
<td>reserved</td>
</tr>
<tr>
<td>18.</td>
<td></td>
<td>Size of the pictures 0=different dimensions</td>
</tr>
<tr>
<td>19.</td>
<td></td>
<td>1=equal width</td>
</tr>
<tr>
<td>20.</td>
<td></td>
<td>2=equal height (e.g. proportional Fonts)</td>
</tr>
<tr>
<td>21.</td>
<td></td>
<td>3=equal dimensions</td>
</tr>
<tr>
<td>22.</td>
<td></td>
<td>First picture / characters number</td>
</tr>
<tr>
<td>23.</td>
<td></td>
<td>Last picture / characters number</td>
</tr>
<tr>
<td>24.</td>
<td></td>
<td>Width \ Width of the broadest picture/character Low byte</td>
</tr>
<tr>
<td>25.</td>
<td></td>
<td>/ High byte</td>
</tr>
<tr>
<td>26.</td>
<td></td>
<td>Height \ Height of the highest picture/character Low byte</td>
</tr>
<tr>
<td>27.</td>
<td></td>
<td>/ High byte</td>
</tr>
</tbody>
</table>
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

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

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: the first pixel is the data bit D7
(monochrome) Number of Bytes per Line = (Width+7) / 8

4 bits per pixel: the first pixel is the HI Nibble (D7..D4)
(16-color) the second pixel is the LO Nibble (D3..D0)
Number of Bytes per Line = (Width+1) / 2

8 bits per pixel: the first pixel is the first byte
(256-color) Number of Bytes per Line = width

16 bits per pixel: the first pixel is the first RGB565-WORD
(65636-color) 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
compresses to
84 00 03 12 34 56 78 86 ff

Example 16-Bit RGB565 line with 16 pixels:
0000 0000 0000 0000 0001 2345 6789 ABCD 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\eDIPFT32-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\eDIPFT32-A\My first project

File:
my_first_project.kmc

Commands:
#AT, #BR, #ZL, #UI, #WD

Open file in KitEditor

eDIPFT32-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,
  #WL 1 ; because pixels are deleted with next command
  #RL 170, 0, 319, 239 ; stop animation process
  ; 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**
can stay visible,

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

#BD 1,0 ; delete bargraph 1, because of touchmacro 3 ("Bargraph"), it
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-fle
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\n
**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\n
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 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). In addition you will find help to include WinFonts under BEGINNER - Cyrillic Font.kmc.

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
#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
#GC 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
#ZC 280,120,"vertical centered"

; rotate text 90°
; 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). In addition you will find help to include WinFonts under BEGINNER - Cyrillic Font.kmc.

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

--- Place ELECTRONIC ASSEMBLY Logo ---

;--- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2, yoff, LOGO ; place Picture no. 1
#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
#ZF 3 ; same as "#FZ 5,1"
#ZL 2, 2 ; set font no. 3
#ZL 5, 100, !TEXT1! ; place text "left justified" at the left frame
in line 150

;---- centered text ----
#FZ RED,WHITE ; set text colour
#ZF 5 ; set font no. 5
#ZL 2, 2 ; set zoom factor 2 in x and 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, EXPERT - Place text.kmc).

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIP\eDIP\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>                           ; double click to open Bitmap Editor
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)
shift and mark them with the mouse                          ; select regions and characters by pressing
is activated                                                 ; be sure that the box "use Font for EditBox"

Macro: MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----
#IC 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, {CFD0C8C2C5D28220CA0C0CA20C4C5CBC03F}        ; 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 invertered and normal. If you want to show an animation, please refer to BEGINNER - Show an animated gif file.kmc.

Folder: \ELECTRONIC\ASSEMBLY\LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Picture\

File: BEGINNER – show a bmp file.kmc

Commands:
#UI

Open file in KiEditor
eDIPTFT32-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.

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A!How to use\Picture\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 ----
#IC 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), Radiogroups (see BEGINNER - radiogroup.kmc) and another Example with touch buttons (see EXPERT - numbers_to_terminal_with_autorepeat.kmc).

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 ----
#AC 1,0,2,2 ; set Button no.1, rotation and size
#AU 120,110,66,60 "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. 6 for 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 right 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) and another Example with touch buttons (see BEGINNER - 3 simple buttons.kmc).

