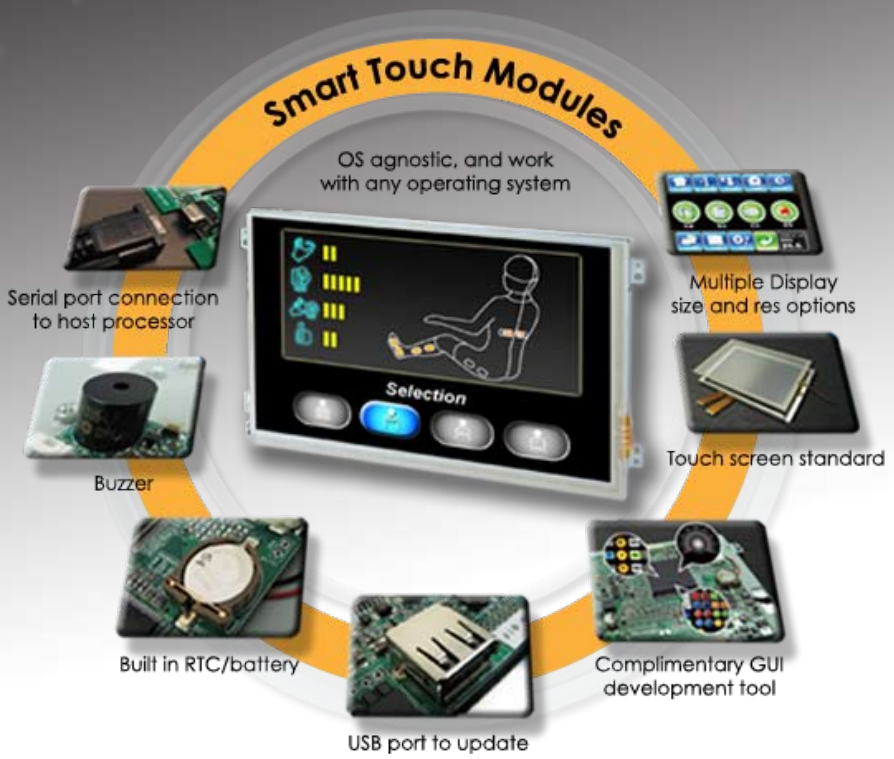
andersDX

Smart Touch Module User Manual



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Interfaces to Inspire

Manual revision history

Issue	Date	Comments
1.0		

Contents

Smart Touch Modules User's Manual

Introduction

Any machine or process you build, whatever its application, must have a user interface. A lift has buttons that let you choose the floor you want, and a display to show which floor you're on. A nuclear power station has a rather more complex set of buttons and displays, but the requirement is the same – to let the user command the process, and see the process's status.

Originally, such user interfaces had to be physically assembled, bit by bit, using switches, buttons, lamps and meters as the process dictated. As well as being slow, this approach was not easily amenable to modification or extension. Then the advent of industrial computer hardware and software allowed 'virtual' user interfaces using CRT and then flat panel display screens. However, even with software packages, designing a viewable control strategy could be time consuming – and integrating a flat panel display into a control system could be even more frustrating, as the effort involved didn't seem to help the marketable functionality of the machine much.

The Anders Smart Touch Module (STM) you have just purchased has been developed as an easy to use, simply integrated alternative to such approaches. It comprises a TFT display ready assembled with all drive electronics and an optional touch screen, which you can connect to your target machine with just a simple, standard serial interface. Drag and drop icons for pushbuttons, switches, lamps, meters and other items from the STM icon library onto the display, add text, and it becomes your target machine's control panel.

The STM features a real-time, dynamic user interface. The optional touch screen allows you to press an ON/OFF switch, see its Icon change state on the STM, and observe your target machine's reaction to the switching event. Lamp Icons will appear as lit or unlit and meters will show a range of values, depending on Command Strings supplied by your target machine through the serial link. Animations can be displayed by sequenced displays of Icon sets.

The process of configuring your STM and integrating it with your target machine comprises 8 steps:

1. Install the supplied 'Arranger' package on your PC, and use it to lay out your Icons and text messages as you wish them to appear on your STM 'control panel'.
2. Store your completed layout as a project on your PC
3. Transfer your project Icons and other images to the STM using a USB memory stick
4. Connect your STM to a USB port on your PC using the USB to UART converter supplied.
5. Use the Arranger package to send command strings which it has automatically generated to the STM and watch their effect on the STM's display. Arranger is acting as a simulator for your target machine.
6. Use the Command Pilot software package supplied to simulate your target machine's actions by preparing complete Command String sequences and sending them to the STM. They define which Icons to retrieve from memory, and display. These command strings are defined and understood by the STM. They include codes to handle STM touch screen events, so that the STM can supply switch and pushbutton inputs to your target machine as well as displaying your target machine's outputs on lamp and meter Icons.
7. Then, dispense with the PC and use the Graphic Testing Board supplied to emulate the behaviour of your own target machine hardware, sending Command Strings to the STM.
8. Connect your STM as the Control Panel for your target machine, using a serial link. Install and run the Command String sequences prototyped using Command Pilot and the Graphic Testing Board.

Your STM is supplied with all necessary cables, hardware and software. As a first step, you can power up your STM with the power supply provided and see the 'Anders' logo appear on the STM screen. Then you can connect the STM via the cables provided to a USB port on your PC, and follow the instructions to install the appropriate USB drivers for PC – STM communication.

Next, you can install the Arranger software package provided onto your PC. The Arranger has a library of Icons for input devices such as pushbuttons and switches, and output devices such as lamps and meters. You can select the devices you want, then drag and drop them onto an Arranger work area that represents the layout of your STM's TFT display. Some of these Icons are dual-state devices such as Lamps or Switches that can be ON or OFF. The STM handles this by creating two Icons for each dual-state device: one displaying the device in its ON state, and the other displaying it in its OFF state. During configuration, both Icons will occupy the same position on the display. Later however, during online operation, your target machine will command either the ON or OFF version of the Icon to be displayed as appropriate to the machine's current status.

Similarly, there are multi-state devices such as Meters. These have a family of Icons to represent full-scale, zero, and some intermediate values. The STM also has other features, including a Buzzer, a Real Time Clock with Alarm, and text display facilities. A choice of fonts, font sizes and background colours is available. Any font can be used, including Chinese and other graphics types.

The output from your 'Arranger' configuration effort will be a project folder. This comprises:

- a binary image file containing all the graphics elements to be stored on your STM

- A project file which you can store and recall at any time to run on Arranger. It includes automatically-generated Command Strings which Arranger can send via serial link from the PC to the STM to call stored Icons, background pictures and text messages from STM memory to display.

- Reference image, text and other files

You can then use the Command Pilot and Graphic Testing Board prototyping tools provided to write complete control programs using Command Strings, and test them before installation onto your target machine.

Chapter 2 below describes the components provided with the STM kit, and the specifications of the PC you will need to run the STM Arranger and Command Pilot tools. Chapter 3 is a Quick Start guide, showing you how to power up the STM and see that it is working OK, install the software on your PC, and connect the PC to the STM and power supply. Chapter 4 introduces the layout and components of the Arranger package. Chapter 5 describes how to use the Arranger package for an example configuration. Chapter 6 explains how to use Arranger in Communications mode to send command strings to your STM. It also introduces Command Pilot and the Graphic Testing Board, and their role as prototyping tools for Command String programs.

2. What's in the box

The STM kit as delivered comprises a set of hardware and software components:

2.1 Smart Touch Module

This is a TFT of any size from 3.5" to 10.4", depending on purchase, integrated with the Smart Touch controller board and optionally a touch screen. There are different versions of the Smart Touch board; the version you have depends on the size of your TFT display. The different versions, STM Type 1 and STM Type 2 have different layouts as shown below:

STM Type 1:

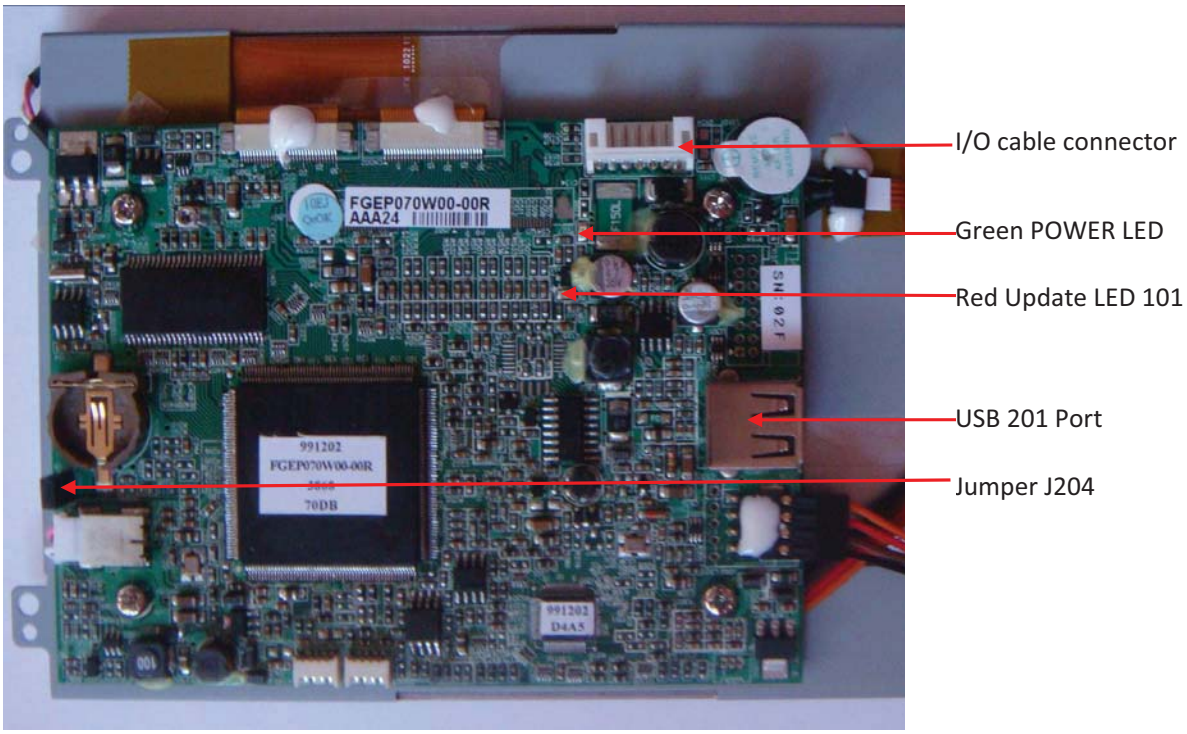


Fig 2.1 Smart Touch Module (STM) board Type 1

Comes with displays:

STM	Display
FG0502W001-00R	5”
FG064VW001-00R	6.4”
FG070WW001-00R	7”
FG080SW001-00R	8”
FG102WW001-00R	10.2”

LED and Jumper table:

Name	Status
J204	Short = Update
	Open = Normal
LED	Lit = Power OK
	Off = Power OFF
LED101	Flashes during update
USB201	USB Port

