# AL529BT Display


# USER MANUAL

# *WARRANTY*

## *EXTENDED WARRANTY*

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# TABLE OF CONTENTS





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# TABLE OF FIGURES



# INDEX OF TABLES



# TABLE OF APPENDIXES




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# CHAPTER 1 : INTRODUCTION

## 1.1 OVERVIEW

The AL529BT is a product which consists of custom Apogee Labs software that operates on a Panasonic Toughpad® FZ-G1 ten inch tablet, which is docked in an appropriate desktop cradle. This document explains the operation of the AL529BT display and provides information regarding the various user interface screens and software operation.

# CHAPTER 2 : SPECIFICATIONS

The full specifications for the Panasonic Toughpad ® FZ-G1 tablet can be obtained from Panasonic at this link: ftp://ftp.panasonic.com/computer/fzg1/

## 2.1 MECHANICAL & ENVIRONMENTAL

- DIMENSIONS - 10.6"(L) x 7.4"(W) x 0.8"(H)
- WEIGHT - 2.4 lbs
- MIL-STD-810G certified (4' drop, shock, vibration, rain, dust, sand, altitude, freeze/thaw, high/low temperature, temperature shock, humidity, explosive atmosphere)
- IP65 certified sealed all-weather design

## 2.2 DISPLAY CHARACTERISTICS

- Resolution: WUXGA 1920(horizontal) x 1200(vertical) pixels (Viewed in Landscape orientation)
- Screen Size: 10.1" daylight-readable screen with anti-reflective and anti-glare screen treatments
- Touchscreen: 10-point capacitive multi touch + digitizer screen
  - Supports bare-hand touch and gestures and electronic waterproof stylus pen
  - Supports glove mode and wet-touch mode
- Brightness: 2-800 nit IPS display with direct bonding
- Backlight: Rugged LED-based backlight

## 2.3 SOFTWARE

- Operating system: Linux


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# CHAPTER 3 : USER INTERFACE

## 3.1 TOUCHSCREEN USER INTERFACE

The AL529BT has an active touchscreen interface, which is used to control the device via a menu system.

To access the menu system, press and release the A1 button on the front panel. This will bring up the main menu overlay appears as shown in the figure below.


**Figure 1: Main Menu**

Each of these on-screen buttons can be pressed and will perform a specific action, or bring up a sub-menu.

Pressing the **EXIT** button will close the menu system. The following section defines the menu operation.


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If the optional **ODP.txt** file is located in the display's ftp server's **pub** directory, there will be an extra button displayed on the bottom right of the page, named USER PARAMETERS. This button is shows in the following figure.

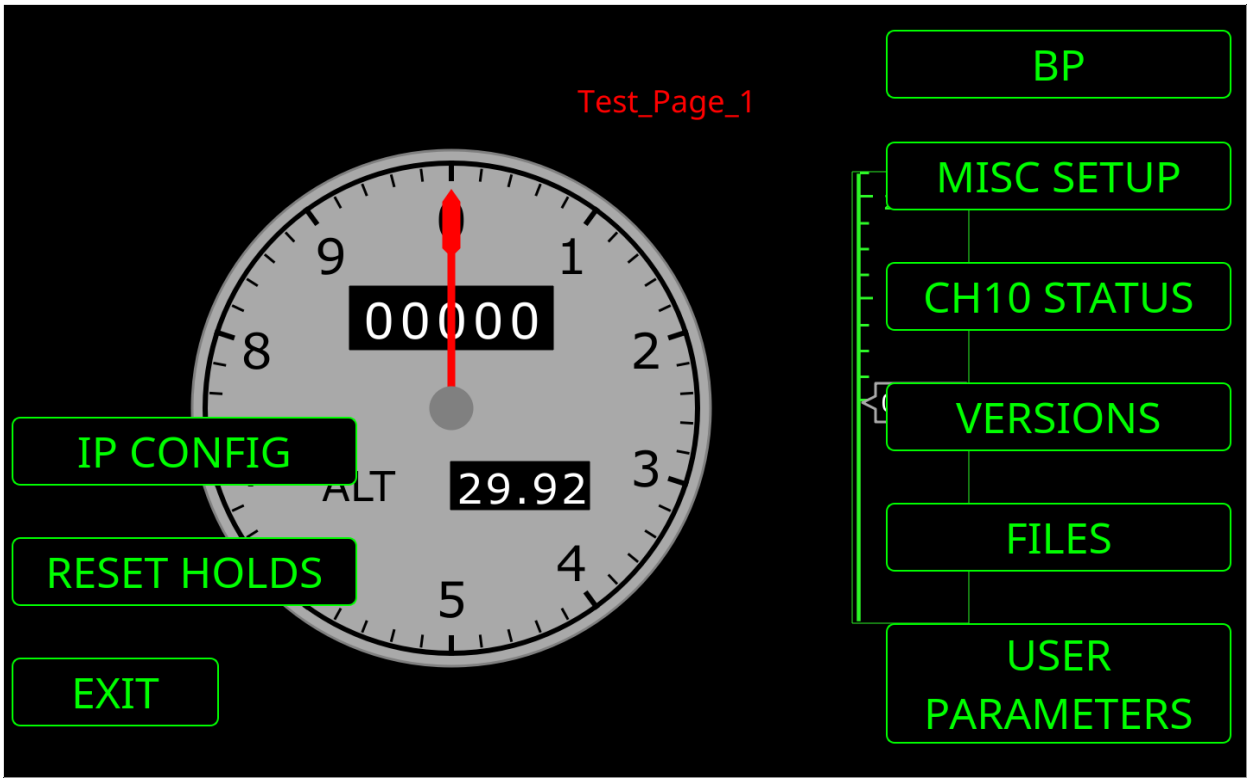


**Figure 2: Main Menu with User Parameters**

Each of these on-screen buttons can be pressed and will perform a specific action, or bring up a sub-menu.


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## 3.2 MENU BUTTONS AND PAGES

### 3.2.1 IP CONFIG Page

Pressing the **IP CONFIG** button from the main menu will bring up the following page that can be used to configure the network configuration parameters for the device.