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

```plaintext
eDIPTFT32-A "Glass 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 EditBox" is activated, if you want to edit strings
; (refer to l.20)
WEB = 1
DAUPHIN = 2
WinFont: WEB "Webdings", -32, 0, 52 + 55-60 + SF058 + SF0AF + SF0B2-6F0B3, 22
WinFont: DAUPHIN "Dauphin", -32, 1, 32-125, 36

;---define string-constants for webdings
; 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"

!PLAY! = {34}
!PAUS! = {39}
!REW! = {37}
!FOW! = {38}
!STOP! = {3A}
!EARCD! = {3D3C3E}
```
; define constants for touch-macros
play = 1
pau = 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 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 ----
xoffs = 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 l.16Webdings)
xoffs = xoffs
xoffs += pitch+xw

#AU xoffs,ys,play,!PLAY! ; define Picture Button with call touchmacro 1
xoffs += pitch+xw

#AU xoffs,ys,rew,!REW!
xoffs += pitch+xw

#AU xoffs,ys,fow,!FOW!
xoffs += pitch+xw

#AU xoffs,ys,stop,!STOP!

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


xoffs = xoffs
st_x = xoffs
st_y = 200

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

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

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

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

TouchMacro: pau ; called by Button rewind
#MN DELETE ; delete old string and set font
#ZL st_x,st_y, "Pressed pause" ; place description
#AU xoffs,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), Buttons (see BEGINNER - 3 simple buttons.kmc) and another Example with touch buttons (see EXPERT - numbers_to_terminal_with_autorepeat.kmc).

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPFT32-A\How to use\Touch\File:
BEGINNER - touch as radio button.kmc

Commands:
#AR, #AJ

--- 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

#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

---
put a "3" (533, 51 dec.) into send buffer

#AJ OriginX,OriginY+3*PitchY,4',0 "L Number 4" ; draw Touch switch - this will
put a "4" (534, 52 dec.) into send buffer

#AP '1',1

; preset switch no. 1 to

#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), Buttons (see BEGINNER - 3 simple buttons.kmc) and Radio groups (see BEGINNER - radiogroup.kmc).

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
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

#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=xs
y+=pitch+yh
  #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"

;-------------------------------------------------------------------------

;---- 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
How-to-use

;-------------
; 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

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.

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, linewith 1 and green drawingline

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

Define a free drawing area. There is a Beginner example available, too. Please have a look at Beginner – free_draw_area.kmc.

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, linewith 1 and green drawingline

;---- Place information ----
#FZ WHITE, BLACK ; set color for text
#2F CHICAGO14 ; set font no.5
#2L dw_xs, dw_ys-14-5,"Drawing area:

;---- Place buttons ----
#FR 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"

--- 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 parameters 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
EA eDIPTFT32-A compiler help

#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; set fill pattern for bargraph (none)
#BM 0; set the bargraph frame
#FB GREEN, BLACK, TRANSPARENT; set colour for bargraph pattern, background
#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
#BR 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 Line recorder - EXPERT

Draw a x-graph in two different ways. Above all interesting for connection with an microcontroller.

---

**Folder:**
\`ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP\intelligent\_graphic\_displays\eDIPTFT32-A\How\_to\_use\Draw\`

**File:**
EXPERT - line recorder.kmc

**Commands:**
#GS, #GW, #GX

---

**Open file in KiEdit**

```
eDIPTFT32-A "Line-recorder"
...
...
; include pictures and buttons
Path <..\..\..\..\bitmaps\color> 
LOGO = 1 ; define constants makes it easier to use 
Picture: LOGO <ea logo making things easy black.bmp>; double click to open

RadioBut = 1
Button: RadioBut <button\RadioButton95x20_0.bmp>,<button\RadioButton95x20_1.bmp>
;-------------------------------------------------------------------------------
; information: this example shows the difference between drawing straight lines and drawing a graph directly.
; The difference is hardly remarkable looking at execution time.
; But, if you have to send the values via an interface you will see a great difference.

; constants for grid
pitch=10
xs=10
x=xs
xb=120
xe=XPIXEL-BUTTON\_W(RadioBut)-6
ys=PICTURE\_H(LOGO)+10
yh=(YMAX-ys)
arraypitch=xe/10

Makro: MnPowerOn
"--- Place ELECTRONIC ASSEMBLY Logo ----
#TC 0; Cursor invisible
yoff = 0
#UI (XPIXEL-PICTURE\_W(LOGO))/2,yoff,LOGO; place Picture no. 1

#MN GRID

; define constants for radio group
x=XPIXEL-BUTTON\_W(RadioBut)
y=ys
#AF CHICAGO14 ; set font for touch
```
#FA WHITE, YELLOW; set color for touch font
#AC RadioBut, 0, 1, 1; use radiobutton
#AR 1; define first group
#AJ x,y,1,0,"CLine"; place touch button
y+=BUTTON_H(RadioBut)+pitch
#AR x,y,4,"Graph"
#AR 0; end of first group