STM Type 2

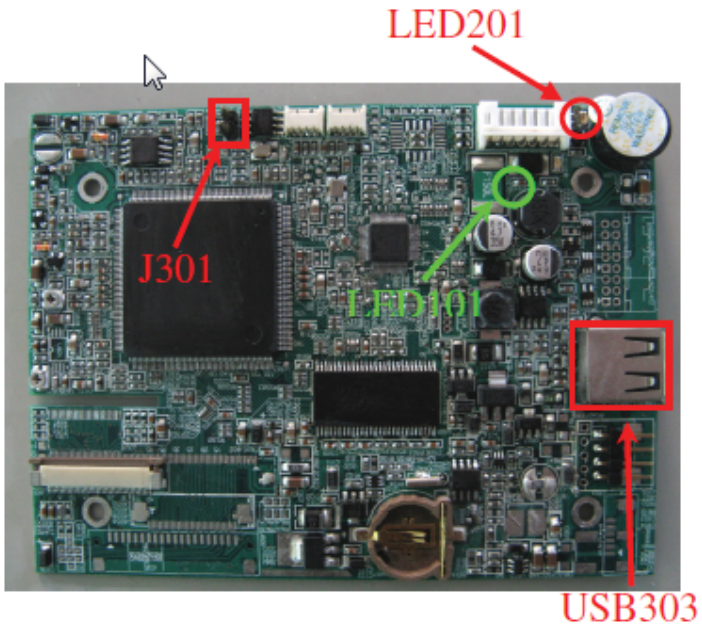


Fig 2.2 Smart Touch Module (STM) board Type 2

Comes with displays:

STM	Display
FG050VW001-00R	5”
FG056VW001-00R	5.6”
FG104SW001-00R	10.4”

LED and Jumper table:

Name	Status
J301	Short = Update
	Open = Normal
LED101	Lit = Power OK
	Off = Power OFF
LED201	Flashes during update
USB303	USB Port

2.2 I/O Cable and USB to UART Converter

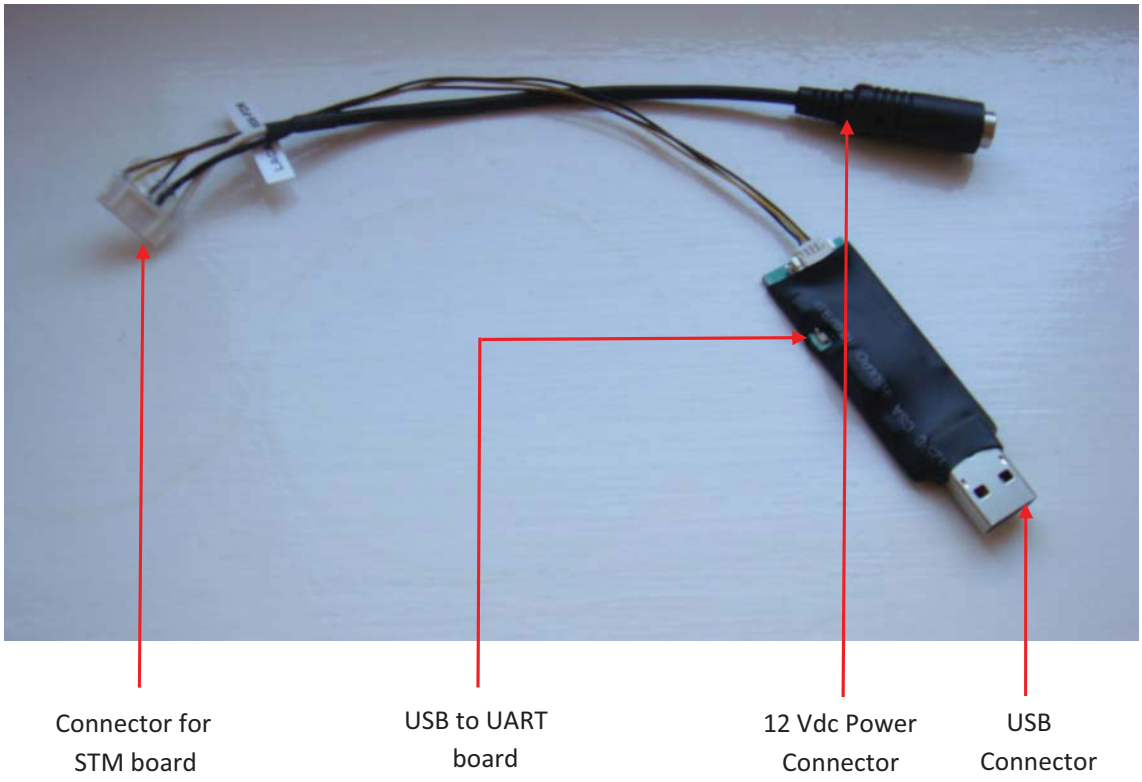


Fig 2.3 I/O Cable (Ref LACABLE08-FDR) with USB to UART board connected

2.3 USB to UART board

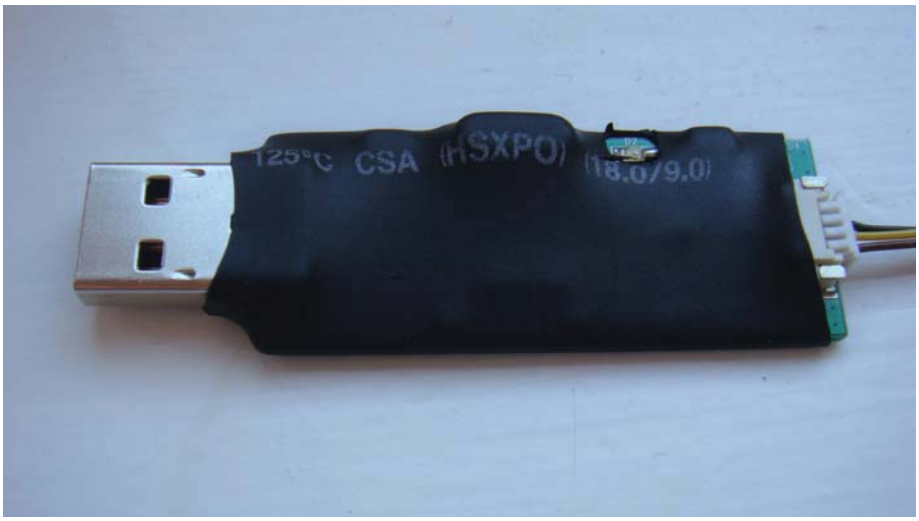


Fig 2.4 USB to UART board

2.4 AC Power Adaptor Module

Fig 2.5 AC Power Adapter Module

Rating: 100 – 240 V/47 – 63 Hz → 12 VDC/2.5 A

2.5 USB Cable

Fig 2.6 USB Cable

Connects USB to UART board to PC USB Host Port. USB Type A connectors

2.6 Graphic Testing User Board

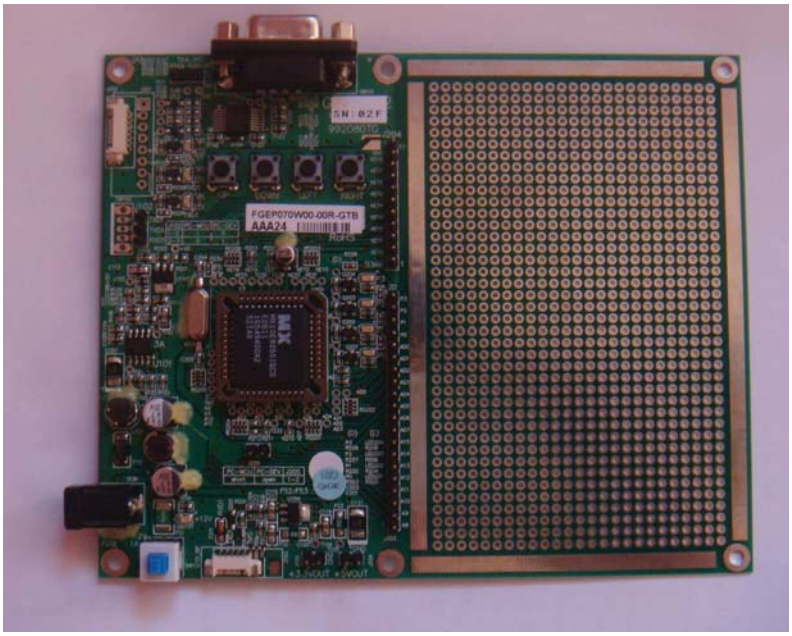


Fig 2.7 Graphic Testing User Board

2.7 Graphic Testing Board - PC Serial Cable

Fig 2.8 Test board Serial Cable

Connects Graphic Testing Board to COM Port on PC

2.8 Graphic Testing Board to Smart Touch Module cable

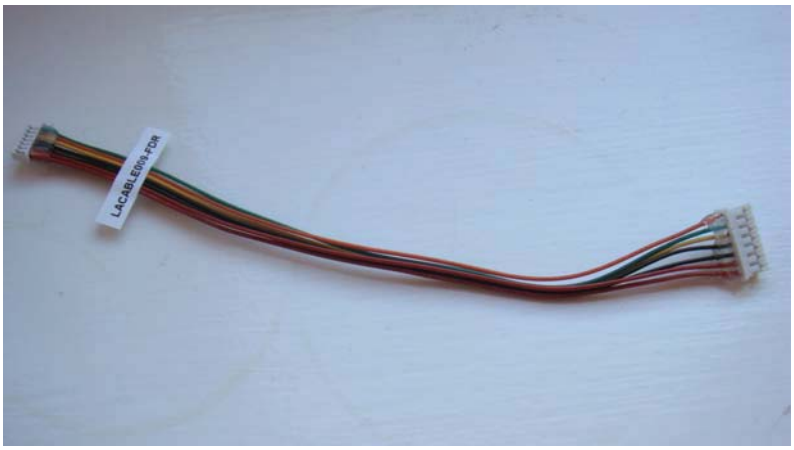


Fig 2.9 Graphic Testing Board to Smart Touch Module cable

Cable ref: LACABLE009-FDR

2.9 Network cable for Graphic Testing Board

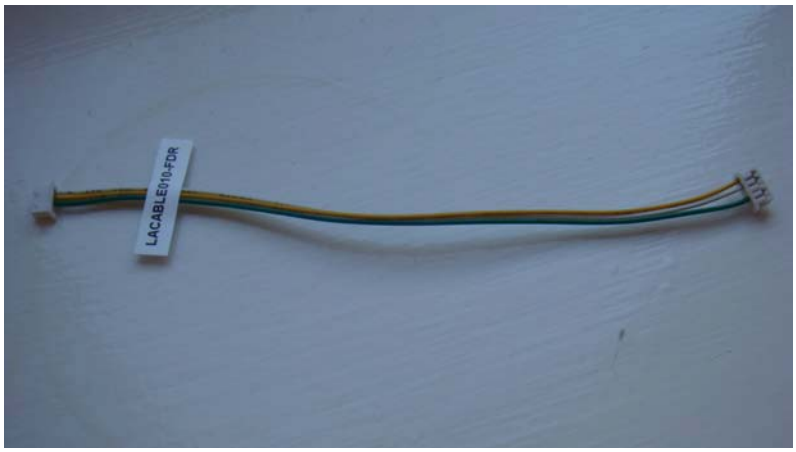


Fig 2.10 Network cable for Graphic Testing Board

Cable ref: LACABLE010-FDR

2.10 Software DVD containing

- 'Arranger' Configuration Package
- Command Pilot Package
- Drivers for USB to UART Converter
- Documentation
- Specifications
- Example Projects, Icons and Background Pictures

2.11 Other components

- 2 x Jumpers – to place STM into Module Information/USB Memory Stick Update mode
- 1 x CR1220 Lithium Battery for STM Real Time Clock

2.12 Hardware requirements

You need a PC to run the 'Arranger' package and associated software, and to test the STM. Minimum specifications for your PC are:

- Pentium lll or higher
- 512 MB or more memory
- Hard disk capacity of 1 GB or more
- CD/DVD-ROM
- Screen resolution of at least 800 x 600 (1024 x 768 recommended)
- Windows XP 32 bit OS

3. STM Quick Start

The STM Quick Start procedure is intended to introduce you to the concepts of the STM and its interaction with the 'Arranger' package and associated tools. The Quick Start procedure alone will not equip you to generate STM projects, but it will demonstrate how to assemble the modules and show what to expect.

