Pico Display Layout Builder (PDLB)

Datasheet

- Desktop GUI software program to generate advanced graphics for PicoMite running on a Raspberry Pi Pico board.
- Companion software for the Pico Display Base Board.
- The software is intended to help the designer “avoid the blank-page…where do I start syndrome”.

Version 1.0

Applying Microcontroller Solutions

Document Date: 2024-09-15

Contents

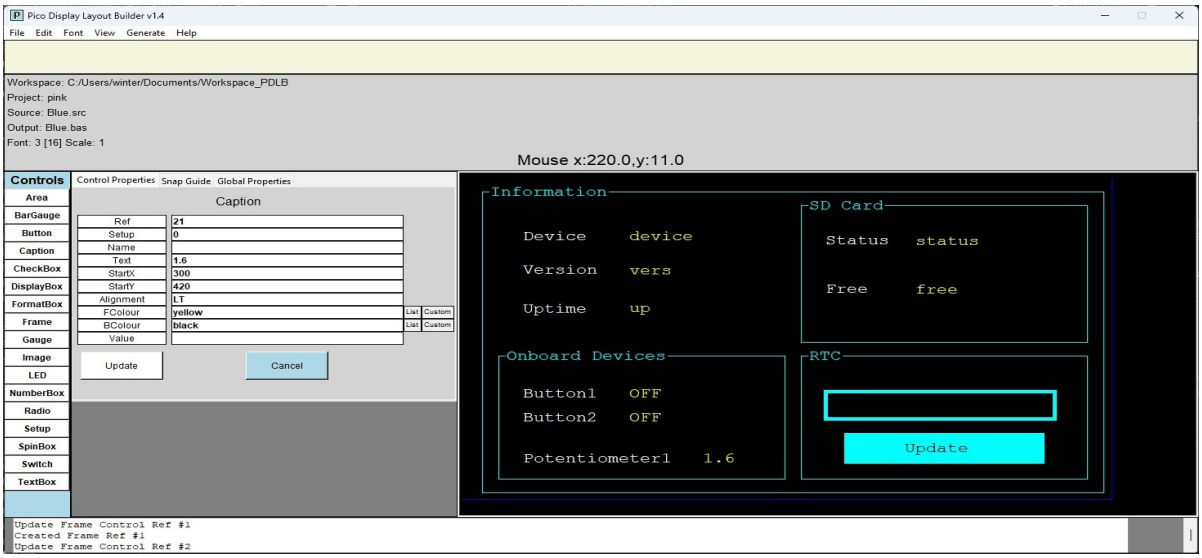
See endnotes for references to all products and authors.

Product Overview

The Pico Display Layout Editor (PDLB) software helps the hardware enthusiast design colorful displays for their Project.

Pico Display Layout Builder (PDLB) is a desktop Graphical User Interface (GUI) application to layout PicoMite advanced graphics Controls. The software 'mimics' the PicoMite Controls using rectangle and circle shapes which can be positioned or resized in a virtual display. When satisfied, a mouse button click generates the PicoMite BASIC code.

The product is companion software for the Pico Display Base Board (available at Tindie.) The Pico, wires and external devices are not included. However these low-cost components are available from popular online retailers.



FEATURES

- **GUI Layout Builder of PicoMite advanced graphic Controls.**
- **Organize PicoMite Controls in files for single or multiple page displays. Merge with optional code files.**
- **Manage graphical design work as source text files within projects. (No database required.)**
- **Generates MMBasic text files that can be deployed into a PicoMite using standard utilities.**

APPLICATIONS

- **Supports PicoMite on the Pico Display Base Board.**
  - **Raspberry Pi Pico**
  - **PicoMite 5.07**
  - **SSD1963 5-inch LCD Display (800*480)**
  - **Integrated Touch control and SD card**
- **Compatible with TeraTerm and MM Edit/MM Console.**

Specifications

Prerequisites

The PDLB software expects the following:

- Pico Display Base Board with a Raspberry Pi Pico and the PicoMite 5.07 firmware.
- 5-inch SSD1963 graphics card plugged into the 40-pin display port.
- The SSD1963 display is integrated with a Touch screen and SD Card.
-

The kit is built on Microsoft Windows 11. Briefly tested on Windows 10 Home; found it runs just as well.

