

PENMOUNT P2 PCIMSET USERS' GUIDE FOR MICROSOFT WINDOWS

Version 2.10

2021/05/31



Preface

Disclaimer

The information in this document is subject to change without notice. The manufacturer makes no representations or warranties regarding the contents of this manual and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose. Furthermore, the manufacturer reserves the right to revise this publication or make changes in the specifications of the product described within it at any time without notice and without obligation to notify any person of such revision.

Trademarks

AMT is the registered trademark of Apex Material Technology Corp. PenMount is a registered trademark of SALT International Corp. Microsoft and Windows are registered trademarks of Microsoft Corp. Other product names used in this manual are the properties of their respective owners and are acknowledged.

Copyright

This publication, including all photographs, illustrations and software, is protected under international copyright laws, with all rights reserved. Neither this manual, nor any of the material contained herein, may be reproduced without the express written consent of the manufacturer.

Copyright © 2021 All rights reserved.

Revision Table

Date	Revision	Changes
29/Aug/2017	2.3	Initial release version.
03/Jan/2018	2.4	<ul style="list-style-type: none"> (1) Added "Parameters CRC" to page display items (2) Added 1.4.7: Log UI Parameters Information Button under Information item, can read/write UI Parameter. (3) Added Auto Save Log Button to 2.1.3 Open Short Test function. (4) Added 2.4.3 Options, "Switch on the System Reference Dialog Box" and "Auto Save Log Button" selections to System Reference function. (5) Changed 3.1 Export / Import Parameters file format from PMP to INI format in the Parameters item. (6) 3.9.3 Orientation, corrected Orientation display method. (7) 5.2 Firmware Update item, added "Writer Factory Default Parameter" and "Write Host Interface/Panel Parameters" selections.
20/Jul/2018	2.5	<ul style="list-style-type: none"> (1) 5.1: add description of utility supporting pfp files with virtual button settings. (2) 5.2: add description of utility automatically selects write factory default option when using PMF or PMC file.
31/Jan/2019	2.6	<ul style="list-style-type: none"> (1) 1.4: New options in the "Information" page. (2) 1.6: New command line options. (3) 2.4.3: New "Select Folder" option in "SR" page. (4) 4.7: New "Anti-noise" parameters. (5) 3.9.1: New Resolution Setting. (6) 5.1: New "pnc", "pnf", "pxc", and "pxf" format supported. (7) 5.3: New button to generate PFP file in the "Update"

		<p>page.</p> <p>(8) 7.2: Remove “Log Noise Info” and combine the function into “Log Current Device Information”.</p> <p>(9) 8: New “Process Config” feature</p>
31/Jan/2019	2.7	<p>(1) Chapter 8: New section for Golden.</p> <p>(2) Chapter 8: New “Diagnostic Test” Option.</p>
20/Aug/2020	2.8	<p>(1) Removed: Process List Golden Sample and Diagnostic Test.</p> <p>(2) Add: 1.4.3 DLL Version.</p> <p>(3) Add:1.4.4 Core Version.</p> <p>(4) Add: 1.4.7 Folder Configure.</p> <p>(5) Add: 2.4.3 Reset SR.</p> <p>(6) Add: 4.8.4 Edge Adjustment.</p> <p>(7) Modify: 4.7.1 Median Filter Renamed to Spike Filter.</p> <p>(8) Modify:4.7.3 Enhanced Frequency Hopping Renamed to Frequency Hopping Mode.</p> <p>(9) 5.1: Show CRC information of ND Base.</p> <p>(10) Add: 8.3 Skip Noise Level N Times Setting.</p>
31/Mar/2021	2.9	<p>(1) Document Title Changes to PenMount P2 PCIUtility Users Guide.</p> <p>(2) Modify: 1.6 psave and pload command line options.</p> <p>(3) Modify: 2.1 Open Short Test Renamed to Panel Quality Test.</p> <p>(4) Add: 4.7.3.2 Double ADC, FH Plus, and FH Tuning options.</p>
09/Apr/2021	2.9A	<p>(1) Modify: 1.6 -srns and -fu command line options.</p>
30/Apr/2021	2.9B	<p>(1) Modify:2.4, add notes that SR is required when using WD or WP.</p> <p>(2) Modify:4.6.1, add notes that SR is required when using WD or WP.</p>

31/May/2021	2.10	<ul style="list-style-type: none">(1) Modify:1.4.5, ND Base CRC information.(2) Modify: 錯誤! 找不到參照來源。 , Add options for changing background color.(3) Modify: 4.7.3.2, the advanced FH parameters.(4) Modify: 4.7.3.3, introducing new UI.
--------------------	------	--