Also on completion of the 'Quick Start' procedure you will be ready to start your configuration exercise using 'Arranger'.

3.1 Connecting the STM to your PC, and starting the display

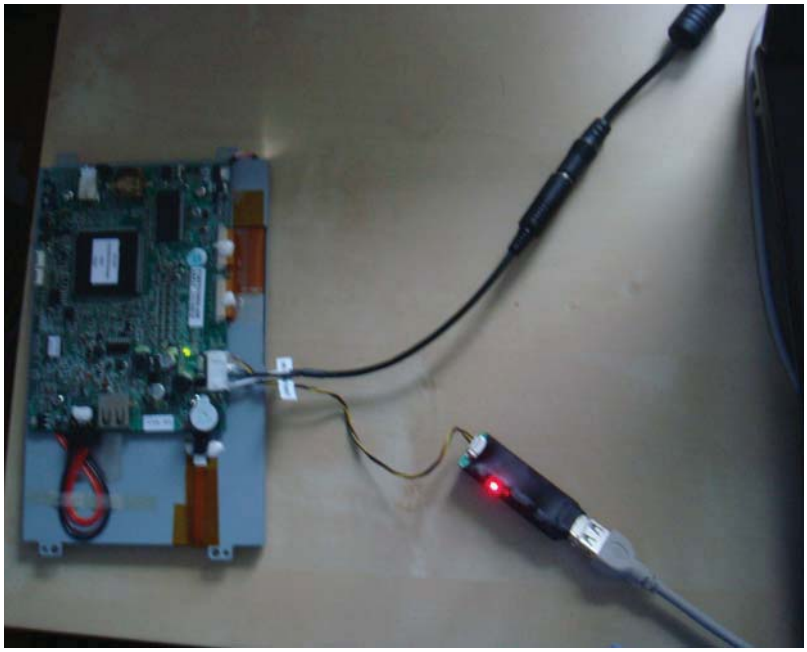


Fig 3.1 Connecting the STM to your PC

- Connect the I/O Cable to the I/O connector on the STM as shown.
- Connect the USB to UART converter to the I/O Cable.
- Connect the USB Cable between the USB to UART converter and a USB port on your PC
- Connect the Power Adapter cable to the power input connector on the I/O Cable

The TFT display should now light and show the Anders Electronics logo and the title 'Smart Touch Modules'

Note: The Connection to the PC's USB port is not required for the STM display to light and show the Logo.

3.2 Show module information

- Remove power from the STM module
- Mount Jumper J204 (STM Type 1) or J301 (STM Type 2)(See 2.1 for more information)
- Re-apply power to see module information on the STM display as shown in Fig 3.1 below:
- Power down and remove the jumper again to restore normal display operation

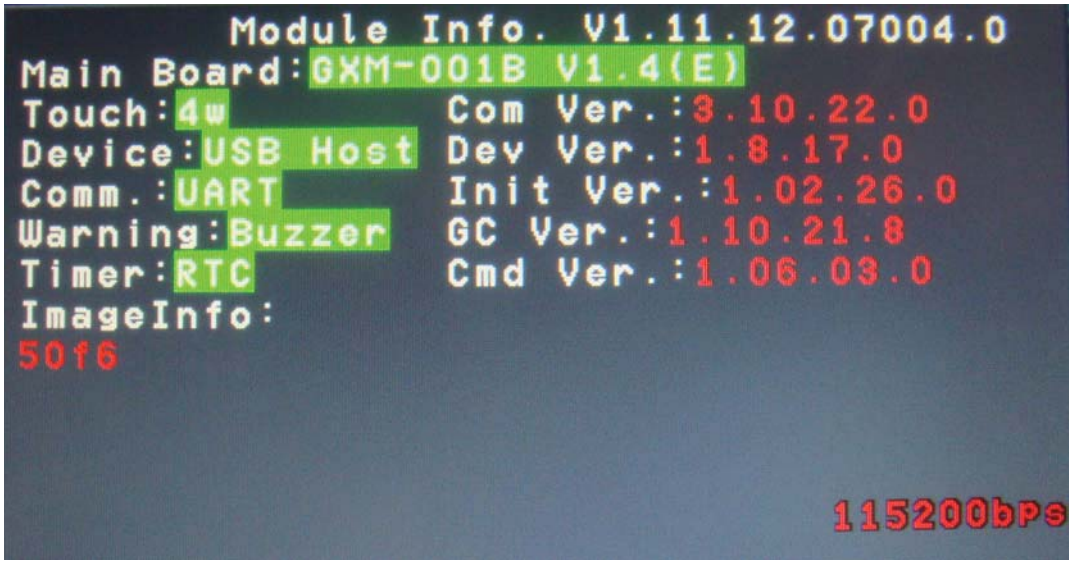


Fig 3.2 Module Information display

3.3 Install the USB to UART Drivers

- Ensure the STM DVD supplied is mounted on your PC'DVD drive
- Connect the USB Cable between the I/O Cable and a spare USB port on your PC if you have not already done so.
- When this connection is first made, the PC should detect the presence of the USB to UART converter as a USB device. If so, the PC will prompt you to install three new drivers:

- FDT USB Writer Tool A
- FDT USB Writer Tool B
- USB Serial Port

Follow the dialogue and the PC will install these drivers from the DVD.

3.4 Install the 'Arranger' package

With the DVD still mounted, navigate to

D:\STM-20101126\Tools(software)\Easy Graphic Arranger\Program

Where 'D' references your DVD drive.

You will now see two WinRAR compressed archives:

ANDERS-GRAPHIC_Arranger(3.3.1.1)-x64)

And

ANDERS-GRAPHIC_Arranger(3.3.1.1)-x86

Choose the x64 version if x64, and the x86 version if x86. Use a WinRAR decompression utility to extract the Setup.exe file and run it. On successful completion of the installation you will see an 'ANDERS-GRAPHIC_Arranger' Icon on your Desktop. Double-click on this to open the 'ANDERS-GRAPHIC_Arranger' User Interface.

3.5 Install .NET Framework 3.5

If your PC, does not have .NET Framework 3.5, or has an earlier version, install as below:

Select and open the WinRAR archive as described above. Within the archive, open the DotNetFX35 folder to see dotNetFX35Setup.exe. Run this to update your PC to . NET Framework 3.5.

3.6 Install the 'Command Pilot' package

With the DVD still mounted, navigate to

D:\STM-20101126\Tools(software)\ANDERS-Command_pilot2(1-8-31-1)\Program

Where 'D' references your DVD drive.

You will now see two WinRAR compressed archives:

ANDERS-Command_pilot2(1-8-31-1)-(x64)

And

ANDERS-Command_pilot2(1-8-31-1)-(x86)

Choose the x64 version if x64, and the x86 version if x86. Use a WinRAR decompression utility to extract the Setup.exe file and run it. On successful completion of the installation you will see an 'ANDERS-Command_pilot 2' Icon on your Desktop. Double-click on this to open the 'ANDERS-Command_pilot 2' User Interface.

4. Easy Graphic Arranger package components and layout

The Easy Graphic Arranger Package – or 'Arranger' for short – provides an Editing toolset allowing you to build your control configuration by dragging and dropping Icons, and adding text messages. There is also a Communications toolset that allows you to use Arranger as a simulator for your target machine, sending Command Strings to the STM via a serial link. You can then observe the results on the STM.

Double-click on your ANDERS-Graphic_Arranger desktop icon and Arranger will start. A User Interface screen will appear, ready for you to configure. Select control input and output Icons from Arranger's Icon library, and drag and drop them into a layout as desired on the STM display. Fig 4.1 shows an extremely simple configuration example. It comprises a switch and a yellow indicator lamp. As one would expect, the switch is an input device that can indicate to your target machine that it is either ON or OFF, while the yellow indicator lamp is an output device that can be set to either ON or OFF, driven by a variable within your target machine.

Fig 4.1 shows the layout and key areas of the Arranger interface. Arranger is based around the Layout Grid area that covers the majority of the interface window. In Fig 4.1 this is displaying the switch and indicator lamp 'configuration' which is built in the same way as the more realistic configurations you will generate for your own application.

Fig 4.1 also shows the key control areas you will be using, labelled as below:

1. Project Manager
2. Picture Organiser
3. STM Memory Status Information
4. Edit Page Toolbar
5. UART Function Toolbar

6. Picture Type and Attribute Area
7. Picture Status Window
8. Picture Effect Modification

The Arranger interface also contains two other control areas which are not immediately visible when you open the Arranger interface, but can be selected for display and interaction when required. The first concerns Command Strings and UART communications, and the second concerns Fonts and Text Messages.