Macro: GRID
x=xs
#RL x,ys, xe+1, YMAX
#FG GREY,BLACK; set line color
; draw vertical lines
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
x+=arraypitch
#GD x,ys,x,ys+yh
; draw horizontal lines
x=xs
y=ys
#GD x,y,xr,y
y+=arraypitch
#GD x,y,xr,y
y+=arraypitch
#GD x,y,xr,y
y+=arraypitch
#GD x,y,xr,y
y+=arraypitch
#GD x,y,xr,y
y+=arraypitch
#GD x,y,xr,y
y+=arraypitch
#GD x,y,xr,y
y+=arraypitch
#GD x,y,xr,y

;-------------------------------------------------------------------------
TouchMakro: 1; draw graph as lines ( use continue straight lines)
#MN GRID
#FG YELLOW, BLACK; set color for lines
#GS xs + 0 , 218; set start point
#GN xs + 3 , 209; draw line
#GN xs + 6 , 84
#GN xs + 9 , 137
#GN xs + 12 , 137
#GN xs + 15 , 153
#GN xs + 18 , 156
#GN xs + 21 , 92
#GN xs + 24 , 223
#GN xs + 27 , 188
#GN xs + 30 , 223
#GN xs + 33 , 152
#GN xs + 36 , 130
#GN xs + 39 , 212
#GN xs + 42 , 166
#GW xs + 45 , 186
#GW xs + 48 , 136
#GW xs + 51 , 207
#GW xs + 54 , 145
#GW xs + 57 , 190
#GW xs + 60 , 189
#GW xs + 63 , 156
#GW xs + 66 , 221
#GW xs + 69 , 187
#GW xs + 72 , 141
#GW xs + 75 , 90
#GW xs + 78 , 152
#GW xs + 81 , 98
#GW xs + 84 , 219
#GW xs + 87 , 149
#GW xs + 90 , 182
#GW xs + 93 , 181
#GW xs + 96 , 103
#GW xs + 99 , 170
#GW xs + 102 , 187
#GW xs + 105 , 119
#GW xs + 108 , 136
#GW xs + 111 , 133
#GW xs + 114 , 162
#GW xs + 117 , 175
#GW xs + 120 , 140
#GW xs + 123 , 110
#GW xs + 126 , 186
#GW xs + 129 , 179
#GW xs + 132 , 82
#GW xs + 135 , 172
#GW xs + 138 , 204
#GW xs + 141 , 178
#GW xs + 144 , 92
#GW xs + 147 , 207
#GW xs + 150 , 91
#GW xs + 153 , 130
#GW xs + 156 , 166
#GW xs + 159 , 100
#GW xs + 162 , 204
#GW xs + 165 , 152
#GW xs + 168 , 100
#GW xs + 171 , 95
#GW xs + 174 , 109
#GW xs + 177 , 140
#GW xs + 180 , 138
#GW xs + 183 , 186
#GW xs + 186 , 210
#GW xs + 189 , 175
#GW xs + 192 , 121
#GW xs + 195 , 185
#GW xs + 198 , 217

TouchMakro: 2
#MN GRID
#FG GREEN,BLACK ; set color for lines
#GS xs + 0 , 218 ; set start point
;draw graph in x-steps of 3. We need the command two times, because the parameters exceed the limit of 255 values