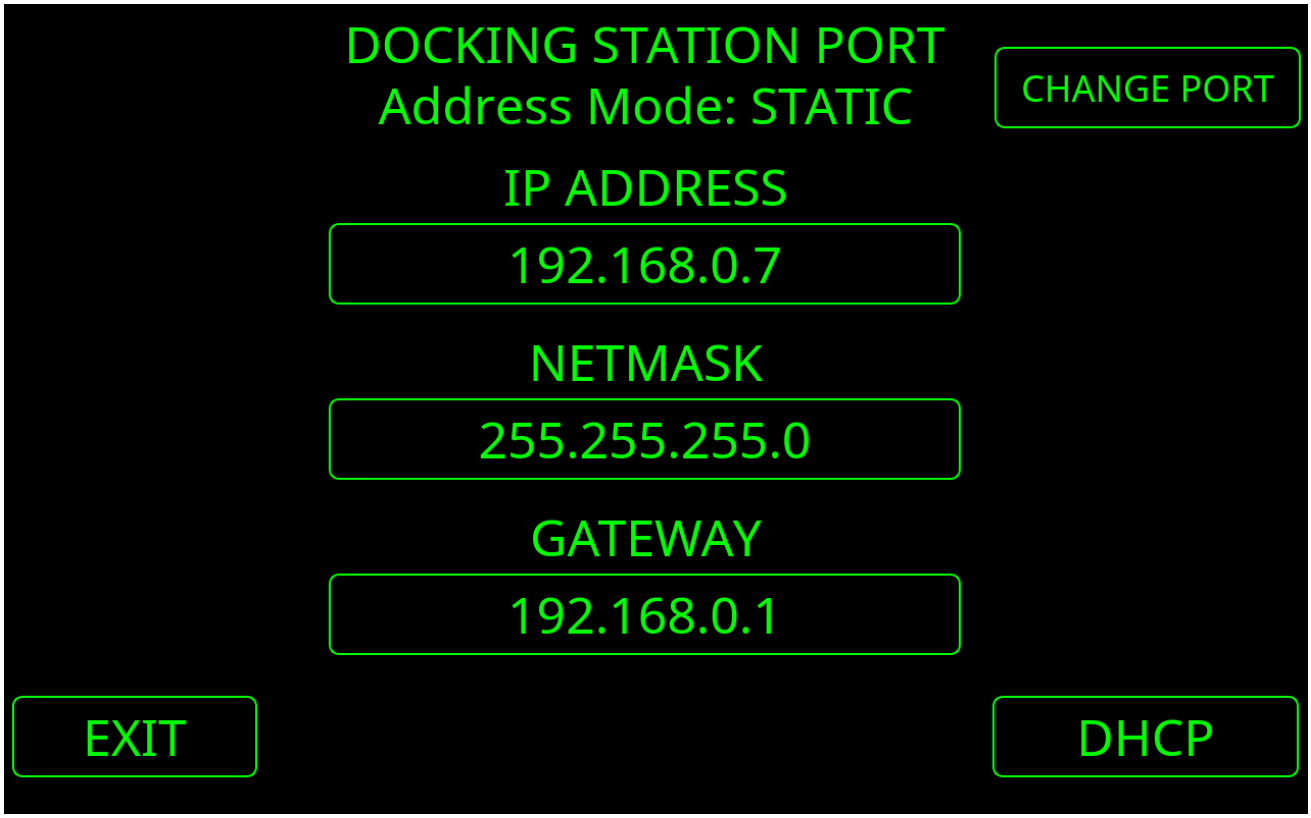


**Figure 3: IP Configuration Page**

When this page first loads, it displays the current network configuration.

The default settings are:

- Docking Station Port
- Address Mode: STATIC
- IP ADDRESS: 192.168.0.5
- NETMASK: 255.255.255.0
- GATEWAY: 192.168.0.1


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To change the IP ADDRESS, NETMASK, or GATEWAY values, press the value display area for the field that you wish the change, and a keypad page will pop-up to let you make changes. Here is the screen that is displayed when you touch the IP ADDRESS value area:


**Figure 4: IP Config / IP Address Entry Page**

The cursor is hidden at the end of the displayed value (*right side*), so use the **DEL** button to delete from the end of the value, until you get to the section that you wish to change. Use the number buttons and the period button to enter the desired value. If you wish to abandon your changes, press the **Exit** button and you will return to the IP CONFIG screen. To accept the value, press the **Enter** button.

If you press the Enter button, you will advance to the next IP CONFIG item down the page. If you are on IP ADDRESS, it will proceed to NETMASK. If you are on NETMASK, it will proceed to GATEWAY. If you are on GATEWAY and press the Enter key, it will perform validation and enact the network settings that you entered, returning you to the IP CONFIG page


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If you wish to obtain your IP address from a DHCP server, instead of using a static IP address, press the DHCP button that is located on the bottom right of the page. The system will then change into DHCP mode, and display a status message that it is waiting for an IP address from the DHCP server. When the DHCP address information arrives, the fields on this screen will be updated to show the new values in red, as shown in the following figure.

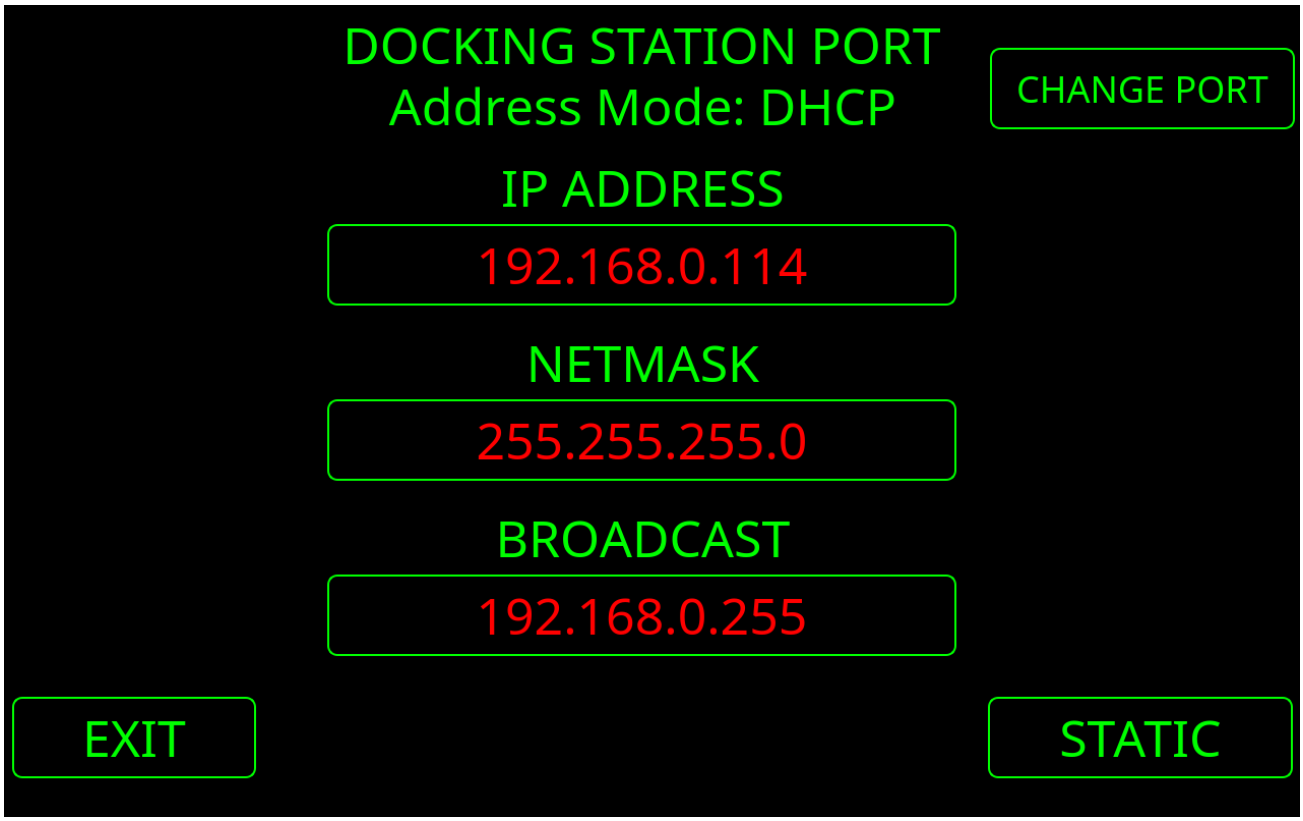


**Figure 5: IP Config / DHCP Mode**

In DHCP mode, the individual, red text parameter fields are not editable. Pressing the **STATIC** button will switch the system back into the Static IP Address mode, and restore the last saved static IP address parameter values.


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The AL529BT can use either the Ethernet port that is built into the docking station, or the Ethernet port that is built into the top of the Toughpad FZ-G1 itself. The AL529BT defaults to using the docking station port. If you wish to change the active Ethernet port to the one that is built into the Toughpad FZ-G1, press the **CHANGE PORT** button and the active interface will be changed to show that it is using the ***Tablet Port***, as shown below.