Limitations

The software allows a designer to place similarly-shaped graphic rectangles and ovals (See Screenshot #3) on a virtual desktop canvas to represent PicoMite Controls. The virtually displayed objects are a close approximation to PicoMite Controls.

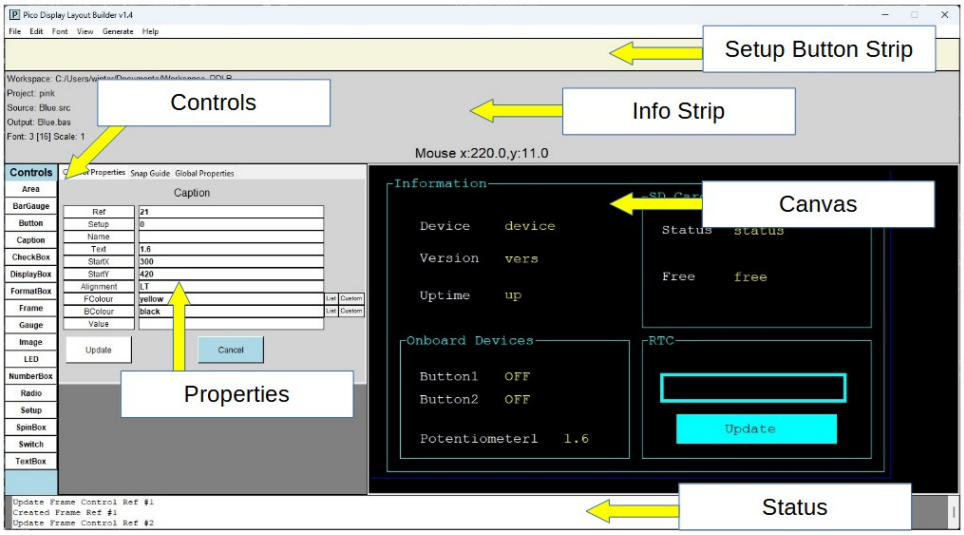
Some current limitations:

- Object selection and movement is limited to one Control at a time. (No lasso.)
- The PicoMite LCD Display is set in Landscape mode.
- The BLIT command, Sounds and Custom Fonts are not directly supported.

Pico Display Layout Builder (PDLB) Description

The PDLB software is a desktop GUI Integrated Development Environment (IDE) application that resides as a single screen with tabs and menus that manage all of the steps to design graphical layouts and generate the PicoMite code.

Below is a screenshot of the PDLB IDE with an overlay describing the various sections:



Screenshot #1

The IDE

The sections of the IDE are organized so the designer can concentrate on designing. Clicking one of the **Controls** (buttons) initiates a placement session with one of the PicoMite Advance Graphic Controls. The placement occurs on the C**anvas** which is a (800*480 pixel) virtual display (that is 1:1 to the PicoMite display.) Each Control is specified via a **Control Properties** pane; modifications are immediately reflected on the Canvas. The Properties pane includes dialog displays that allow the user to choose one of the PicoMite's standard colors or use the custom RGB color picker. The **Info Strip** prominently displays the mouse cursor's "X,Y" locations and the current names of the workspace, project, and source file. A unique feature of PicoMite is grouping Control objects on a display page into a Setup "group"; each Setup page can be viewed/edited by clicking a button in the **Setup Button Strip**. Finally, the **Status** bar displays important messages as the layout progresses.