#GX 3, 209, 84, 137, 137, 153, 156, 92, 223, 188, 223, 152, 130, 212, 166, 186, 136, 207, 145, 190, 189, 156, 221, 187, 141, 90, 152, 98, 219, 149, 182, 181, 103, 170, 187, 119, 136, 133, 162, 175, 140, 110, 186, 179, 82, 172, 204, 178, 92, 207, 91, 130, 166, 100, 204, 152, 100, 95, 109, 140, 138, 186, 210, 175, 121, 185, 217
9.16 Bargraph by touch - BEGINNER

Place a bargraph, that is adjustable by touch and controls the backlight. There is a an EXPERT example available, too. Please have a look at EXPERT - 2 Bargraphs with backlight dimming.kmc. If you need help using touch functions, please refer to BEGINNER - 3 simple buttons.kmc.

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Bargraph\n
File:
BEGINNER - 2 Bargraphs with backlight dimming.kmc

Commands:
#BR, #YB

Open file in KitEditor

eDIPTFT32-A "2 Bargraphs with backlight dimming"

--- 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
#BE 114 ; same as "#FB 4,1,8
#BR 1,20,150,250,170,0,100,5 ; define bargraph no. 1 with size, value and type
#BA 1,57 ; define 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
#BY 0,100,5 ; 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

---

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Bargraph\n
File:
BEGINNER - 2 Bargraphs with backlight dimming.kmc

Commands:
#BR, #YB
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 2,28 ; actualize bargraph no. 2 value
#AB 2 ; define bargraph no. 2 to be adjusted by the

;---- 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
after the YB command
#BA 1,79 ; in this example 100% brightness is adjusted
brightness is set to 79%
;---- Deactivate transmission of bar ----
#AQ 0 ; deactivate transmission of bar-value to
display's sendbuffer
9.17 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**. If you need help using touch functions, please refer to **BEGINNER - 3 simple buttons.kmc**.

---

**Folder:**
\ELECTRONIC\_ASSEMBLY\_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPFT32-A\How to use\Bargraph\ 

**File:**
EXPERT - 2 Bargraphs with backlight dimming.kmc 

**Commands:**
#BR, #YB

---

Open file in KitEditor

---

eDIPFT32-A "2 Bargraphs with backlight dimming"

... 

---

<table>
<thead>
<tr>
<th>Path &lt;......\bitmaps\color&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOGO = 1 ; using constants makes it easier</td>
</tr>
<tr>
<td>Picture LOGO &lt;ea2_making_things_easy_178x63.bmp&gt; ; double click to open</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>define constants for bargraph numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR1 = 1</td>
</tr>
<tr>
<td>BR2 = 2</td>
</tr>
</tbody>
</table>

---

**Macro:** MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----

```markdown
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
#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 ----

```markdown
brlx = 20
brly = 150
brlh = 20
#BM 0 ; set fill pattern for bargraph (none)
#FB GREEN,BLACK,WHITE ; set colour for bargraph pattern, background and frame
#BE 114 ; same as "#FB 4,1,8
#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 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
#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
9.18 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). If you want an overview about all instruments, refer to EXPERT - show some instruments.kmc.

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 Instrument ----
value #IP 1, 85,85, 1,9, 0,100 ; place instrument no. 1 with angle and start/end
#A+ 1 ; instrument is controlled by touch
#Y+ 1 ; instrument is assigned to brightness
```
9.19 **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](#)). If you want an overview about all instruments, refer to [EXPERT - show some instruments.kmc](#).

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.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 Instrument ----
#IP 1, 55,90, 10, 0,200 ; place instrument no. 1 with angle and start/end value

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

#VK 1,0,5 ; set hysteresis to 100mV AIN1

#VA 1 ; enable analog inputs
#VR 1 ; redraw instrument 1

;--------------------------------------------------------------------------------------------------------------------

AnalogeMacro: 1 ; rising analog input 1 (-->hysteresis)
#VR 1 ; redraw instrument 1 with new analog value

AnalogeMacro: 2
#VR 1 ; redraw instrument 1 with new analog value
Place many instruments and connect them with the analogue input.

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPFT32-A\How to use\Instruments\eDIPFT32-A

File:
EXPERT - show some instruments.kmc

Commands:
#IP, #V+

Open file in KitEditor

eDIPFT32-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|AnlogIn1:"

; string constants 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
How-to-use

---

**Macro:** MnAutoStart

;---- Place ELECTRONIC ASSEMBLY Logo ----