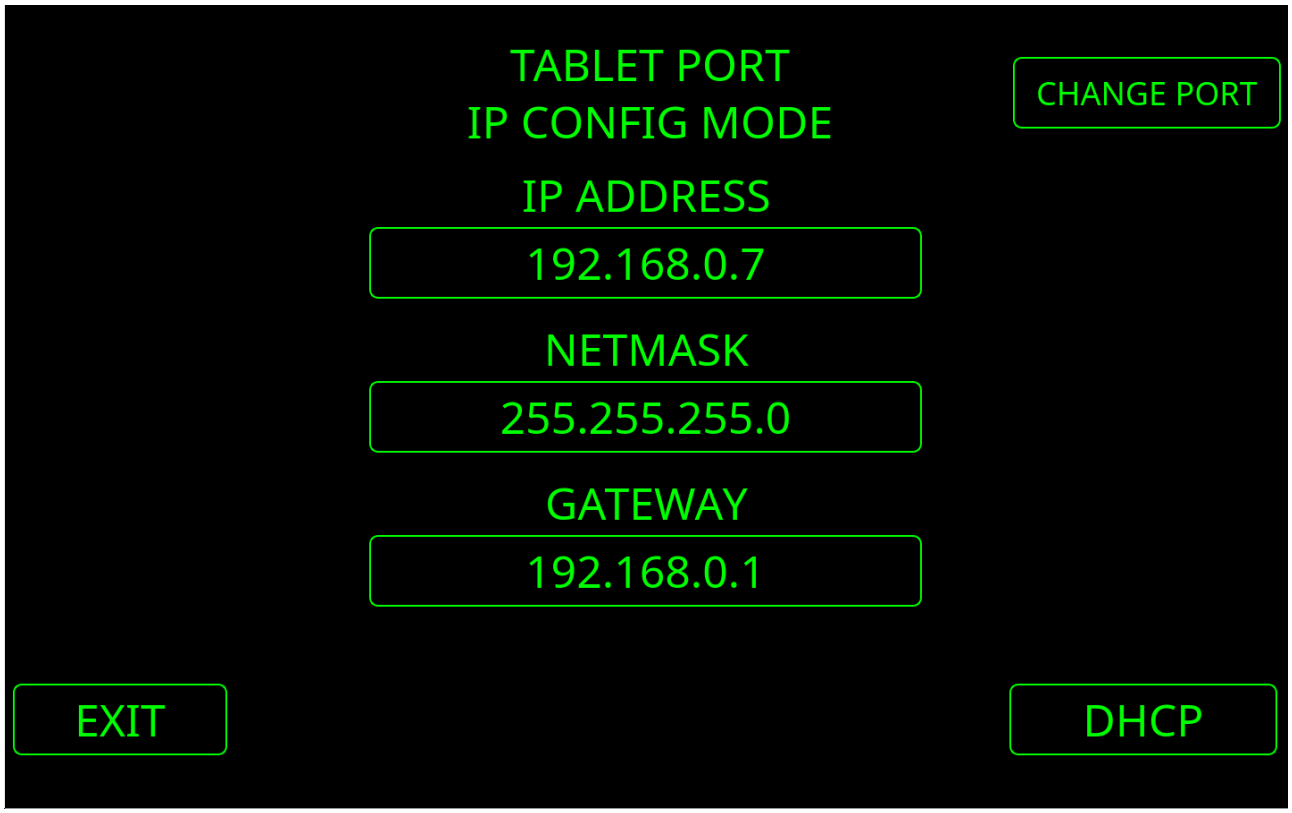


**Figure 6: IP Config / Change Port**

To switch back to using the docking station Ethernet port, press the **CHANGE PORT** button again.

Pressing the **EXIT** button will exit the menu system.

### 3.2.2 RESET HOLDS Button

Pressing the **RESET HOLDS** button from the main menu will reset the Peak / Hold and Min / Hold values on the currently displayed gauge page. Pressing the Windows button on the front panel will also activate this feature.


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### 3.2.3 BP Page

Pressing the **BP** button from the main menu will bring you to the Barometric Pressure Adjustment page. This page which lets you adjust the global barometric pressure value that will be used in the system.

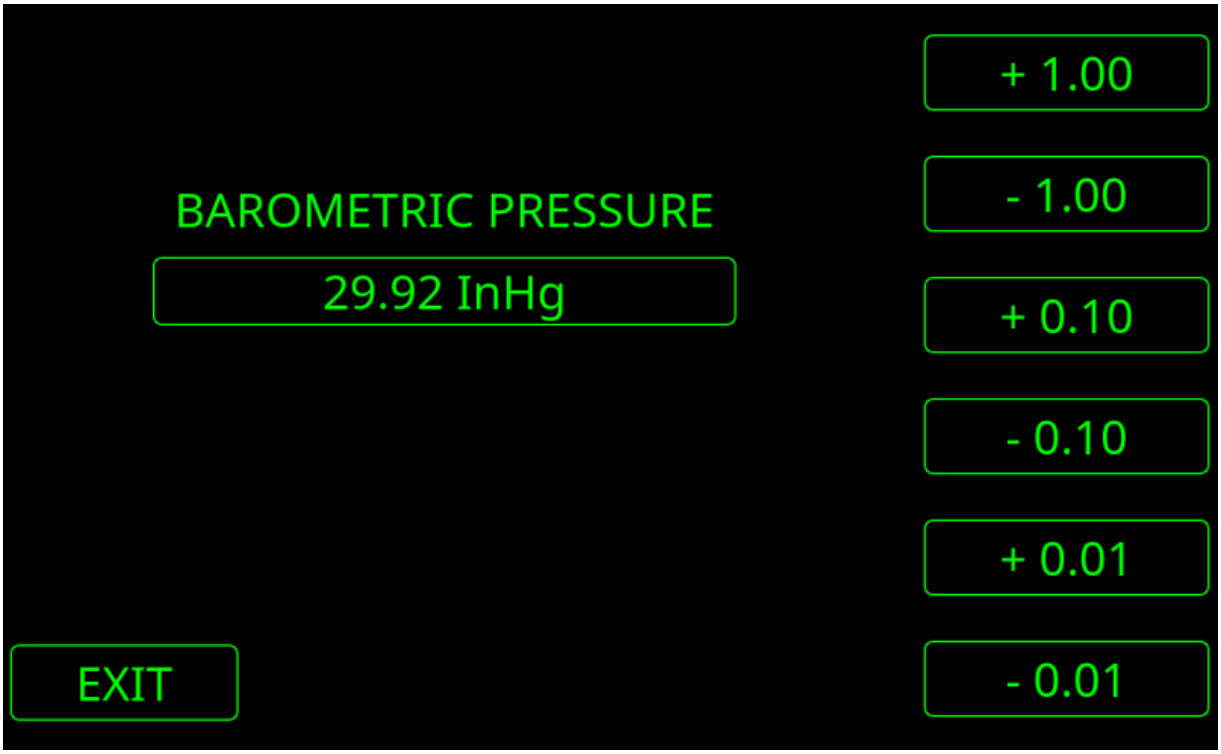


**Figure 7: Barometric Pressure Adjustment Page**

Pressing the **+1.00** button will add 1.00 to the Barometric Pressure value.
Pressing the **-1.00** button will subtract 1.00 from the Barometric Pressure value.
Pressing the **+0.10** button will add 0.10 to the Barometric Pressure value.
Pressing the **-0.10** button will subtract 0.10 from the Barometric Pressure value.
Pressing the **+0.01** button will add 0.01 to the Barometric Pressure value.
Pressing the **-0.01** button will subtract 0.01 from the Barometric Pressure value.

The Barometric Pressure value will be applied immediately, and also saved to the system, in order for the value to be restored upon power up.

Pressing the **EXIT** button will exit the menu system.


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### 3.2.4 MISC SETUP Page

Pressing the **MISC SETUP** button from the main menu will bring you to the Miscellaneous Setup page. This page lets you adjust the brightness of the screen, and enter the touchscreen screen calibration mode.