Layout on the Canvas

Graphical objects, that mimic PicoMite Controls are depicted in the Canvas in a 1:1 relationship to those on the LCD display. Therefore, the designer can grab an object and move it around the screen to decide on its best location, re-size it, and change its color. As the designer places an object, the software maintains a textual

specification of each object, which can be saved into a text source file. Likewise, when ready, a mouse click causes the software to generate the display into PicoMite MMBasic text commands.

Canvas

Screenshot #2

For example, in the close-up of the canvas in Screenshot #2, the cyan-filled rectangle represents the layout of a Button Control (with the text and shape that it would appear on the PicoMite display.) The empty cyan-outlined rectangle represents the layout of a DisplayBox Control (which begins empty on the PicoMite but is updated with the current date/time during program execution.) The thin cyan-colored rectangles represent the Frame Control (with its caption).

Generated PicoMite Controls

At any time, the designer can click the “Build Controls” menu item, and a text file is created with the PicoMite Control MMBASIC commands (see Code #1). An alternate menu item will merge a user created code file.

```
'Pico Display Base Board
'Control layout configured: 2024-09-08 12:19:38.
'
GUI DELETE ALL
cls RGB(black)
COLOUR RGB(white), RGB(black)
FONT 3,1
```

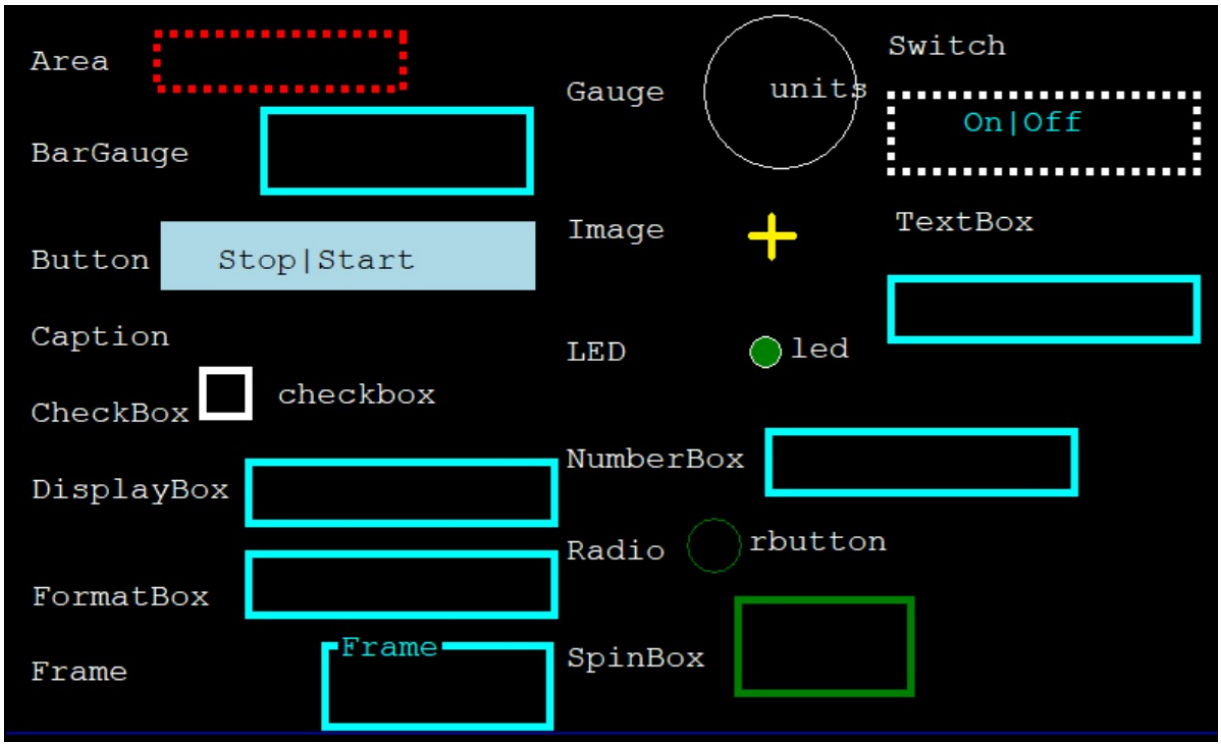


```
GUI SETUP 1
GUI CAPTION #1,"Page 1",700,20,"LT",RGB(white),RGB(black)
GUI FRAME #2,"Information",20,60,770,400,RGB(pink)
GUI FRAME #3,"Frame",350,90,200,200,RGB(pink)
GUI BUTTON #4,"Next Page",570,390,200,50,RGB(black),RGB(pink)
GUI CAPTION #9,"Device",80,120,"LT",RGB(white),RGB(black)
GUI CAPTION #10,"Version",80,180,"LT",RGB(white),RGB(black)
GUI CAPTION #11,"Uptime",80,240,"LT",RGB(white),RGB(black)
GUI SETUP 2
GUI CAPTION #5,"Page 2",700,20,"LT",RGB(white),RGB(black)
GUI FRAME #6,"Configure",30,60,750,400,RGB(cyan)
GUI BUTTON #7,"Home Page",40,390,200,50,RGB(black),RGB(cyan)
GUI CAPTION #8,"num",380,240,"LT",RGB(white),RGB(black)
```