Table of Content

PREFACE	I
Disclaimer	i
Trademarks.....	i
Copyright	i
REVISION TABLE	II
1. INTRODUCTION	9
1.1 Supported Systems.....	9
1.2 Supported Devices.....	10
1.3 Summary	11
1.4 Checking Utility Information	11
1.4.1 Device Information	12
1.4.2 Application Version	12
1.4.3 DLL Version	13
1.4.4 Core Version	13
1.4.5 ND Base CRC	13
1.4.6 Open Default Export File Folder	13
1.4.7 Folder Configure	14
1.4.8 Log UI Parameters Information	15
1.4.9 Disable Data Report.....	15
1.4.10 Show Menu in Draw	16
1.4.11 Reset Device	16
1.5 Special Notice	17
1.6 Command Line Features.....	17
2. DIAGNOSTIC	19
2.1 Panel Quality Test.....	19
2.1.1 Test Items	20

2.1.2	Test Result & Analysis.....	21
2.1.3	Save Test Results	23
2.1.4	Test Log	23
2.2	Noise Level	25
2.2.1	Execute test	26
2.2.2	Test Analysis	27
2.3	3D Module of Touch Signal.....	28
2.4	System Reference (SR).....	31
2.4.1	Checking Status	31
2.4.2	Rebuild the System Reference	31
2.4.3	Options	33
3.	QUICK SELECT	34
3.1	FRAME MODE	35
4.	PARAMETERS.....	37
4.1	Main Features.....	38
4.2	Interface Parameters.....	39
4.2.1	Change Interface	40
4.2.2	I2C Address	40
4.2.3	Baud Rate	40
4.3	Panel Parameters	40
4.3.1	Choosing from a Preset	40
4.4	Finger Parameters	41
4.4.1	Sensitivity	41
4.4.2	Touch Points	41
4.5	Palm Parameters	42
4.5.1	Palm Rejection.....	42
4.6	Water Handling	42

4.6.1	Choosing a Water Handling Solution.....	42
4.7	Anti-Noise Parameters	43
4.7.1	Configure Spike Noise Filtering.....	43
4.7.2	Enhanced Driving.....	44
4.7.3	Configuring Frequency Hopping	44
4.7.3.1	Frequency Hopping Mode.....	44
4.7.3.2	Advanced Frequency Hopping Options	44
4.7.3.3	Frequency Hopping Tuning.....	44
4.8	Coordinate Parameters	46
4.8.1	Calibration	47
4.8.2	Edge Compensation.....	50
4.8.3	Tail Orientation.....	50
4.8.4	Edge Adjustment	50
5.	FIELD UPDATE	50
5.1	Load Firmware File	51
5.2	Update Firmware.....	52
5.3	Generate New PFP File	53
6.	DRAW	55
7.	DEBUG	59
7.1	Reset Touch Panel	59
7.2	Log Current Device Information	59
7.3	Show Notifications for Water Detection	62
7.4	Touch and Halt	62
8.	PROCESS CONFIG	64
8.1	Work Order Number	64
8.2	Load PFP File.....	65

8.3	Miscellaneous.....	65
8.4	Select Tests for Process List.....	66

1. Introduction

This document provides information for using PenMount PCIMset to determine touch device settings and perform updates and tests.

1.1 Supported Systems

PenMount PCIMset can operate in the operating systems listed below:

Types	Operating Systems
Desktop	Windows XP (32/64bit)
	Windows Vista (32/64 bit)
	Windows 7 (32/64 bit)
	Windows 8 / 8.1 (32/64 bit)
	Windows 10 (32/64bit) ¹
Server	Windows Server 2003 / R2
	Windows Server 2008 / R2
	Windows Server 2012 / R2
	Windows Server 2016 / 2019
Embedded	Windows XP Embedded / Standard 2009
	Windows Embedded Standard / POSReady 7
	Windows Embedded 8 Standard / 8.1 Industry
	Windows 10 IoT Enterprise

¹ Recommend using the Windows 10 Anniversary Edition 1607 (10.0.0.14393) and later versions.

1.2 Supported Devices

Devices and interfaces supported by PenMount PCIMset are as follows:

Series	Control Board	USB	RS-232 / UART	I ² C ²
PenMount P2-02 Series	PM1100		v	
	PM2101		v	v
PenMount P2-03 Series	PM1200	v	v	
	PM1201A	v	v	
	PM2201	v	v	v
PenMount P2-04 Series	PM1300A	v		
	PM1302	v	v	v
	PM1302B			v
	PM1400A	v	v	
	PM1401	v	v	
	PM1401A	v		v
	PM1500	v	v	v
PenMount P2-06 Series	PM1110A		v	
	PM1210	v	v	v
	PM2103	v	v	v
	PM2203	v	v	v
	PM2203B	v	v	v
	PM2203C	v		
	PM2204	v	v	v
	PM2205	v	v	v
	PM2251	v	v	v
	PM2252	v	v	v
	PM2351	v		
	PM2356	v	v	
	PM2358	v	v	v
	PM2300	v	v	v
	PM2301A	v	v	v

² The I²C, UART / RS-232 interface is supported by connecting through the PMT101 Adapter.

	PM2303	v	v	v
	PM2304	v	v	v
PenMount P2-08 Series	PM1310	v	v	v
	PM2303	v	v	v
	PM1410	v	v	v
	PM1415	v		v
	PM1710	v	v	
	PM1711	v		v
	PM1715	v		v

1.3 Summary

The application version of PenMount PCIMset is summarized in the table below.