**Figure 8: Miscellaneous Setup Page**

Pressing the **INCREASE** button will make the screen brighter. Pressing the **DECREASE** button will make the screen darker. The dimmest value is 1 while the brightest value is 10.

The selected brightness value will be applied immediately, and also saved to the system, in order for the value to be restored upon power up.

Pressing the **SCREEN CAL** button will close the Apogee Labs gauge display software, then launch an external touchscreen calibration program. When the calibration process is complete, the system will restart.

Pressing the **EXIT** button will exit the menu system.


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### 3.2.5 CH10 STATUS Page

Pressing the **CH10 STATUS** button from the main menu will bring you to a page which displays several items from the TMATS file associated with the currently active page file. These items are: *bits per word*, *word per frame*, *frame sync pattern length*, *frame sync pattern*, and the currently active *TMATS filename*. You can use these item values to validate that your CH10 data source is configured to match the current page's TMATS configuration.

If the currently displayed gauge page does not have a valid TMATS file associated with it, the fields on this screen will not be populated.

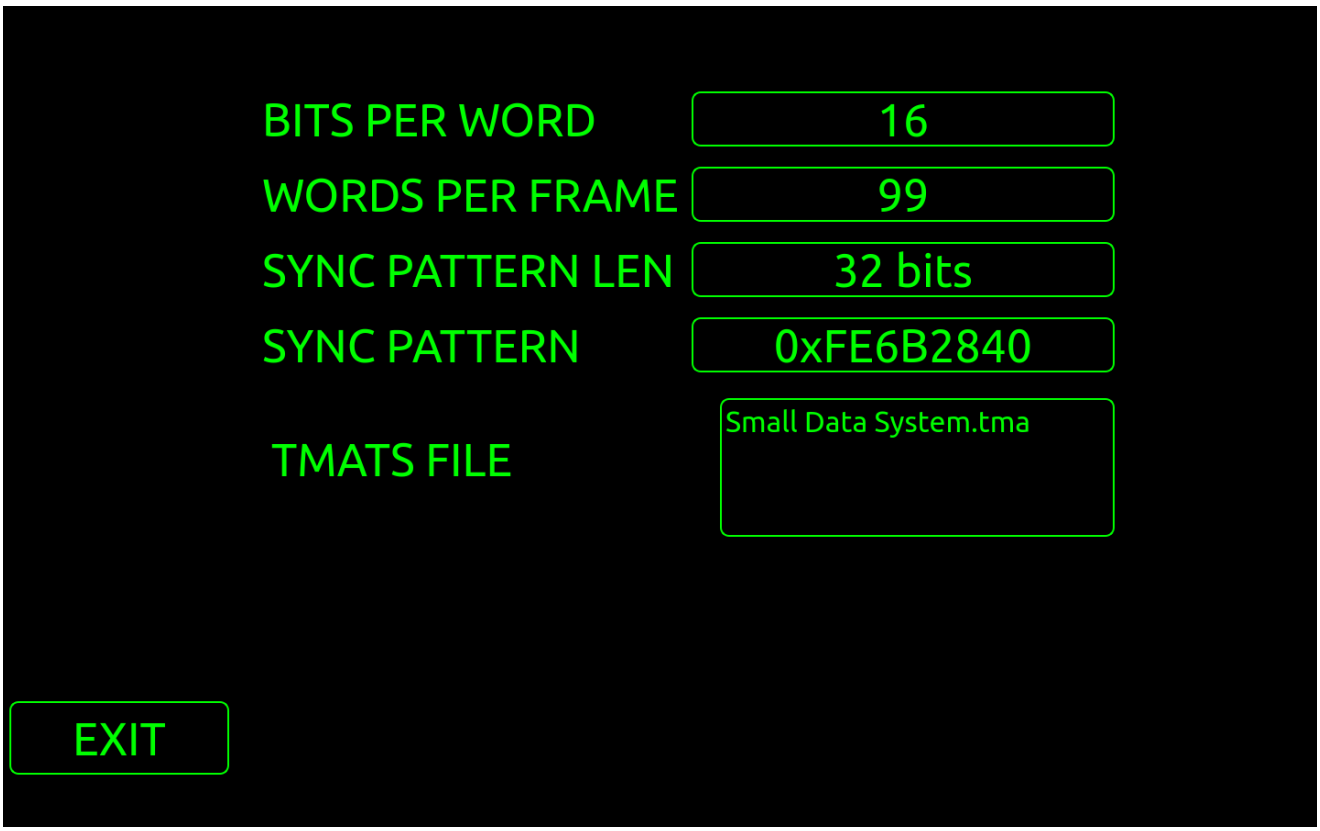


**Figure 9: CH10 Status Page**

Pressing the **EXIT** button will exit the menu system.


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### 3.2.6 VERSIONS Page

Pressing the **VERSIONS** button from the main menu will bring up a page which displays the system software component version information.

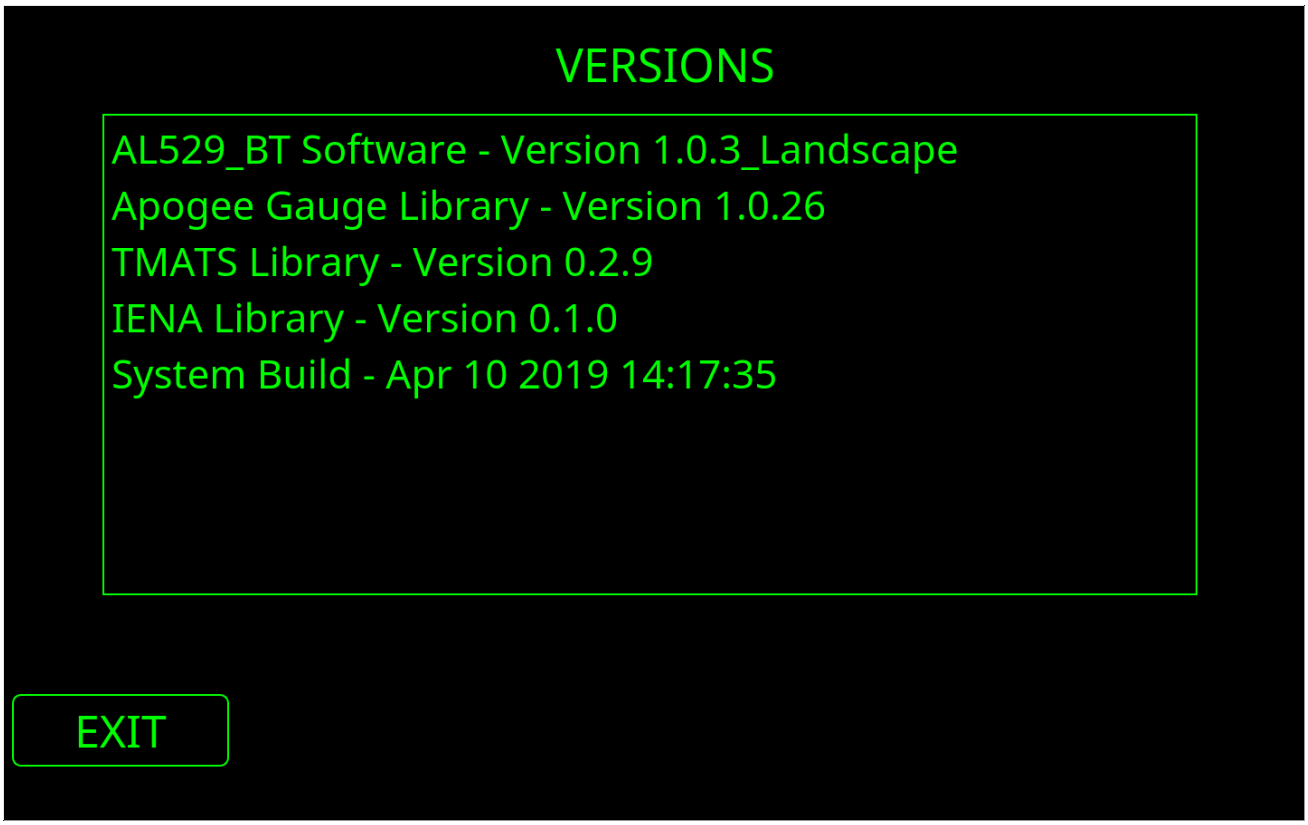


**Figure 10: Versions Page**

Pressing the **EXIT** button will exit the menu system.