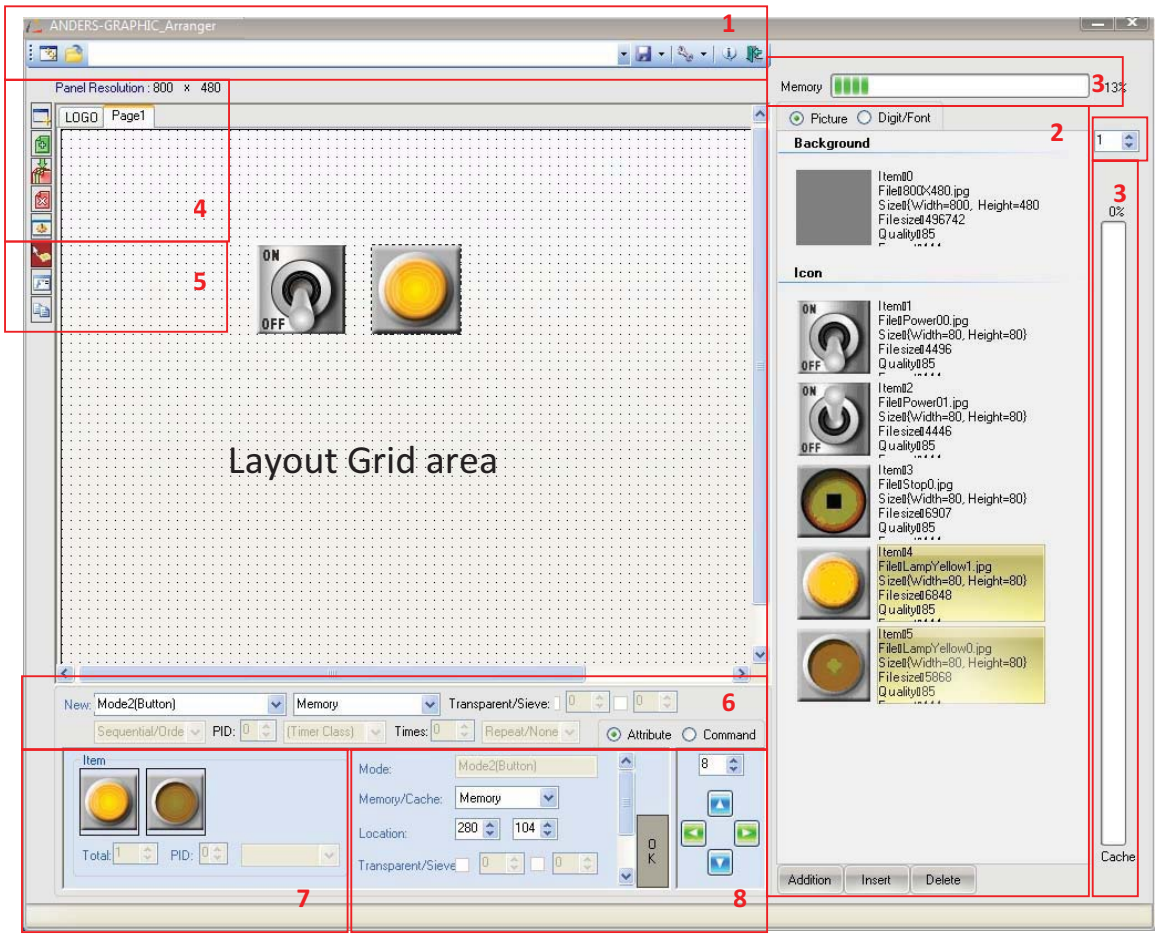


Fig 4.1 'Arranger' User Interface showing key function areas

4.1 Project Manager

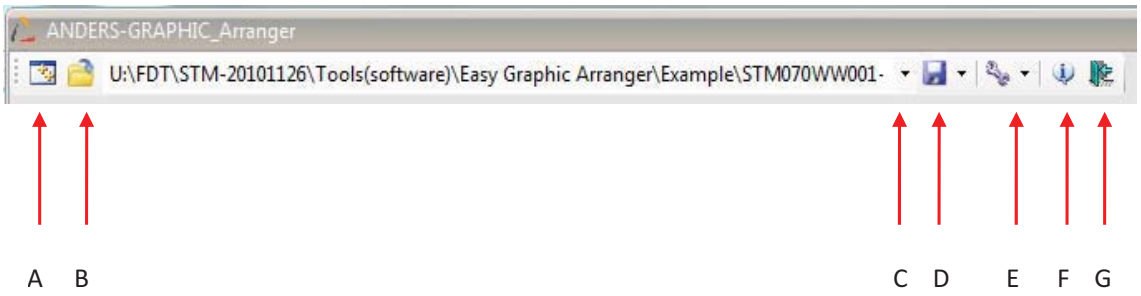


Fig 4.2 Project Manager area of Arranger

Use the Project Manager to Load and Save project files and related information:

A: **Create a new Project.** Clears the User Interface and allows you to start work on a new, blank project.

B: **Open Project**. Allows you to open an existing project, such as one of the samples provided on the DVD, or another project you have been developing.

C: **Quick access** to projects you have recently been working on.

D: **Save the project** you are currently working on to your PC's hard drive

E: **Tools** used for outputting data to your STM module. Also allows start-up of Font dialogue.

F: '**About** Easy Graphic Arranger'

G: **Exit** from Easy Graphic Arranger

4.2 Picture Organiser

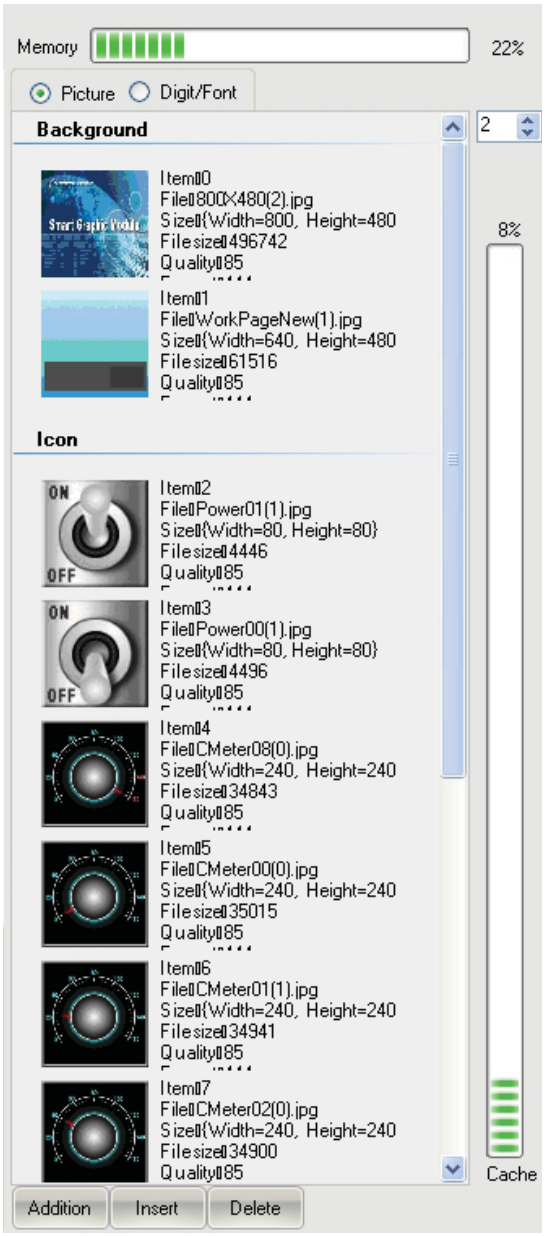


Fig 4.3 Picture Organiser

The DVD shipped with your STM contains a set of pictures, divided into libraries for different STM panel resolutions. Using the Picture Organiser area of the Arranger screen as shown here in Fig 4.3, you can browse an appropriate library, select and display a column of pictures to fulfil your project requirements. These act as 'Parent' pictures. Dragging and Dropping any of these onto the Layout Grid will create 'Child' pictures. Apart from Background pictures, each picture can have more than one Child. For example you may wish to have four Switches for your target machine, to start different processes. You can create this by Dragging and Dropping the Power01 Switch Pair onto the Layout Grid four times to create four Power01 Switch pair instances.

Arranger compiles the Child pictures and other information on the Layout Grid into a single binary file for loading into STM memory. Chapter 5 – An Example Configuration Exercise – will describe this in more detail.

The pictures are available in three modes:

- Mode 1 (Single Picture)
- Mode 2 (Button)
- Mode 3 (Multi-Icon)

Mode 1, Single Picture types are used mainly for Logos and Background Pictures. In fact, the Arranger classifies Logo as a type of Background Picture.

Mode 2, Button Type pictures always exist as pairs, such as Power00 and Power01. This is because they represent Buttons, Switches, Lamps and other devices that have two states – ON and OFF. One component of the picture pair is used to display the device in its ON state while the other displays the device's OFF state.

Mode 3, (Multi-Icon) pictures exist as a set such as CMeter00, CMeter02, CMeter03…..CMeter08 to represent a meter that can display 0, Full Scale or one of seven intermediate readings. Note the different positions of the red needle in the visible CMeter pictures.

Note the Background Picture Count setting box on the upper right of the Picture Organiser area, shown as set to '2'. This is because we want two background pictures for our simple project – a Logo picture which is initially displayed when the STM is powered up, and a Background picture for the single page that will contain our configuration. Larger configurations can contain more pages, each with its own Background picture. Just click on the box arrows to increment or decrement the number of Background pictures assigned.

The Addition tab at the base of the Picture Organiser allows you to select pictures from the supplied DVD picture libraries or another source, and add them to the Picture Organiser List, where they are automatically appended to the end. Because the Background Picture Count is set to 2, the first two pictures are automatically assigned as Background type, while the rest are assigned as Icons. The 'Insert' tab allows you to insert pictures into the list rather than appending them. Click on any picture, and use the 'Insert' function to place the new picture immediately above it. Click on an unwanted picture, then on the 'Delete' tab to delete it. The 'Addition', Insertion' and 'Delete' commands can also be accessed by right-clicking on any picture in the Picture Organiser column.

You can also build your own picture libraries with images for use as Logo or Background pictures, or control Icons. These should be Bitmap (.bmp) or JPEG (.jpg) files. Note however that Photoshop JPEG files are not supported. If you have such files, convert them to a compatible format using ACD.

Both the horizontal and vertical pixel count should be a multiple of 8. Attempts to load images not complying with this requirement will invoke an 'Image Size Not Supported!' message.

Also note the Radio button pair at the top of the Picture Organiser area, where 'Picture' is shown as selected. If 'Digit/Font' is selected instead the Picture Organiser area becomes a Font area in which text messages can be assembled and dropped onto the display grid. Parameters including Font type, size, colour and background colour can be defined. 4.2.1 below describes this in more detail.

4.2.1 Font Organiser

By clicking on the Digi/Font radio button at the top of the Picture Organiser, a Font Organiser like the one on the right can be displayed.

The Font 'Anders1' has been created using Arranger editing tools. These allow choices of font type, size, colour, background and position of font within its background area. The character set can also be chosen. (ie A,B,C etc, a,b,c etc, 1,2,3 etc)

The Font box can then be dragged over the layout grid. This action will open up a large 'Select Font' dialogue box, allowing you to compose text messages which you can drag into position as desired on the screen.

Note: Each Text Message has a maximum size of 16 characters.

You can Add other Fonts to, or Delete Fonts from the Font Organiser by using the Addition and Delete buttons at the base of the Organiser.

Chapter 5.3 later in the Manual shows how to create Fonts and Text Messages.

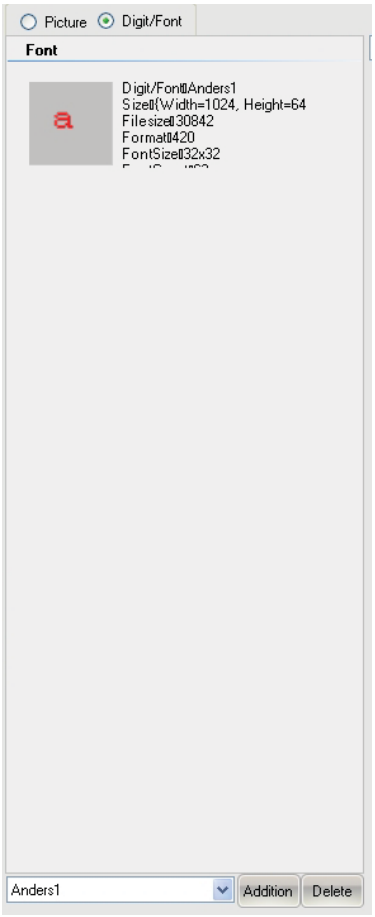


Fig 4.4 Font Organiser area

4.3 Memory Area

The Memory Area, shown as Area 3 in Fig 4.1, and shown again with the Picture Organiser area in Fig 4.3 above, comprises a horizontal status bar titled 'Memory' and a vertical status bar titled 'Cache'. Neither capacity should be more than 95%. The bars refer to memory areas within the STM, displaying their usage and remaining capacity. 'Cache' comprises fast battery-backed SDRAM, while 'Memory' is slower but larger capacity Flash. To maximise performance, pictures that are used frequently should be selected for Cache during configuration (See 4.6 below). The STM will copy such pictures from its Flash memory to its Cache during power-up.

While adding pictures and text to your configuration, it is important to allocate these equally to avoid exceeding capacity in one memory area while under-utilizing the other.

4.4 Edit Page Toolbar

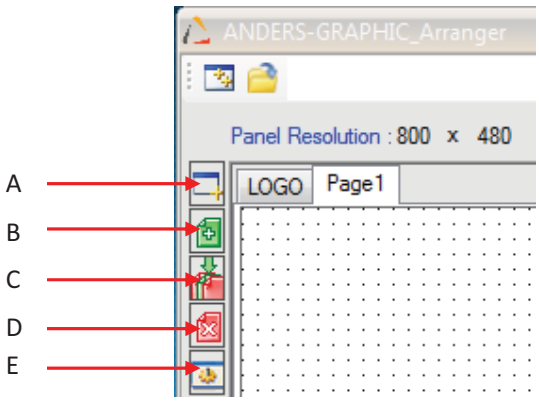


Fig 4.5 Edit Page toolbar

The Edit Page Toolbar allows you to match your Layout Grid to your target STM resolution. Click the Logo tab to display the Logo area or the Page1 tab to display the first page for your configuration layout as you build it. Edit Page Toolbar functions are as below:

A: **Set Panel Size**. Use this to match the display resolution of your target STM. Clicking this will display a Panel Resolution box allowing you to choose between Standard and Other options. Standard options reflect standard display resolutions, including 800 x 480 for the 7" STM used in our example. 'Others' allows you to increment or decrement horizontal and vertical resolutions, a pixel at a time, to accommodate any required profile.