```plaintext
#TC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1
#GD (XPIXEL-PICTURE_W(LOGO))/2,yoff+PICTURE_H(LOGO), (XPIXEL-PICTURE_W(LOGO))/2,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 Chicago14
#AF Wingdings
#MT Instrument_1
```

---

**TouchMacro:** Instrument_1

```plaintext
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width, 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 analog value

;---- Place navigation buttons ----

#AT BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrument_1, {E7}

#AT BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instrument_2, {E8}
```

**TouchMacro:** Instrument_2

```plaintext
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width, 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 analog value

;---- Place navigation buttons ----

#AT BT_Left_xstart,BT_Left_ystart,BT_Left_xstart+BT_width,BT_Left_ystart+BT_height,0,Instrument_1, {E7}

#AT BT_Right_xstart,BT_Right_ystart,BT_Right_xstart+BT_width,BT_Right_ystart+BT_height,0,Instrument_2, {E8}
```

**TouchMacro:** Instrument_3

```plaintext
#AL 0,0; delete Touchbutton, but remain visible
#RL BT_Left_xstart+BT_width, 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 analog value

;---- Place navigation buttons ----

#AT
```
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, 250; place instrument no. 1 with angle and start/end value
   #Z RN_x, RN_y, "Tachometer.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, (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, 250; place instrument no. 1 with angle and start/end value
   #Z RN_x, RN_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_5, (E7)

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, 250; place instrument no. 1 with angle and start/end value
   #Z RN_x, RN_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_6, (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.116"

#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_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 analog 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
9.21 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.

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
How-to-use

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
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
9.22 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.

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Language\

File:
EXPERT - stringtable.kmc

Commands:
#ST, #MK

---

eDIPTFT32-A "Stringtable"
...
...
...
; Bilder einbinden max. 256 Bilder (0..255)
Path <..\..\..\bitmaps\color> ; specify path
LOGO = 1 ; using 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 EditBox to write your strings
; please select font (double click on default font.kmi) -> right click on CHICAG14.FXT and select font for EditBox
; double click on string below and the EditBox 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 ----

```
#IC 0 ; Cursor invisible
yoff = 10
#UI (XPIXEL-PICTURE_W(logo))/2, yoff, LOGO ; place Picture no. 1
#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) ---
x = 5
xw = 80
ys = 120
yh = 30
pitch = 10
x = xs
y = ys

#AE 14,0 ; set Frame style no. 14 and rotation
#AF CHICAGO14 ; set font no. 5 for Touch area
#AT x,y,x+xw,y+yh,GER, @"Deutsch" ; place button "German" and call
TouchMacro 1
y+=yh+pitch

#AT x,y,x+xw,y+yh,ENG, @"English" ; place button "English" and call
TouchMacro 2
x+=xw+pitch
y=ys

#AT x,y,x+xw,y+yh,FRE, @"Fran"135"ais" ; place button "French" and call
TouchMacro 3
y+=yh+pitch
for cdille
#AT x,y,x+xw,y+yh,ITA, @"Italiano" ; place button "Italian" and call
TouchMacro 4

;---- Place some text ----

```
#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
```