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### 3.2.7 Hidden SYSTEM INFO page

While the VERSIONS menu page is being displayed, pressing the bottom right side of the screen (*across from the **EXIT** button*) will bring up a hidden menu page named SYSTEM INFO. This page displays any available extra information about the current system.

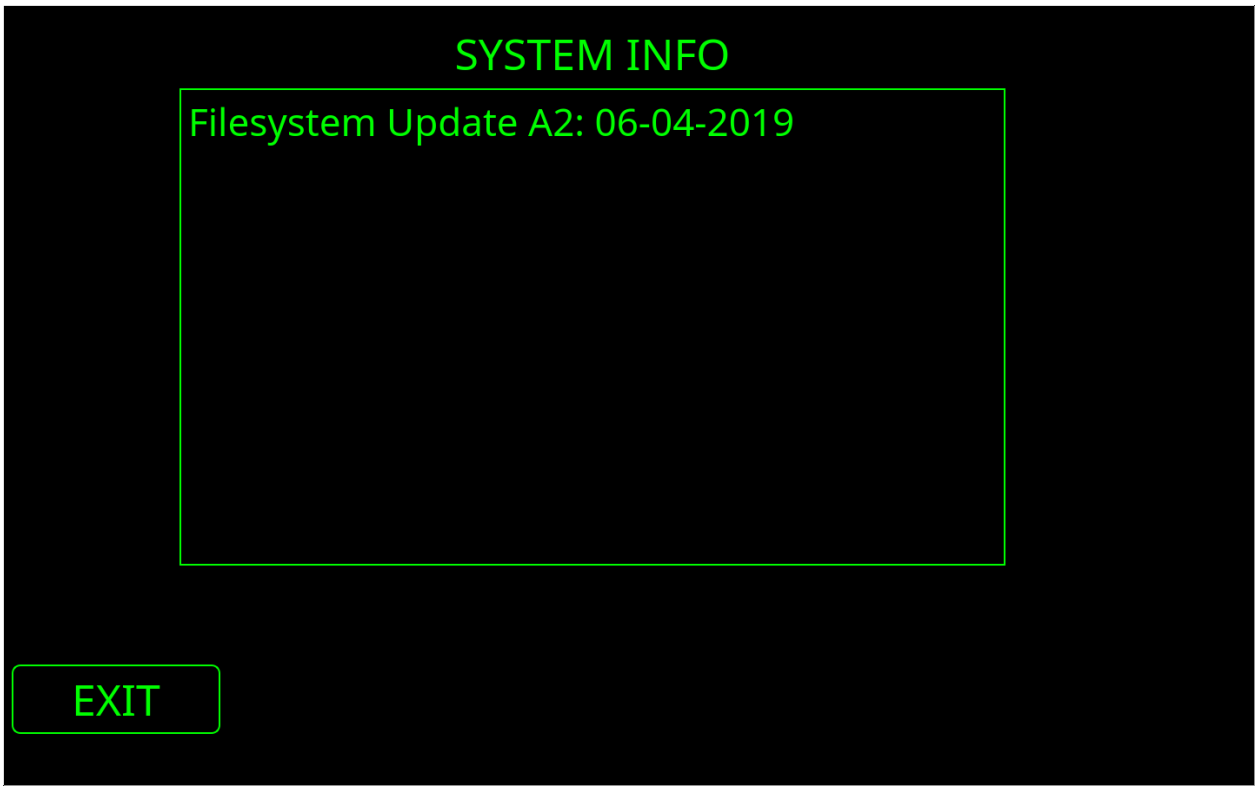


**Figure 11: System Info Page**

Pressing the **EXIT** button will exit the menu system.


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### 3.2.8 LOADED FILES Page

Pressing the **FILES** button from the main menu will bring up a page which displays the gauge page files which are currently loaded onto the system.

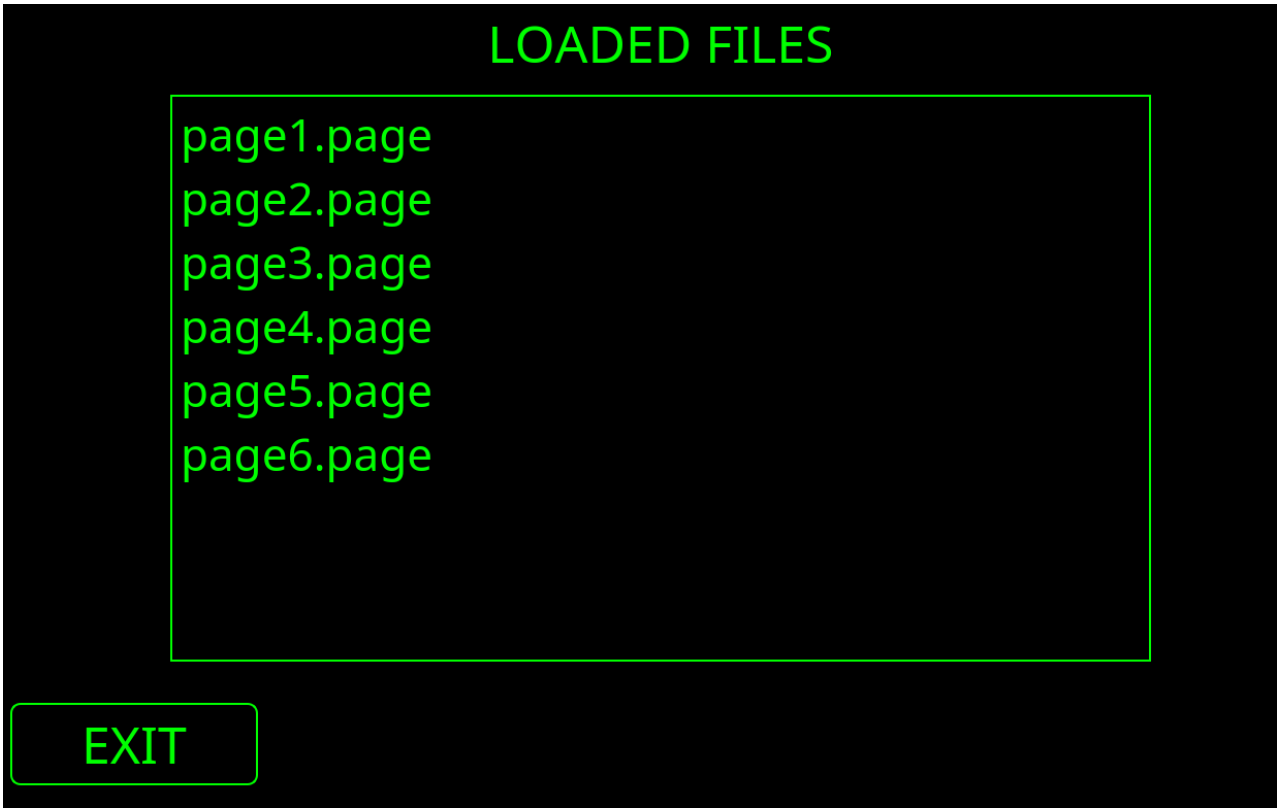


**Figure 12: Loaded Files Page**

The box located in the center of the page will list all of the page files that are currently loaded onto your system. Pressing on one of the file names will load that page file, making it active, and exiting you from the menu system.