Code #1

The code can be generated and deployed anytime to the Pico to be verified on the LCD Display.

In Screenshot #3, is a sample of all of the Controls. The Control objects can be moved around and/or resized. The Control's color can be set with the standard PicoMite colorlist or via a RGB Color Picker.

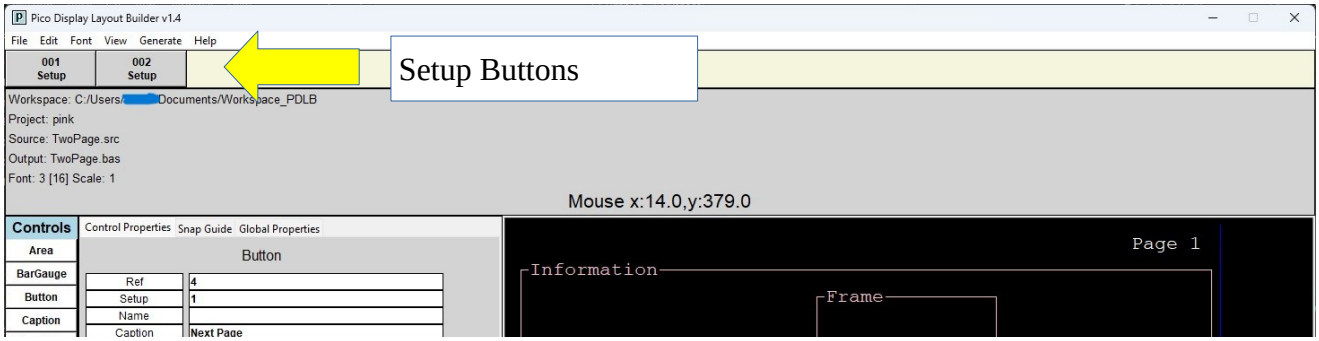


Screenshot #3

PicoMite “Setup”

Control Objects can be grouped into a PicoMite “Setup”. When the designer adds a new Setup Control, all of the current Controls are hidden. New Control placements are associated with the new Setup page.

In Screenshot #4 below, two Setup groups are evident, by the Setup 1 and Setup 2 buttons in the Button Strip. The picture shows that the designer returned to Setup page one. Upon this action, the Setup page two objects are hidden, and the page one Controls re-appear. The designer can add more Controls to Setup page one.



Screenshot #4

Platform

The Pico Display Base Board (link) is designed to interface to a five-inch SSD1963 LCD Display and many of the devices supported by PicoMite. The Base Board PCB was kept small and simple to make it affordable for multiple projects.