B: **Add Page**: Allows you to add a page to run different background pictures and an increased number of active Icons if your application requires.

C: **Insert Page:** If you want to insert, for example, a new page between Page 2 and Page 3, then

- Click on the 'Page 3' tab
- Click on the 'Insert Page' function
- A new Page will be inserted between Page 2 and Page 3.

D: **Delete Page:** If you wish to delete, for example, Page 4, then click on the Page 4 tab and then the Delete Page function. Page 4 will be deleted.

Note: There is no 'Are you Sure?' function – the page will disappear immediately the Delete Page function is clicked, even it is populated with a configuration.

E: **Grid:** Click on this to display a co-ordinate grid on all pages except the Logo page: Click again to remove the grid display.

4.5 UART Function Toolbar

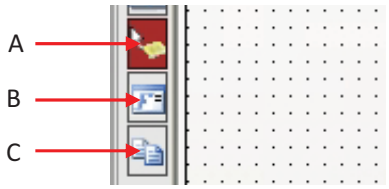


Fig 4.6 UART Function Toolbar

The UART Function Toolbar supports you when you wish to run serial communications with your STM. The functions are introduced here and explained in more detail later.

A: **Select Mode**. Click on this to display Command Strings and Serial Port Settings instead of Picture information below the Layout Grid area.

B: **Select Command Format**: This affects how Command Strings are formatted and packaged for transmission from your PC across the serial link to the STM.

C: **Copy Command to Clipboard**. As you drag and drop pictures and text messages onto the Layout Grid, Arranger generates Command Strings describing each picture's position on the Layout Grid – which will also become its position on the STM screen. You will need to use these Command Strings as part of your controlling software when you want to drive the STM from your target machine. This function allows you highlight and copy one or more Command Strings to your clipboard, from where you can paste them into your own documentation or software.

4.6 Picture Type and Attribute Area

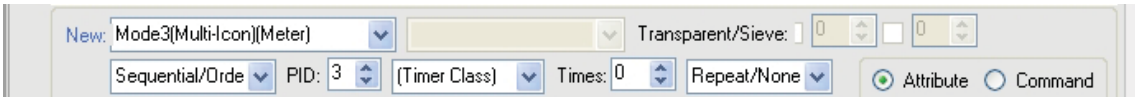


Fig 4.7 Picture Type and Attribute area

This area of Arranger allows you to set up attributes applied to the Parent pictures listed in the Picture Organiser column – see 4.2 above. Attributes applied to any picture within the Organiser area will by default also apply to any of its 'Child' pictures created by dragging and dropping into the Layout Grid.

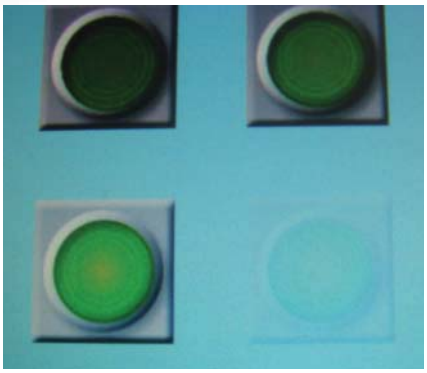
The **Select component mode** drop down menu allows you to specify the mode of an object before you drop it onto the layout grid. Modes can be:

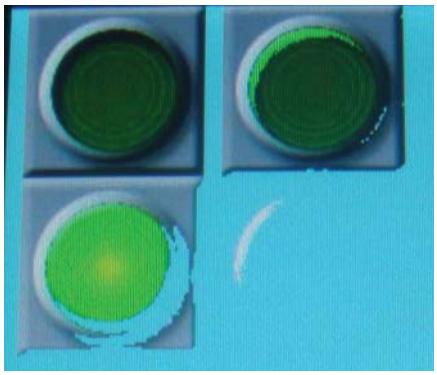
- Mode1 (Single Picture) Mostly used for Logos and Background Pictures
- Mode2(Button) Used for Switches, Lamps and any other 2-state ON/OFF devices
- Mode3 (Multi-Icon)(Meter) Used for Meters or other Multi-state devices that can be at 0, Full Scale or an intermediate value.
- Mode4(Digit/Font) for displaying Text strings

The **Memory/Cache** drop down menu allows you to choose whether to store Icons or text in the STM's Cache or Main Memory – trading off performance against available storage area.

Transparent is an attribute that can only be applied to Icons stored in STM cache. By default each Icon's Transparency is set to 0. This means that the Icon will appear as a solid object on the STM screen, entirely obscuring the area of background picture it covers. Transparency is effectively set to 0 if the checkbox next to the 'Transparency' scroll box is unchecked. If it is checked, the scroll box can be used to increment the Icon's Transparency to any value up to 15, when the Background picture dominates the Icon. These effects cannot be seen on the Arranger screen, but only on the Icons as they appear on the STM TFT display.

Sieve is controlled in a similar way to Transparency. Fig 4.8 shows the effect of changing Transparency and Sieve settings: Top Left = 0. TR = 4, BR = 8 and BL = 15.





Transparency **Sieve**

Fig 4.8 Effect of Transparency and Sieve settings on Green Lamp Icon, visible on STM TFT screen

The remaining options in the Picture Type and Attribute area apply to Mode 3 Multi-Icon devices such as Meters, which can have several states. In some situations, such as a demo system, it may be desirable to show a meter cycling through all of its possible states to show what can be done. Alternatively a multi-Icon set may be created to implement an animated display other than a meter. In other situations, such as when the STM is being driven by your target machine in a real application, the meter should remain at one state until a Command String from the target machine calls for a different state. The paragraphs below describe how to set up the response you require with the options available.

Sequential/Order = Sequential AND Repeat/None = Repeat.

The CMeter Icon on the STM display will increment from 0, through all of its intermediate states to Full Scale. It will then reset to 0 and repeat the cycle until further input

Sequential/Order = Sequential AND Repeat/None = None.

The CMeter Icon on the STM display will increment from 0, through all of its intermediate states to Full Scale. After completing this once, it will remain static until further command.

Sequential/Order = Order (Repeat/None = Don't care)

Normally a Mode 3 Animation comprises a set of pre-configured Icons (such as the CMeter example) where the entire set is dropped onto the Layout Grid to perform as a single animated Icon. Choosing the Order option allows you to assign up to four Icons into the four boxes within the Picture Status Window. They can then operate as one animation.

Timer Class and Times

These can be configured together to define the time interval between successive increments in a sequential meter display.

Timer Class A = 1/20th Sec. (50 mS)

Timer Class B = 1 S

Times is a multiplication factor that can be set to any value from 0 to 127. For example , with settings of Timer Class = B and Timing = 2, there will be a 2 S delay between each increment of the CMeter display

PID: A maximum of four Mode 3 Icons are allowed in any one configuration, labelled as PID 0 to PID 3. Set the maximum number here. Attempts to configure more than this will cause error messages.

Attribute/Command radio buttons: These switch the lower part of the Arranger display between the Picture Status Window (discussed next) and a Command Window. The Command Window shows the Command String generated for any Icon, which can be displayed by clicking on the Icon. The Window allows the Command String's format to be varied between FDT Protocol and C coding compatibility.

Hover the mouse pointer over any Icon on the Layout Grid to view its Attribute settings.

4.7 Picture Status Window

Whereas 4.6 – Picture Type and Attribute Area – concerned the parent pictures in the Picture Organiser area, the Picture Status Window and Picture Effect Modification area concern the individual Child pictures within the Layout Grid. Options from these areas allow you to override some of the attributes that the Child pictures inherit from their Parents. So, two Child pictures can have different attributes even though they were generated from the same Parent. Different Meters could run on different Timers, for example.

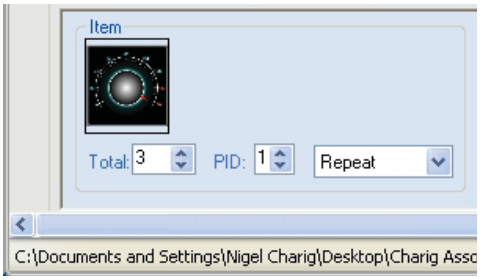


Fig 4.9 Picture Status Window

Fig 4.9 shows that a CMeter Icon has been highlighted within the Layout Grid. It is PID Ref 1: The first CMeter on the Grid is PID Ref 0. The PID Ref can be changed as long as no two multi-Icon devices have the same reference, and the PID value is no greater than 3.

Total = 3. By default, if a multi-Icon device is in Sequential mode, it will cycle through its full range of settings – 9 in the case of the CMeter Icon provided. However this can be limited if so desired. Fig 4.8 shows a limit of 3: On the STM display, the CMeter will increment to 3, then stop or reset to 0 ready for the next cycle. In this case, the Meter is in Repeat mode.

See 4.8 below for information on the 'OK' button which applies in this area as well.

4.8 Picture Effect Modification

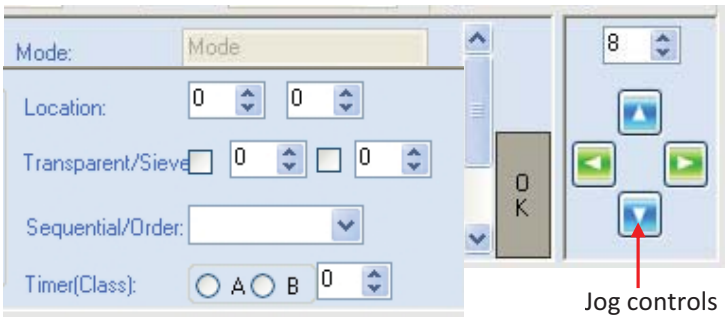


Fig 4.10 Picture Effect Modification area

The above illustration shows the Picture Effect Modification Area as it would appear if it could all be seen at once. In reality the Scroll Bar next to the OK button has to be used for navigation within the Area.

Click on any item in the layout grid, and the Picture Effect Modification area will show the status of that item, and allow you to make changes.

The Memory/Cache box allows you to view and change the storage area for the selected Icon.

The Location boxes display the X and Y co-ordinates of the selected Icon on the layout grid. The co-ordinate references apply to the Top Left of the selected Icon. You can change these by using the arrows to increment or decrement, or by typing values directly into the boxes.

The Jog control arrows allow you to adjust your Icon's position on the layout grid. The dialogue box above allows you to adjust the resolution of the arrow jog commands. This is a useful facility for fine adjustment after dragging and dropping an Icon approximately into its target location.

You can also change the Transparency and Sieve settings for individual Layout Grid Icons, and Sequential/Order, Timer and Times settings for multi-Icon devices. Use the OK button to save any changes made here or in the Picture Status Window. For the Layout Grid Icon selected, this action will overwrite attributes inherited from the parent Icon in the Organiser area.

5. An Example Configuration Exercise

The previous ‘ Introduction to Arranger’ chapter allowed you to explore the user interface and gain some familiarity with its various control areas. Armed with this knowledge, you can now build and test a simple configuration, which will cover all the procedures you’ll need to use for your own, real application. This Chapter takes you through the simple configuration process.