Pressing the **EXIT** button will exit the menu system.

### 3.2.9 USER PARAMETERS Page

Pressing the optional **USER PARAMETERS** button from the main menu will bring up a page which displays the user parameter variables that are setup in your ODP.txt file. More information about this can be found later in the document in the section named **User Parameters Page.**


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# CHAPTER 4 : FRONT PANEL OPERATIONS

## 4.1 OPERATIONAL OVERVIEW

When the AL529BT powers on, the list of page files on the device is sorted alphabetically, and then the first page is loaded and displayed. This page will actively respond to the configured inputs and display the requested values.

If the displayed page file has Min / Peak Hold Indicators, they can be reset by pressing the Windows button on the front panel.

If the displayed page file has Strip Chart Gauges, they can be paused and un-paused by using the Rotation button on the front panel, as as described in the following sub-section. (*On older FZ-G1 hardware, this feature is currently unavailable, and the Rotation button performs the same as the Windows button.*) If the user switches to a different page file, the Strip Chart Gauges will be automatically un-paused.

The user can change the currently displayed page file by using the Files button from the System Menu, or by using the Volume Up and Down front panel buttons as described in the following sub-section.

### 4.1.1 Front Panel Buttons

In addition to the touchscreen interface, the AL529BT has front panel buttons which can be used to control the system operation.


**Figure 13: Front Panel Buttons**

The AL529BT software utilizes four of these front panel buttons, in addition to the power button. Starting from the left, here is the functionality of each button:

**A1 Button :** Bring up the System Menu overlay.
**A2 Button :** Bring up the User Parameters page.
**Volume Down Button :** Switch to the previous page file (alphabetically sorted)
**Volume Up Button :** Switch to the next page file (alphabetically sorted)
**Windows Button :** Reset the Min/Peak holds on the current page
**Screen Rotation Button :** On newer FZ-G1 hardware, this Pauses / Un-pauses strip charts on the current page. On older FZ-G1 hardware, this functions the same as the Windows Button.
**Power Button :** Turn the AL529BT on and off


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### 4.1.2 Touchscreen Operation

There are currently two touchscreen operations for the AL529BT:

If you have a page file loaded that doesn't use the entire available screen resolution, pressing and holding the left-bottom area of the screen will bring up the System Menu overlay.

The other operation involves user pages that contains an XY Crossplot gauge, with a target area mode that uses the offsets configuration. Touching one of these gauges will cause the target area to be repositioned at the location of the touch. Long pressing one of these gauges will cause the target area to be reset to the default position, once the long press is released.



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### 4.1.3 User Parameters Page

If the optional ***ODP.txt*** file is located in the ftp's pub directory, the AL529BT software has a USER PARAMETERS page which can be brought up by pressing the A2 button on the front of the displaym or from the USER PARAMETERS button on the menu system. This page uses the Operator Defined Parameter names and values which are configured in the optional ***ODP.txt*** file located in the ftp's pub directory, and lets the user set the values for these parameter names.

There can be up to ten of these parameters, and if present, they will be added to the optional broadcast stream which can be configured in the ***INI.txt*** file, as defined in the appendix.

Here is an example of all ten parameters being present in the ***ODP.txt*** file:

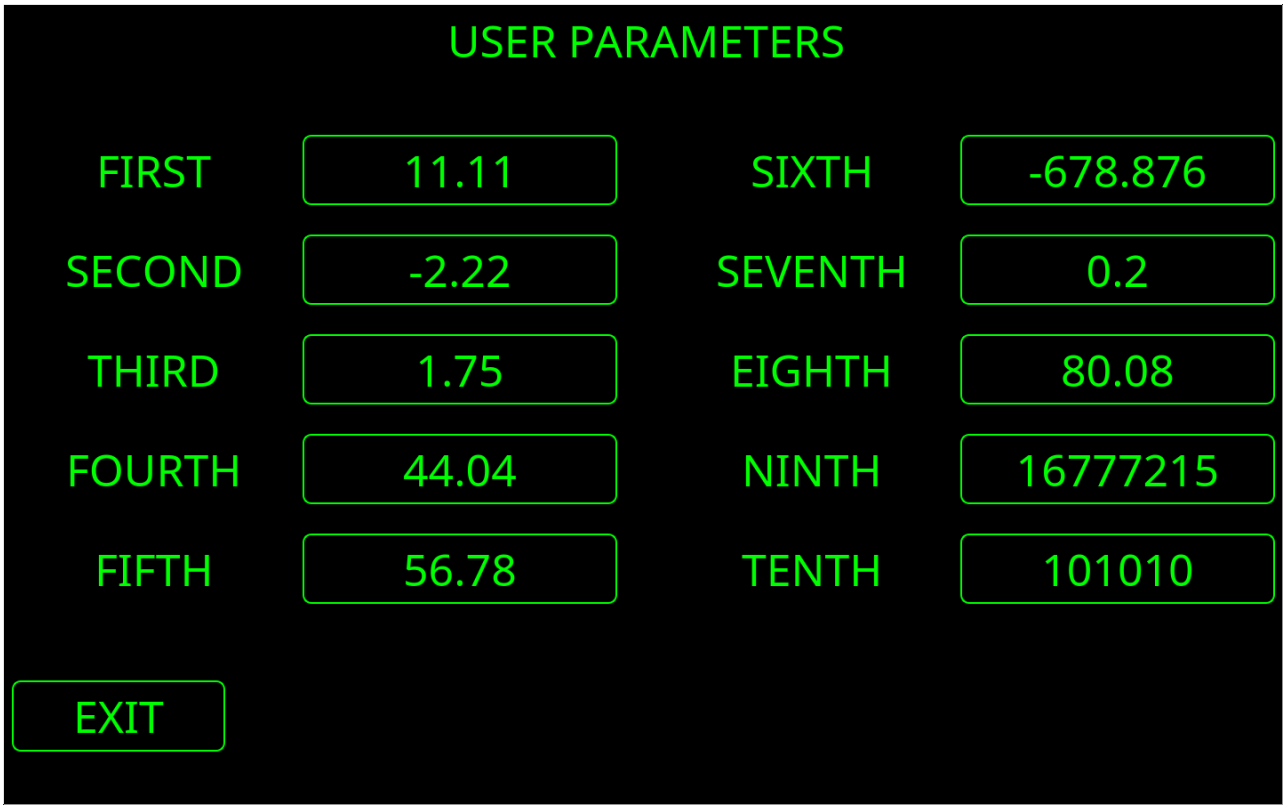


**Figure 14: User Parameters Page**


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When the user presses on one of the value boxes, the page will change to a data entry screen, where you can modify the value for a parameter. Here is an example of editing the value for the first parameter:


**Figure 15: Editing First User Parameter**

When the user changes a value on the User Parameter page, the ***ODP.txt*** file will be updated with the new value, and the updated value will be sent in the optional broadcast stream message.