The PicoMite software includes an 8-bit parallel interface for the LCD display and SPI pins for the integrated Thin Film Transistor (TFT) Touchscreen and SD Card. The SSD1963 display boards all have a “standard” 40-pin male header, and so the desired display board is just inserted into the matching 40-pin female port.

The base board expects a 5-inch LCD (800*480 pixels) with a touchscreen. The 40-pin male header is already soldered to the board. The LCD Display can be powered from the Pico. It also has an integrated SD Card which is supported by the PicoMite firmware.

PicoMite firmware is easily deployed to the Raspberry Pi Pico board. It includes MMBasic with advanced graphics and GPIO processing. A very good description of PicoMite is described by the author (link) The PicoMite authors also released MM Edit and MM Console (which is excellent software to edit/deploy the code from a desktop computer.

Managing Source and Deployment

Since the PicoMite on Pico is so versatile, a designer will want to create multiple projects. The PDLB assists the user by creating Workspace and Project folders. Within the workspace, the designer can create one or more projects. Within the project folder are the image, source “SRC”, and Basic “BAS” files. The names of the current workspace, project and source files are displayed on the IDE’s Info Strip.

The suggested workflow (see Diagram #1) is to (1) use PDLB to layout the Controls and generate a “BAS” file. (2) And, include an optional code file. (3) use MM Edit to open the “BAS” file and modify the code further. Click the “Deploy” button. This automates the transfer via MM Console to the Pico and executes the code.

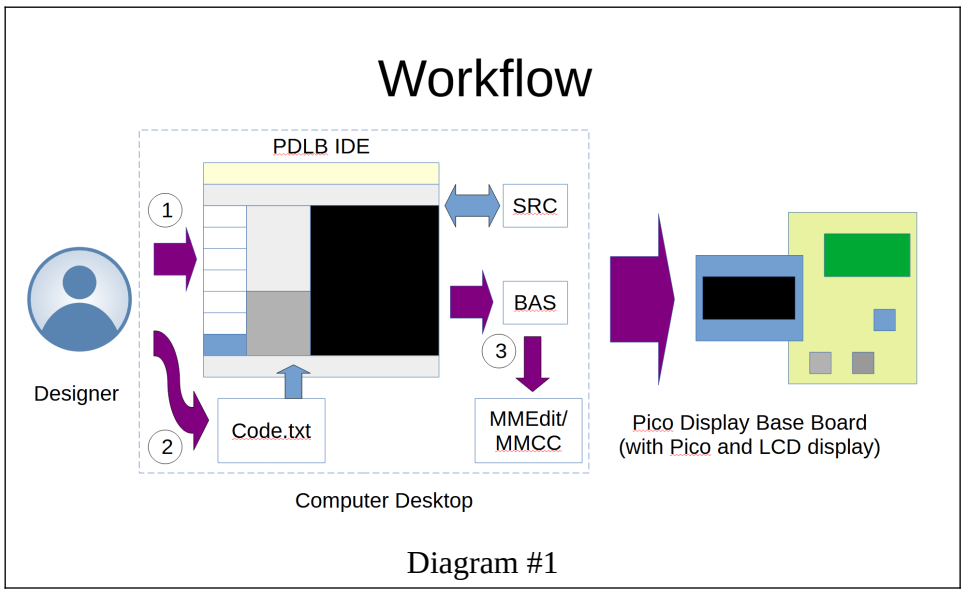


Diagram #1

Alternately, one can edit the “BAS” file and then copy/paste directly into PicoMite using TeraTerm’s terminal.[i]

i Raspberry Pi Pico (Pico) is a product of Raspberry Pi Ltd.
PicoMite is a product of Geoff Graham and others. Visit http://www.thebackshed.com
MMEdit, and MMConsole are products of mmedit@c-com.com.au
TeraTerm is a product of the Tera Term Project. See http://ttssh2.sourceforge.jp/
Tindie is a product of tindiw.org. See https://tindie.com
Pico Display Base Board is a product of KW Services. See his Tindie store.