Let’s suppose our simple machine has a control panel comprising an ON/OFF switch, a power indicator lamp and a level indication meter. We can achieve this using a configuration layout as shown below in Fig. 5.1:

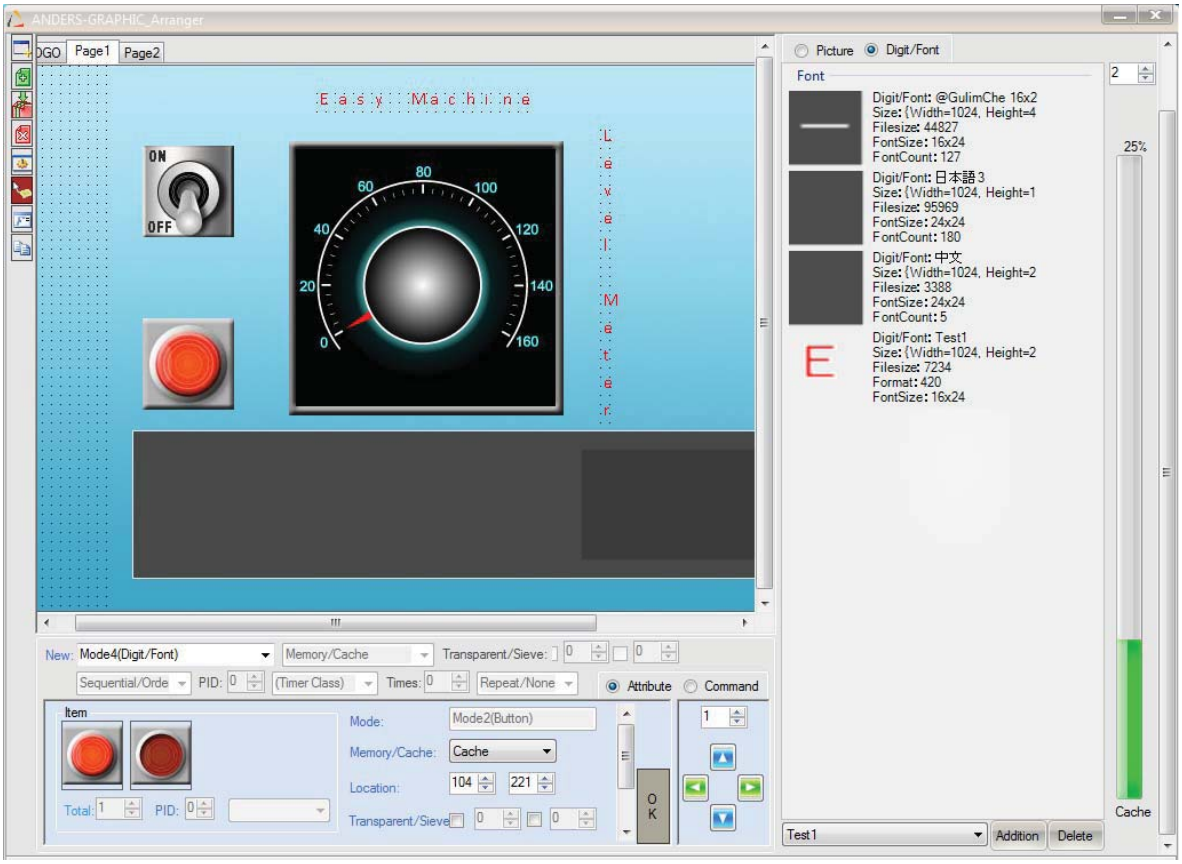


Fig 5.1 Target ‘Easy Machine’ layout

5.1 Populating your Picture Organiser

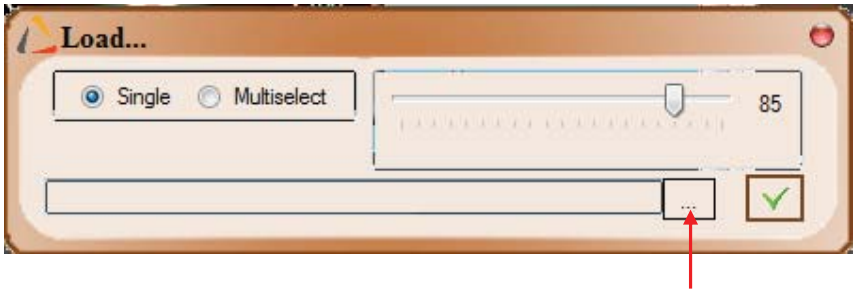
On your PC, open your Easy Arranger package by double-clicking on its desktop Icon. You will see the User Interface display, ready to accept your configuration.

Ensure the DVD supplied is in your PC's disk drive.

Set the Arranger layout grid resolution to match that of the STM panel you have purchased. Click on the 'Set Panel Size' Icon in the 'Edit Page' area (See Fig 4.1) and choose the Standard or other size resolution you require. The example uses a 7" display with an 800 x 480 resolution.

In this example configuration, only two background pictures are needed; the Logo, and a background picture for the one configuration page used. Therefore, set the scroll box in the upper right of the Picture Organiser area to '2'. Once a Background picture has been loaded, you cannot decrease the background picture number in the scroll box below 2 without deleting the picture.

Now you can start organising the pictures you want, beginning with a logo for display on the STM screen during start-up. Click the 'Addition' tab at the base of the Picture Organiser area and you will see:



Browse button

Fig 5.2 Picture Loader

As the logo will be fulfilled with a single picture, leave the 'Single' radio button checked. Click on the Browse button and navigate to the DVD drive root, and from there to:

D:\STM-20101126\Tools(software)\Easy Graphic Arranger\Example\FG070WW001-00R\Standard\800x480_Standard_0.11.23.0\image

Note that folder FG070WW001-00R and its contents have been chosen because the example application is using a 7” display with an 800 x 480 resolution.

From the set of images displayed at this location, choose the one titled ‘800X480’ and see it appear in the box next to the Browse button. Click the ‘Tick’ button and the ‘800X480’ picture will be uploaded into the first position within the Picture Organiser.

Repeat the exercise, choosing file ‘WorkPageNew’. This will become the Background Picture for your STM’s display screen.

Now for the Icons. Click the ‘Addition’ tab again to see the Picture Loader box. This time, however, click the Multiselect radio button within the box, because the Icon you are about to select has two parts – an ON and an OFF image. Click the Browse button and, using SHIFT + LEFT BUTTON, select the files POWER00 and POWER01. Transfer them into Arranger’s Picture Organiser, as you did with the Background Pictures. You will see the two Icons displayed; the first showing the switch ON and the second showing the switch OFF.

If you wish to set Transparency or Sieve Attributes for Mode 2 Icons, set the Memory Attribute to Cache. Then, follow the procedure in 4.6 – Picture Type and Attribute area.

Note that a heading ‘Icon’ has been created for this and all subsequent pictures, because you have informed Arranger that there are only two background pictures – which have now been assigned.

Repeat the exercise to add files LampGreen00 and LampGreen01, which show a green lamp OFF and ON respectively. Repeat once again, adding a set of 9 files called CMeter00 to CMeter08. CMeter00 shows the meter at 0, CMeter08 shows full scale and the other files show the meter at intermediate values.

5.2 Building your configuration on the Layout Grid

When your set of background pictures and Icons is complete, and visible within the Picture Organiser, you can start your configuration on the Layout Grid, beginning with the LOGO picture. First, go to the 'Picture Type and Attribute' area of Arranger (See Fig. 4.1) and use the Mode drop-down menu box to select Mode1(Single Picture). Then use the Memory/Cache menu to select Memory for storage of the LOGO picture within the STM.

Now click the LOGO tab at the top of the grid, to show the LOGO page. Single-click on the first picture listed under 'Background' in the Picture Organiser, to highlight it. Next, move the cursor to any part of the layout grid LOGO page, and single-click again. You will see your chosen picture – '800X480' – fill the LOGO page and accordingly become the LOGO image

Now click the Page1 tab and repeat the exercise to place the second picture in Picture Organiser – WorkPageNew in the example – as the background picture for the layout. There is a slight difference between this and the LOGO picture placement procedure: There is no need to highlight the picture. Instead, double-click anywhere on the Page1 grid layout to see the following 'Background' dialogue box appear:

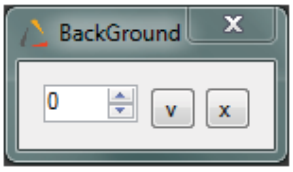


Fig 5.3: Background Picture Selector box

Click the 'Up' arrow to increment the picture item number to 1, which refers to 'WorkPageNew' in our example. Then click on 'V' to place it as the Background Picture for Page1.

To **Delete** this picture as Page1's Background, you can repeat this procedure, using the 'X' button.

Now you can place the Icons on to Page1, starting with Power00 and Power01, which represent the **Dual-state ON/OFF Switch**. Use the Mode drop-down menu again, changing to Mode 2(Button). This covers all 2-state devices. Select Cache Memory as the storage area within the STM for the Switch. Using your mouse with the Shift key, highlight both of the Switch Icons, then drag them to your desired location on the Layout grid. You can use the Jog arrows located within the Picture Effect Modification Area (See Fig 4.1) to adjust the Icon's position on the screen.

Note: If you do not complete all of the above actions, you will not be able to drop the Icon onto the Layout grid. Instead you will see a message saying 'Error'.

Note: Only one Icon is visible, but both have actually been placed, with one under the other. Click on the visible Icon, and you will see both displayed in the Picture Status Window area of Arranger. (See Fig. 4.1). The greyed-out boxes have no relevance to Mode 2.

Note: When these Icons are loaded as a pair, Power01 (showing Switch ON) appears first in the Picture Organiser column, with Power00 below. This order means that when the Icon pair is dragged and dropped onto the Layout Grid, the Switch will be shown in ON position. If you would like it to instead appear on the Layout Grid showing OFF position, you can retrieve the OFF and ON Icons singly from the DVD library file, forcing the OFF Icon to the higher position on the Picture Organiser column. This in turn will render the OFF Icon as visible when the Icon pair is dragged and dropped onto the Layout Grid.

Alternatively, once the Icons are placed on the Layout Grid, you can switch them by right clicking on them:

- **Bring to Top**. This ensures that the selected Icon will appear on top of another Icon at the same co-ordinates
- **Send to Back**. This ensures that the selected Icon will appear underneath another Icon at the same co-ordinates
  (If you click 'Bring to Top' or 'Send to Back' on two overlapping Icons, the most recently selected Icon wins).
- You can also **Delete** an Icon from the Layout area by right-clicking on it and selecting 'Delete'. This has no effect on the parent Icon in the Picture Organiser column.

Repeat the process for the Green Lamp Icon pair.

To place the CMeter **Multi-Icon set**, start by selecting 'Mode3(Multi-Icon)(Meter)' on the' Mode' menu. Next set the other Multi-Icon Attributes(Refer to 4.6 -Picture Type and Attribute Area for information on these Attributes' meanings and how to change them)**:**

- Sequential/Order
- PID
- Timer Class
- Times
- Repeat/None

Next, use the mouse + Shift key to highlight all 9 CMeter Icons (CMeter00 to CMeter08), then drag and drop them onto the desired location within the Grid Layout area.

You would probably require more than one Switch, Lamp or Meter in a real application. If so, you can set up multiple Icons by using drag and drop to create more Child Icons on the Layout Grid from each Parent on the Picture Organiser. By default, the Child Icons will inherent the Attributes of their Parents. If you wish to change these for one or more individual Child Icons, do so using the Picture Effect Modification area of Arranger – see 4.8 for more details.