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# CHAPTER 5 : PAGE LAYOUT APPLICATION

## 5.1 APOGEE LABS GAUGE SETUP APPLICATION

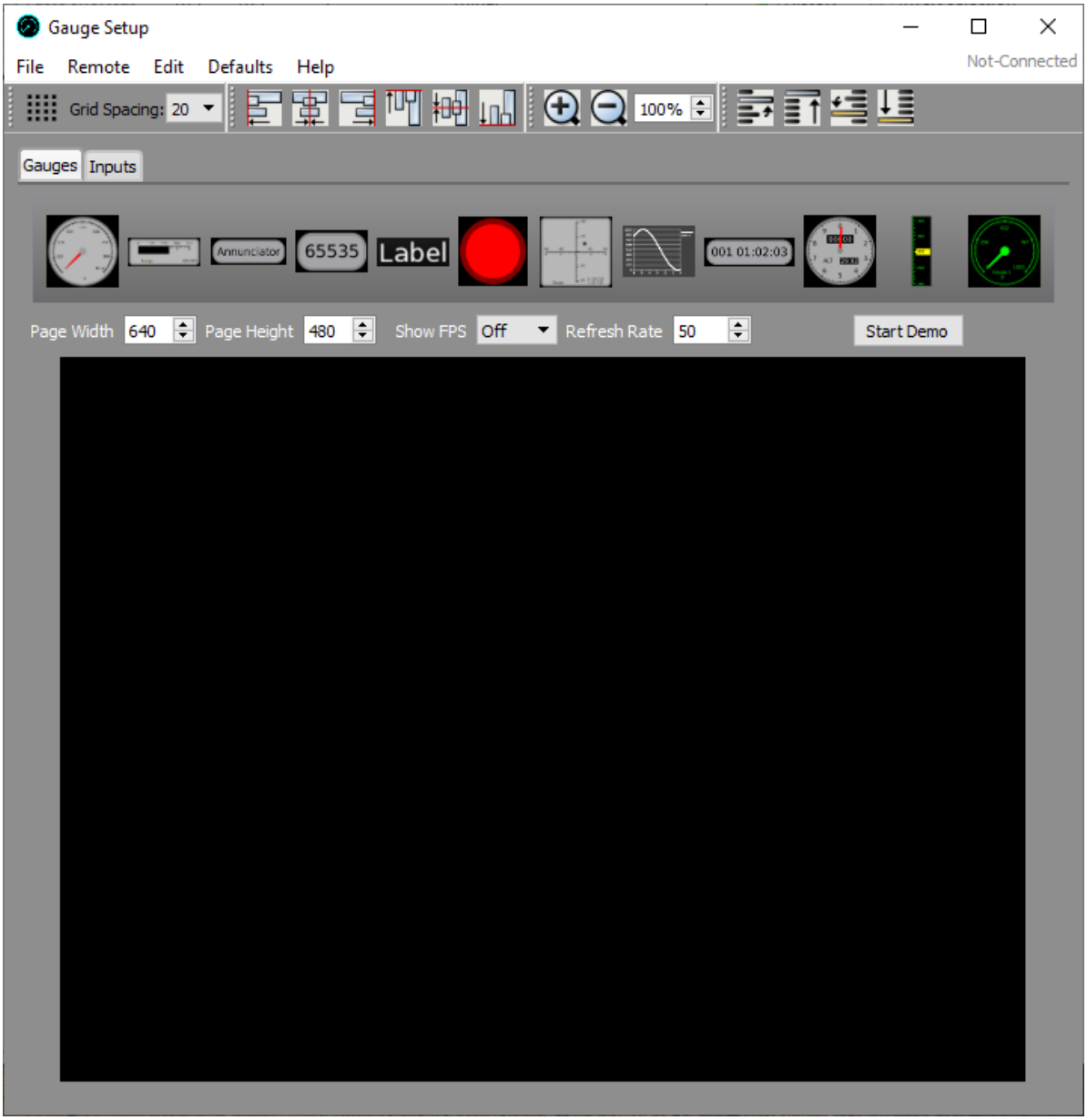


**Figure 16: Gauge Setup Application**

The Apogee Labs Gauge Setup application allows the user to layout, save, and transfer gauge pages (page files). This application provides drag and drop functionality for adding gauges to a page. Additional features include data input configuration, snap to grid, item alignment, and z-order manipulation. The Gauge Setup application allows the user to transfer configured page files directly to the AL529BT. For Chapter 10 data streams, the setup application also transfers the associated TMATS file to the AL529BT.


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When properly configured, the Gauge Setup application allows the user to create derived parameters using their own user defined functions with inputs words from their data stream. In order for these derived parameters to function correctly on the AL529BT, the Linux version of the user defined functions library (*libUserDefinedFunctions.so.1.0.0*) must be manually transferred onto the AL529BT, using its FTP server. For additional information on this process, and all specifics pertaining to the Gauge Setup application please consult the Apogee Labs Gauge Setup User Manual.

## 5.2 MANUAL PAGE FILE TRANSFER

Gauge page files created by the Apogee Labs Gauge Setup software can also be manually transferred onto the AL529BT by using its FTP server, but transferring files this manner does not perform all of the dependency checking that is done when transferring files via the Gauge Setup application, and you need to also manually transfer any TMATS files and libraries.

For more information about where page files and TMATS files should be placed when using the AL529's FTP server, please see the following chapter.



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# CHAPTER 6 : FTP SERVER

## 6.1 FILE DIRECTORY STRUCTURE

The AL529BT has an FTP server which is available for uploading and downloading files. Users can access the FTP service on port 21, by using an anonymous login with a blank password.

The server's folder structure is defined as follows:

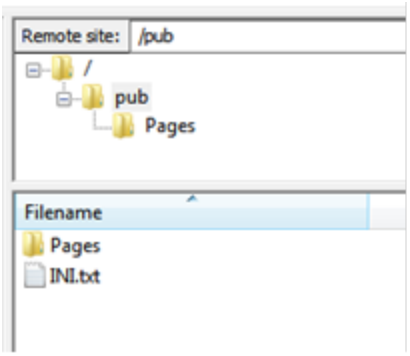


**Figure 17: FTP Server Directory Structure**

### 6.1.1 Pub Directory

The **pub** directory contains the folders necessary for the AL529BT to operate. There is one file contained in the **pub** directory at all times: ***INI.txt***

There is an optional file named ***ODP.txt*** which can also be in this directory. This file contains the names and values of Operator Defined Parameters which can have their value set on the USER PARAMETERS page.

The contents of these files are described in appendixes at the end of this document.


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### 6.1.2 Pages Directory

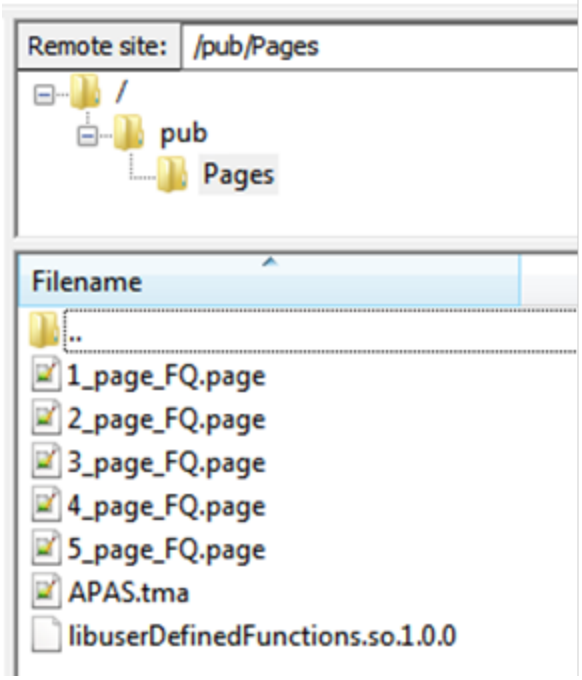


**Figure 18: Pages Directory**

The **Pages** directory contains the page files, TMATS configuration file, and user defined functions library for the AL529BT.

The user defined functions library file in this directory is only necessary if the user has built gauge pages that use derived parameters as inputs to a gauge. For more information on user defined functions and derived parameters see the user manual for the Apogee Labs Gauge Setup application.


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## 6.2 SOFTWARE UPDATE

In the event that a software update is required for the AL529BT, the user will ftp an Apogee Labs supplied update file to the AL529BT in binary mode, placing it into the **pub** folder. After the file transfer is complete, the unit will automatically reboot, sometimes more than once depending upon the type of update. After the rebooting process is complete, the updated software will be automatically installed, and the AL529BT will start up with the newly installed version of software. Please contact Apogee Labs for specific information regarding updated software for your AL529BT.