;---- 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

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

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

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
```
9.23 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 or EXPERT – Port Macro.kmc. In addition you will find help using ProcessMacros (see BEGINNER – Process Macro.kmc) and AutomaticMacros (see EXPERT – Automatic Macro.kmc).

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Macro\BEGINNER - Analog Macro.kmc

Commands:
#VG, #V@, #VE

Open file in KitEditor

eDIPTFT32-A "Analog Macro"

;----- 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
#BE 114 ; same as "#FB 4,1,8
#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
#AT 235,110,295,140,1,0 "5V" ; set font no. 5 for Touch area
#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: ; calibration procedure to set 5.0V
#VE 1,"0=0.000;5000=5.000" ; set new user format for AIN1

;-------------------------------------------------------------------------------
TouchMacro 2: ; calibration procedure to set 3.3V
#VE 1,"0=0.000;3300=3.300" ; set new user format for AIN1
9.24 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), ProcessMacros (see BEGINNER – Prozess Macro.kmc), PortMacros (see BEGINNER – Port Macro.kmc) and AnalogueMacros (see BEGINNER – Analog Macro.kmc).

Folder:
\ELECTRONIC ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPFT32-A\How to use\Macro\File:
BEGINNER – Bit Macro.kmc

Commands:
#YW

Open file in KitEditor

eDIPFT32-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 ----
#IC 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
#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 ----
How-to-use

;String color
#FZ WHITE, BLACK

;String font
#ZF CHICAGO14

;INPUTS
#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 3, 0 ; Reset port 2

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

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

;-------------------------------------------------------------------------------

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

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

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

BitMacro 2:
;Port 2 falling edge
#FZ YELLOW, BLACK ;String color
#ZL 260, 170, "0"
9.25 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), ProcessMacros (see BEGINNER - Prozess Macro.kmc), BitMacros (see BEGINNER – Bit Macro.kmc) and AnalogueMacros (see BEGINNER - Analog Macro.kmc).

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - 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 = 3 ; 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-PIXEL_PICTURE_W(LOGO))/2,yoff,LOGO ; place Picture no. 1

; draw a centered line directly beneath the picture:
#GD (XPIXEL-PIXEL_PICTURE_W(LOGO))/2,yoff+PIXEL_PICTURE_H(LOGO), (XPIXEL-PIXEL_PICTURE_W(LOGO))/2+PIXEL_PICTURE_W(LOGO),yoff+PIXEL_PICTURE_H(LOGO)
#GD XPIXEL/2,yoff+PIXEL_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 (25):"
y+=pitch
#ZL xs,y, "Port 2 (26):"
y+=pitch
#ZL xs,y "All ports (25-32):"

#FZ WHITE, BLUE, YELLOW, WHITE, BLUE, YELLOW  ; Define button colors
#FA YELLOW, BLUE  ; Define text colors
#AF CHICAGO14  ; Touchfont
x=xs
bt_ypitch=18
y=ys+bt_ypitch
y+=10
xw=60
bt_xpitch = 10

#AT x,y,x+xw,y+yh,PORT1TOG,0,"CToggle"  ; Define Button with TouchMacro
1
; "C" means alignent 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
#2F CHICAGO14  ;String font
#ZL XPIXEL/2+bt_xpitch,y_title, "INPUTS"
#ZL XPIXEL/2+bt_xpitch,y, "Port 0x"!HEXSTR(PATTERN1,2)!':'  ; use
compiler function !HEXSTRING(value, digits)! to complete
#ZL XPIXEL/2+bt_xpitch, y+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, y+bt_ypitch, "Bit-pattern:|" !BINSTR(PATTERN1, 8)!

PortMacro: PATTERN2
#FZ YELLOW, BLACK  ;String color
#ZL XPIXEL/2+bt_xpitch, y+bt_ypitch+pitch, "Bit-pattern:|" !BINSTR(PATTERN2, 8)!
A little animation with the help of automatic macros. There are further examples available, containing information about I/Os (see BEGINNER - Analog Macro.kmc, BEGINNER – Bit Macro.kmc, EXPERT – Port Macro.kmc) and a ProcessMacro example (see BEGINNER - Prozess Macro.kmc).

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Macro\...

File:
EXPERT – Automatic Macro.kmc

Commands:
#MJ

--- Place ELECTRONIC ASSEMBLY Logo ---
#IC 0 ; Cursor invisible
yoff = 10
#UI (PIXEL-Picture_W(Logo))/2, yoff, LOGO ; place Picture no. 1
draw a centered line directly beneath the picture:
#GD (PIXEL-Picture_W(Logo))/2, yoff+PIXURE_H(Logo), (PIXEL-Picture_W(Logo))/2+PIXURE_W(Logo), yoff+PIXURE_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"
9.27 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, BEGINNER – Bit Macro.kmc, EXPERT – Port Macro.kmc) and an AutomaticMacro example (see EXPERT – Automatic Macro.kmc).

Folder:
\ELECTRONIC_ASSEMBLY_LCD-Tools-Portable\Data\eDIP - intelligent graphic displays\eDIPTFT32-A\How to use\Macro\n
File:
BEGINNER - Prozess Macro.kmc

Commands:
#MD

--- 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 ----
#ZF 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"