5.3 Using Fonts and generating Text Messages

The set of Icons for our example is now complete. Next we can prepare a couple of Fonts and use them to write Text Messages. In the Project Manager area, (See Fig 4.1) click: Tools/Font/System to open the Font dialogue box as in Fig 5.3 below:

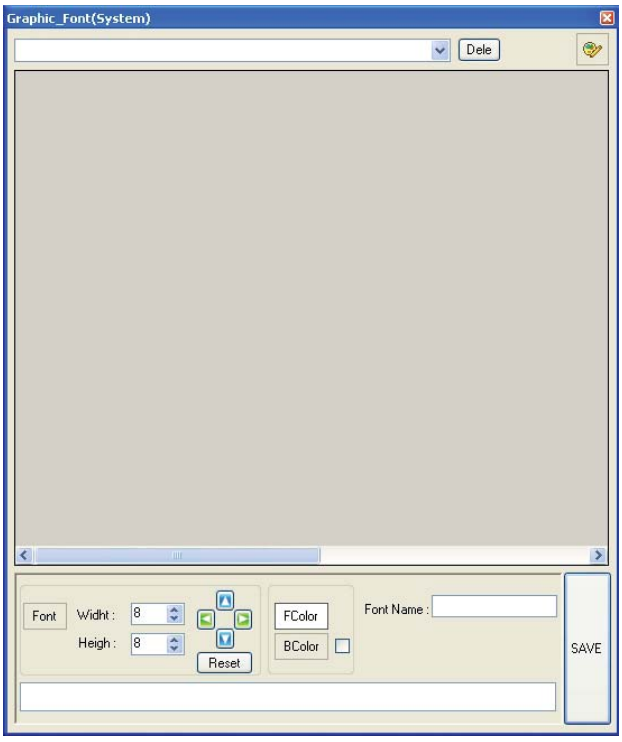


Fig 5.4 Font Dialogue Box

Once the box is open, type the character set required into the character box at the base of the Dialogue Box. This can include upper and lower case letters, numbers and punctuation marks. You can then modify the appearance of your character set as below:

- Click on the Font button to see a choice of font types (Arial, Calibri etc), styles (Regular, Italic, Bold and Bold Italic)and sizes (8 to 72 points). You can also choose Strikeout and Underline effects, and Scripts (Western, Hebrew, Cyrillic etc).

- Use the Width and Height arrow boxes to set the size of the character backgrounds
- Use the Horizontal and Vertical arrows to position the characters within their background area. The 'Reset' button restores the characters to the Top Left corner of their background areas.
- Use the FColor and BColor buttons to assign Foreground and Background colours for your Font. Background is optional and is selected using the Tickbox to the right of the BColor box.
- Give the Font a name such as Anders1 in the example, and click on SAVE. Close the Font Dialogue box.

Go to the Picture Organiser area (See Fig. 4.1) and click the Digit/Font radio button to see the Font Organiser area. Now click the arrow on the drop-down menu at the base of this area to see Anders1 or whatever name you have used for your Font. Select the Font, then click the Addition button to the right of the menu and you will see your new Font added to the Font Organiser list. If required, repeat the exercise to generate different Fonts with different appearances.

To create a message on the layout grid, drag and drop the appropriate Font from the Organiser onto the layout grid. You will see a Message Generator box as below open:

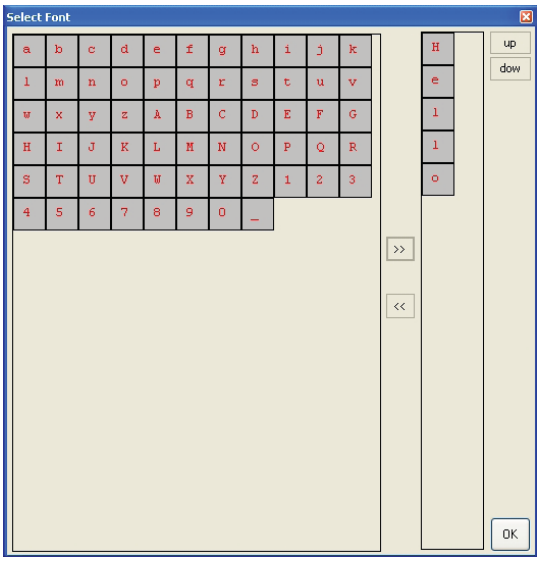


Fig 5.5 Message Generator Box

Build your message by clicking on each character, then clicking the Right Arrow button. Remove characters using the Left Arrow button, and shuffle them using the Up and Down buttons. When your message is edited to your satisfaction, click the OK button to see it appear on the layout grid. Drag it and use the Jog buttons to position it as required, as you would for an Icon.

5.3.1 Using Custom Fonts

Arranger supports the use of specially prepared graphics fonts as well as the standard font set. In the Project Manager area, (See Fig 4.1) click: Tools/Font/System to open the Custom Font dialogue box as in Fig 5.6 below:

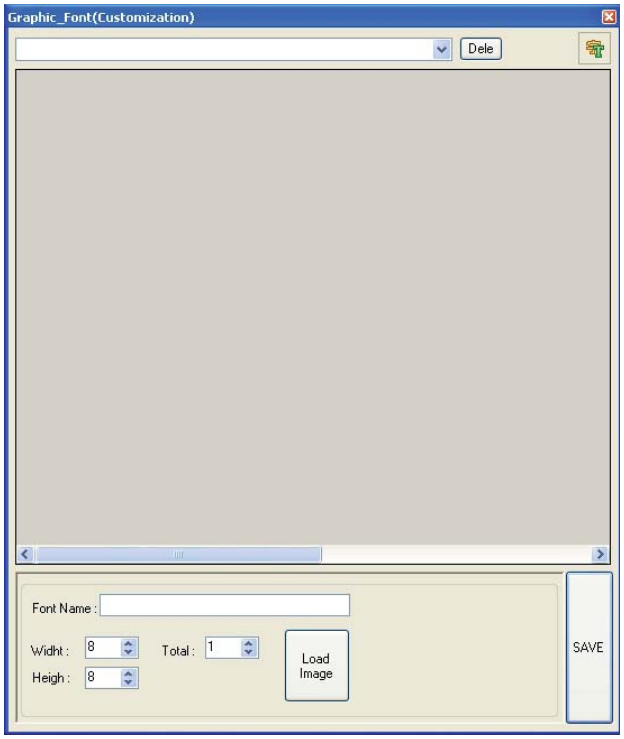


Fig 5.6 Custom Font Dialogue box

- Give the font a name for use by arranger – write this into the Font Name box
- Adjust the size of the word box using the Width and Height controls
- Use the 'Total' control to define the number of squares contained within the box – for example, 26 for a single alphabet rendition.
- Read in the custom characters using the Load Image button to navigate to and select the appropriate files

  Note: Character resolution allowed:

  - L = 1 – 4095; W = 1 – 1024

    - Character resolution must be divisible by 8

- Save the new Font to Arranger

You can now use the new Font to generate text messages in the same way as the standard Fonts. Click the Digi/Font radio button at the top of the Picture Organiser, then select the new Font using the Addition button at the base. Once it appears in the Font Organiser list, you can drag it into the Layout Grid to open the Message Generator box.

6. Saving, uploading and testing your configuration

As you have seen, Arranger allows you to choose Icons and background pictures suitable for your application, and lay them out as required. At this point, it is worth considering the nature of the information that Arranger has compiled as a result of the configuration process. This comprises:

- A set of jpeg or bmp images (Logo, Background Picture and Icon images that you have assembled into your configuration)
- Further sets of images containing the characters defined during Font configuration
- Attributes for these images, such as their Mode, Memory Type and Transparency
- X-Y co-ordinate information for each Icon, defining where it is to be positioned on the Layout Grid and therefor e the STM screen.

To make this configuration active on your STM, you need to load the picture and text images and their attributes into your STM's memory, then display them using Command Strings that can reference them using their X-Y co-ordinates.

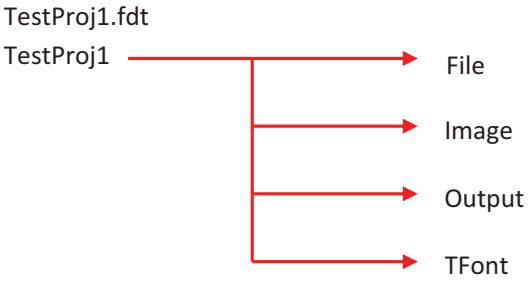
Arranger and the STM include a set of tools allowing you to do this. Functions are available to:

- Save your configuration as a Project on your PC's hard drive
- Output a Binary project file image to a USB Flash memory stick
- Download the Binary file from the USB stick to the STM Memory.
- Switch Arranger into Command mode, from where you can:
    - Set up communication between Arranger and the STM, using the serial link between your PC USB Port and the STM's Serial Port. This link uses the USB to UART Converter supplied.
    - View the Command Strings generated by Arranger during the configuration process
    - Send them, one a t a time, to the STM and view their effect on the STM's display screen.

6.1 Saving your configuration as a Project on your PC's hard drive

Click on the 'Save Project' menu Icon within the Project Manager area at the top of the Arranger screen. See Chapter 4.1 – Project Manager for details on locating this.

Choose 'Save as' from the drop-down menu to see a Windows dialogue box that will let you navigate to anywhere on your PC or network or create a new folder for storage. Once you have saved your configuration as a Project folder, you will see it has a structure as below:



- TestProj1.fdt is your Arranger project file. When you want to work on the project again, open Arranger, go to the Project Manager area and use the OPEN Project button to navigate to and reload TestProj1 into Arranger.

- The 'File' folder contains text files with attribute information for the configuration pictures.

- The 'Image' folder contains a set of jpeg or bmp images as assembled during configuration.

- The 'TFont' folder contains further folders, one for each Font created during configuration. Within each of these folders is a set of jpeg images, one for each character of the Font.

- The 'Output' folder contain one binary file – FGCIMAGE.BIN – which is intended for loading into STM memory and contains all information related to the background pictures, Icons and text messages, and their attributes.

  This file can be copied onto a USB memory stick for transfer to STM memory. This process is described more fully later in this Manual.

6.2 Output your configuration as a Binary file onto a USB memory stick

One way of achieving this using Project Manager has been described above, but Arranger has a more explicit way as well. Click on the 'Tools' menu button within the Project Manager area at the top of the Arranger screen. In the menu, click on 'Out put' to see the Setting dialogue box as shown in Fig 6.1 below:

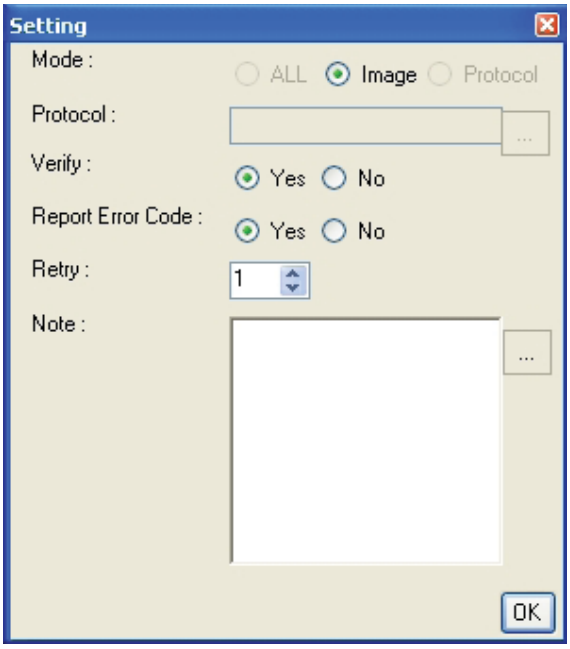


Fig 6.1 'Setting' dialogue box for BIN file output

After making the settings required, click the 'OK' button to see a Windows dialogue box. Use this to store the FCGIMAGE.BIN file in your USB memory stick's root directory.

6.3 Downloading a Project BIN file from USB memory stick to STM memory

Once you have prepared your USB memory stick as above, you will have a single file called FCGIMAGE.BIN in its root directory. Now use the following steps to load this into your STM.