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# CHAPTER 7 : HARDWARE

## 7.1 DESKTOP CRADLE CONNECTORS

The Toughpad desktop cradle has several connectors on it. For use with the AL529BT, only the power connector and Ethernet connector are used. Connect the power supply cable to the desktop cradle's power connector, and insert an active Ethernet cable into the Ethernet jack.

## 7.2 CLEANING

The use of a dry, clean, microfiber cloth is recommended for cleaning all of the AL529BT surfaces, including the display. Avoid using any chemicals which could damage the display.


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# APPENDIX 1 INI.TXT DEFINITION

The **INI.txt** file contained in the ***pub*** directory of the AL529BT's ftp server is a flat text file that configures the IP settings of the display.

The keywords and options are as follows:

- **ipaddress=**<0.0.0.0 – 255.255.255.255>
- **netmask=**<0.0.0.0 – 255.255.255.255>
- **gateway=**<0.0.0.0 – 255.255.255.255>
- **dhcp_enabled=**<YES> or <NO>
- **ethport=**<0 – 1>
- **opmode=**<gauges>
- **orientation=**<normal, left, right, inverted>
- **apogeebroadcast=**<0.0.0.0 – 255.255.255.255>
- **apogeebroadcastport=**<0 – 65535>
- **longpresstime=**<0 - 10000>

All words must be entered exactly as above and there cannot be any spaces between the keyword, equal sign, or value. If any of these keywords (or the file itself) are missing, the AL529 will use the default system values.

If ***dhcp_enabled*** is set to **NO**, then the values associated with the keywords "ipaddress=", "netmask=", and "gateway=" must be set correctly in order to configure the network settings of the AL529BT to communicate with other devices on your network.

If ***dhcp_enabled*** is set to **YES**, then the values associated with the keywords "ipaddress=", "netmask=", and "gateway=" are not utilized.

The ***ethport*** parameter sets the activated Ethernet port to be used by the system. If this parameter is set to **1**, the docking station Ethernet port is used. If this parameter is set to **0**, the Ethernet port built into the Toughpad FZ-G1 is used.

To change the Ethernet settings of the AL529BT via FTP, create an INI.txt file with the information that you wish to use, and FTP it to the AL529BT, placing it into the ***pub*** directory. The AL529BT will use those settings upon its next restart.

The ***opmode*** parameter sets the operational mode of the AL529BT software. For the standalone AL529BT, **gauges** is the only valid value. If the display is also deployed with other application software, another value may be valid for this field, such as **pcu** .


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The ***orientation*** parameter configures the rotation of the display. The valid values for this parameter are **normal**, **left**, **right** and **inverted** .

**normal** : The display operates in a landscape orientation, with the display's physical buttons on the bottom and the power cord on the left bottom.

**left** : The display operates in a portrait orientation, with the display's physical buttons on the left and the power cord on the top left.

**right** : The display operates in a portrait orientation, with the display's physical buttons on the right and the power cord on the bottom right.

**inverted** : The display operates in a landscape orientation, with the display's physical buttons on the top and the power cord on the right top.

The **apogeebroadcast** parameter configures the broadcast IP address to be used for the broadcast data stream. The default value for this parameter is **235.0.0.5**

The **apogeebroadcastport** parameter configures the broadcast port number to be used for the broadcast data stream. The default value for this parameter is **54000**

The **longpresstime** parameter configures the amount of milliseconds for a long press to be detected on an XY Crossplot gauge. The gauge needs to be configured so that the Target Area is enabled, and is using the Offsets Target Mode. After the gauge detects that the amount of time has been reached to create a long press, releasing the touch will recenter the origin of the Target Area to the gauge's default X/Y location. A short press of the gauge will recenter the origin of the Target Area at the location where the touch occurred. Setting the value to 0 disables this functionality. The default value for this parameter is **1000**

Any line starting with a pound sign (#) is considered to be a comment.

Any lines or parameters not used by the AL529BT are left in the undisturbed in the INI.txt file when the application saves it.

Here are the contents of an example **INI.txt** file that could be used to set a static IP address of 192.168.0.49 on the built-in Ethernet port, and operate with the screen in the normal rotation orientation.

```
# Network
ipaddress=192.168.0.49
netmask=255.255.255.0
gateway=192.168.0.1
dhcp_enabled=NO
ethport=0

# misc
opmode=gauges
orientation=normal
```



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# APPENDIX 2 ODP.TXT DEFINITION

The **ODP.txt** file contained in the pub directory of the AL529BT's ftp server is a flat text file that controls which Operator Defined Parameters appear on the USER PARAMETERS page, and in the optional broadcast stream. Up to ten ODPs can be added to the file. The keyword and options are as follows:

- parameter_name_1=NAME_STRING
- parameter_value_1=VALUE_STRING
- …
- parameter_name_10=NAME_STRING
- parameter_value_10=VALUE_STRING

All words on the left of the equal sign must be lowercase and there cannot be any spaces between the keyword, equal sign, or value. Only parameters 1 through 10 are permitted, and the order that they appear in the file is not important. The VALUE_STRING must represent a valid floating point number.

The ***ODP.txt*** file is used to load the name and starting value for each parameter when the display is turned on. If less than ten parameters are configured in the ***ODP.txt*** file only those parameters present will be displayed in the graphical user interface for modification. Any modification to the user defined parameters values via the graphical user interface are updated in the ***ODP.txt*** file.

If the ODP.txt file exists, the AL529BT will broadcast data showing the values for the parameters. The AL529BT will use the value of the **apogeebroadcast** parameter from the ***INI.txt*** file for the broadcast IP address (default value of 235.0.0.5), and the value of the **apogeebroadcastport** parameter from the ***INI.txt*** file for the broadcast port number (default value of 54000).

The format of this broadcast data is defined in a following appendix entry titled *Broadcast Stream Definition*.


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# APPENDIX 3 BROADCAST STREAM DEFINITION

The following table shows the packet definition of the broadcast stream. The Message Type field is a 16bit word which specifies the type of broadcast packet being sent. The Message Counter field is also a 16bit word that increments with each packet sent. All other words in the broadcast stream are 32 bit floats. If a parameter_name_# is defined in the ODP.txt file it's associated value will be output in the broadcast stream in its corresponding location. If a parameter_name_# is missing or commented out (using // or #) a zero will be output in the broadcast stream in the corresponding location. The broadcast stream is only sent if a valid **ODP.txt** file is on the system. The broadcast IP address can be set by using the **apogeebroadcast** parameter from the ***INI.txt*** file. The broadcast port number can be set by using the **apogeebroadcastport** parameter from the ***INI.txt*** file. The default broadcast IP address is 235.0.0.5 and the default broadcast port number is 54000.

| Parameter | Payload Location In Bytes | Format |
|---|---|---|
| Message Type | 0 – 1 | 3 = AL529-BT Broadcast Rev A |
| Message Counter | 2 - 3 | Increments with each packet |
| parameter_name_1 | 4 – 7 | 32 bit Float |
| parameter_name_2 | 8 – 11 | 32 bit Float |
| parameter_name_3 | 12 – 15 | 32 bit Float |
| parameter_name_4 | 16 – 19 | 32 bit Float |
| parameter_name_5 | 20 – 23 | 32 bit Float |
| parameter_name_6 | 24 – 27 | 32 bit Float |
| parameter_name_7 | 28 – 31 | 32 bit Float |
| parameter_name_8 | 32 – 35 | 32 bit Float |
| parameter_name_9 | 36 – 39 | 32 bit Float |
| parameter_name_10 | 40 – 43 | 32 bit Float |

**Table 1: Broadcast Stream Definition**


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