Note that your STM can have either a Type 1 or a Type 2 controller board, depending on your STM TFT display size. See Chapter 2.1 for details. The default jumper, LED and USB Port references shown below are for Type 1 boards; the references in brackets apply to Type 2 boards.

1. Ensure your STM is powered OFF.
2. Mount a jumper (provided) onto J204 (J301).
3. Plug the USB memory stick into USB port 201 (303) on your STM
4. Apply power to the STM using the power adapter provided.
5. The STM display will show a module information screen
6. The green LED (LED101) should light, showing Power OK.
7. The STM Buzzer should sound twice
8. Red LED 101 (201) should start flashing, showing that the automatic upload has started. It will continue to flash throughout the upload. This could take 5 – 30 minutes depending on FCGIMAGE.BIN's file size.
9. When the upload has completed, the STM Buzzer will sound once and LED 101(201) will extinguish.
10. Remove power
11. Remove the J204(301) jumper and USB memory stick
12. Re-apply power

When the STM powers up again, it should display the Logo screen as chosen during configuration. The STM will not start showing Icons or anything else until it receives Command Strings from Arranger (to be described next), Command Pilot or your target machine.

6.4 Driving the STM using Arranger

After loading the BIN image into the STM as described, remove power from the STM. Connect the STM's serial port to a USB port on your PC using the USB to UART board and cables provided. See 2.2 and 2.3 for details of these. Re-apply power to the STM.

If it is not already running, start Arranger on your PC. You can then retrieve your project from its hard drive location using either the OPEN Project button or the drop-down SELECT Project menu in the Project Manager area at the top of the Arranger screen.

You need to find out which PC COM port is being used by the USB connection to the STM.

Windows' 'Device Manager' can tell you this.

Now, you can configure the communications link between Arranger and the STM. Click on the 'Select Mode' button within the UART Function toolbar at the left of the Arranger screen. You will see a UART command and control area as below:

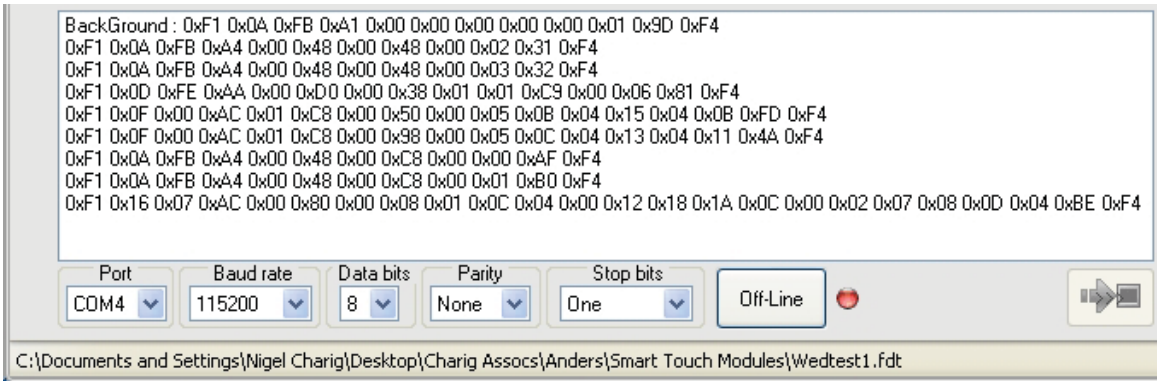


Fig 6.2 UART command and control area

The top part of this area contains a set of Command Strings that position all the Background Picture, Icon and Text Message objects on Page1. The drop-down menu boxes below this are used to configure and start your STM serial link. Configure as below:

- 'Port' should be the COM Port assigned by your PC's Device Manager to the USB STM link
- 'Baud rate' should be 115200
- 'Data bits' should be set to 8
- 'Parity' should be set to None
- 'Stop bits' should be set to One

Click the button labelled 'Off-Line'. If your hardware and configuration for the STM-PC serial link are OK:

- The button should say 'On-Line'
- The red 'LED' should change to green
- The 'Right Arrow' button should change to green
- The objects on the Layout Grid are no longer editable. However clicking on the Green Lamp or Power Switch will cause them to visibly change state while the mouse button is held down.

At this stage, your STM display should still show the Logo image and nothing else.

Now click the Right Arrow and you will see the Page1 Background picture appear on the STM screen, on top of the Logo. On the Arranger screen you will see a blue highlight line appear across the first Command String (labelled BackGround: 0xF1 0x0A…..). This is the Command String that called the Background picture from STM memory and placed it on the STM screen. The blue highlight line shows this as the most recently sent Command String.

Click the Right Arrow again and see the Green Lamp ON Icon appear on the STM screen. The blue Highlight bar has incremented down to the next Command String – the one that called the Green Lamp ON Icon from STM memory to STM display. Click again, to see the Green Lamp OFF Icon appear on the STM screen, covering the ON Icon. Continue clicking to see the other Icons and text messages appear in the same way. When your entire Page1 configuration is showing on the STM screen, the blue Highlight bar will be over the last shown Command String.

6.5 More about Command Strings and prototyping

By now you have built your configuration using Arranger, transferred it to your STM using a USB memory stick, and proved that it works using Command Strings generated and issued by Arranger. The next stage in your project will be to integrate these automatically generated Command Strings with others that you write into a source file that handles the entire control activity – displaying Icons on the STM screen in response to events on your target machine, and responding to touch screen events if your STM has a touch screen.
The STM kit you have purchased from Anders includes tools to help you do this:

6.5.1 Command Pilot

As Figs 6.3 and 6.4 below show, Command Pilot is a software module that runs on your PC alongside Arranger. You can use Command Pilot to act like your target machine in sending Command Strings to the STM, while controlling and recording the Command Strings sent. After setting up the serial communications protocol as shown in Fig 6.3, you can prepare a source file of command strings, then run a program to stream them to your STM. You can also send one Command String at a time in Single Step mode. You can elect to log your transmitted and received files, and Save them to a hard drive if desired.

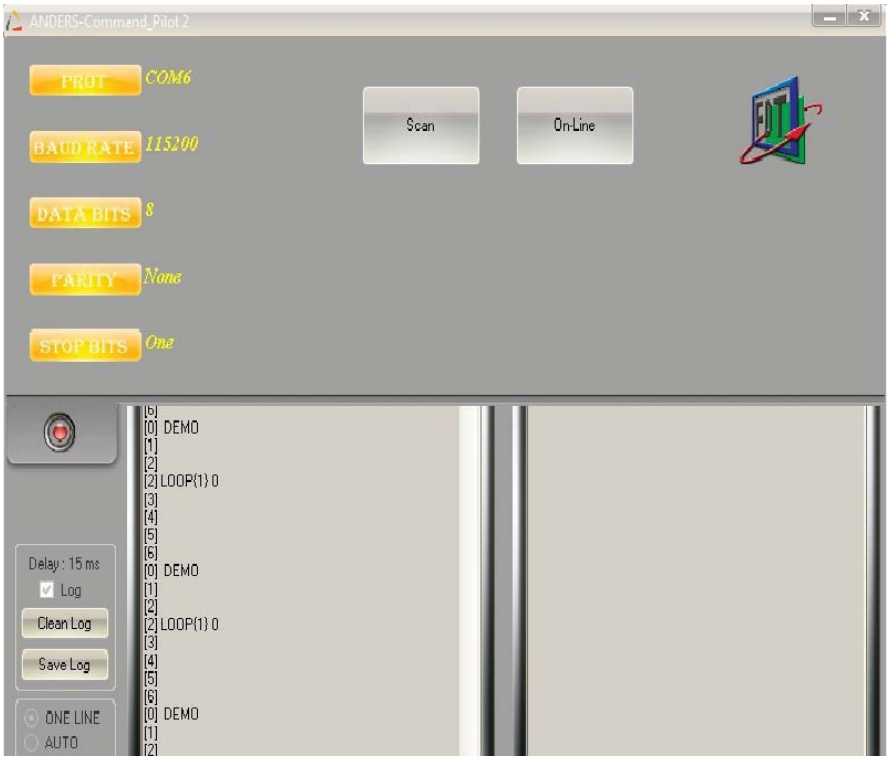


Fig 6.3 Command Pilot screen, showing Communications Protocol setup

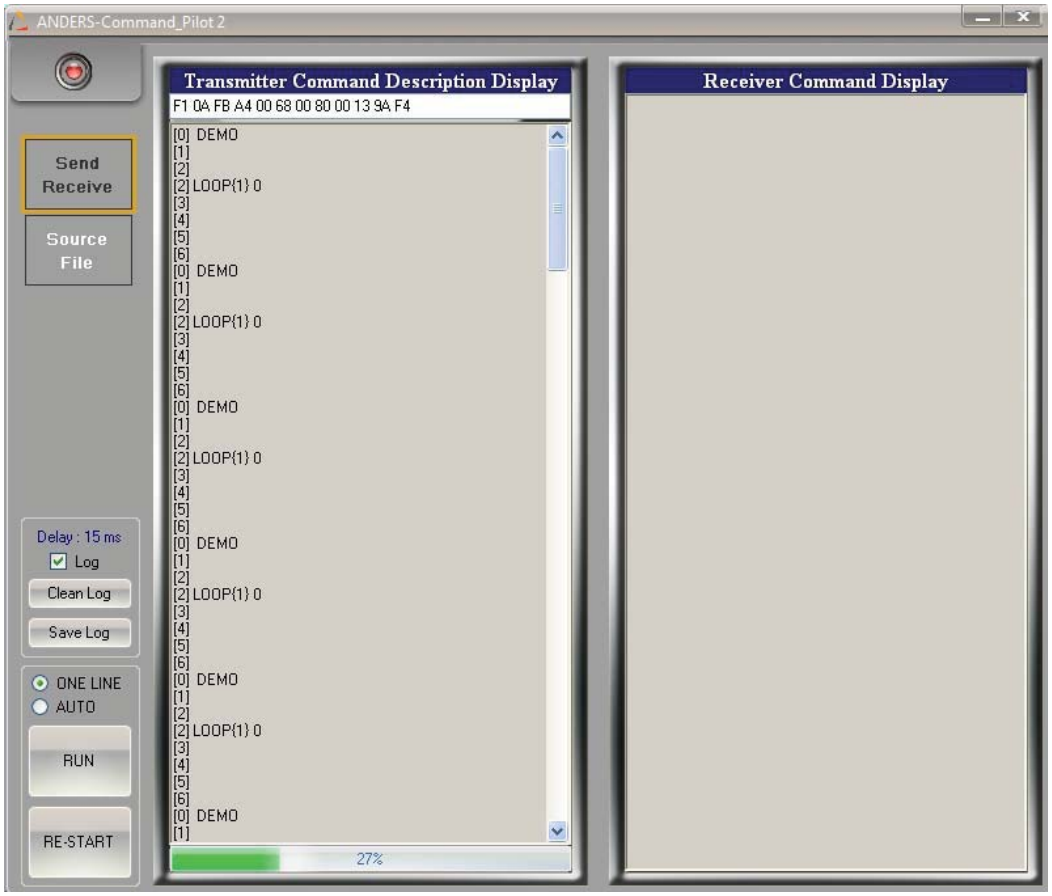


Fig 6.3 Command Pilot screen, showing source file output

6.5.2 Graphic Testing Board and cables

The Graphic Testing Board (GTM) is a hardware module which you can use as a target machine, connected via a serial link to your STM. You can load a program containing Command Strings into the GTM's memory, then prompt the onboard microcontroller to run this program and send the Command Strings to the STM.

The GTB has 2 jumpers, 4 pushbuttons and 8 LEDs to assist in setting up and running programs. It also has a 65 x 100 mm breadboard area with PTH holes on a 2.54 mm grid.