Utility	Usage	Application Version	Notes
PCIMset	PenMount P2 Firmware configuration	2.10.x	

The application version can be found on the “Information” page.

1.4 Checking Utility Information

The version of PCIMset and other useful information are listed on the “Information” page.

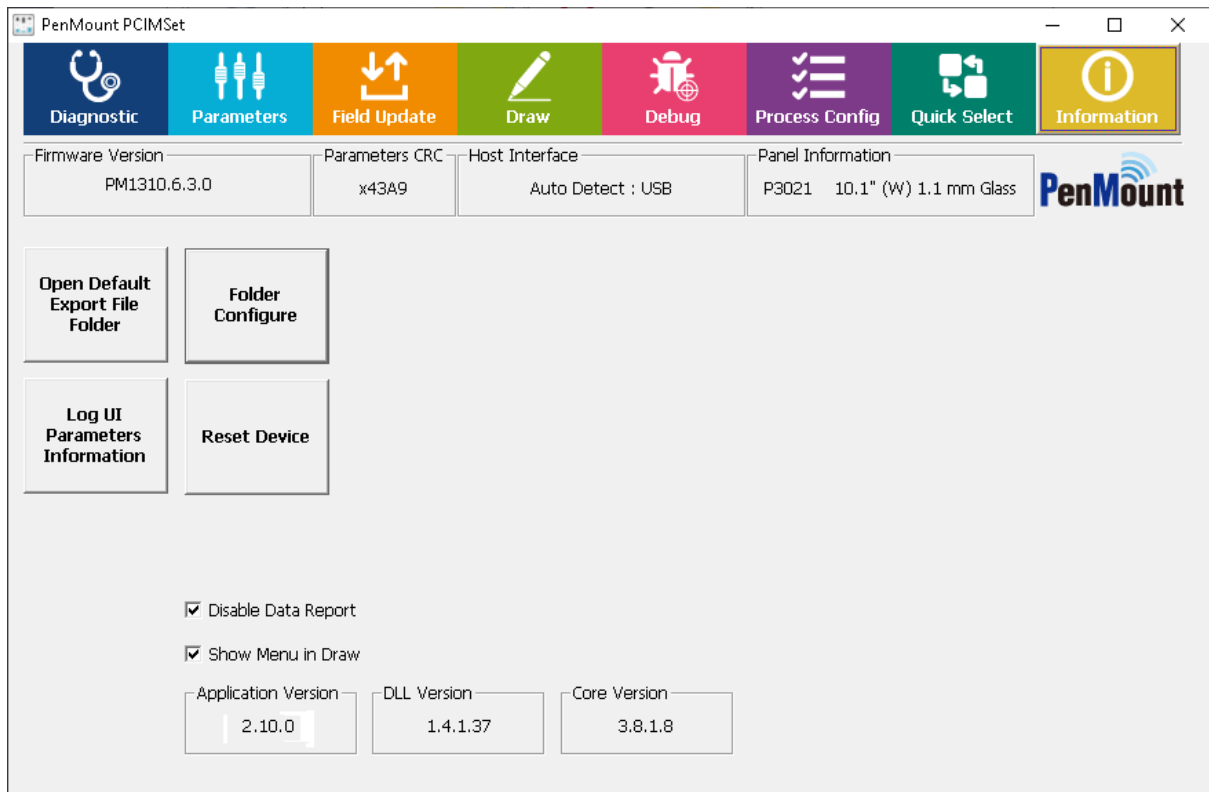


FIGURE 1

1.4.1 Device Information

Connected device information consists of several parts:

- Master Firmware / Slave Firmware / Test Version
The firmware version of the connected device.
If marked as “Test Version”, it means that this firmware is for testing purpose only.
- Parameters CRC
- A code for identifying parameter sets. Same firmware versions with different CRC values indicates there are parameter differences.
- Host Interface
The connected interface, most P2-06 and P2-08 devices support interface auto detection.
- Panel Information
Configuration of panel size and cover lens thickness.

1.4.2 Application Version

It is the version of the utility.

1.4.3 DLL Version

This is the version of the PM_Standard.dll file that the utility is using.

1.4.4 Core Version

It is the version of the firmware core features. Different firmware with similar core versions mean that their performance result will be very close too.

1.4.5 ND Base CRC

When this CRC value appears, it means that this firmware comes with some extra preconfigured noise compensation settings.

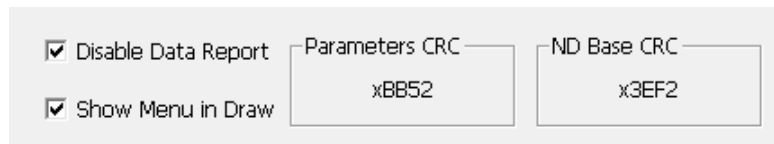


FIGURE 2

1.4.6 Open Default Export File Folder

Pressing this button will open the file manager and allow user to browse the test results, parameters, and other files generated by PCIMset. By default, the directory is located at:

%LOCALAPPDATA%\PenMount Utility

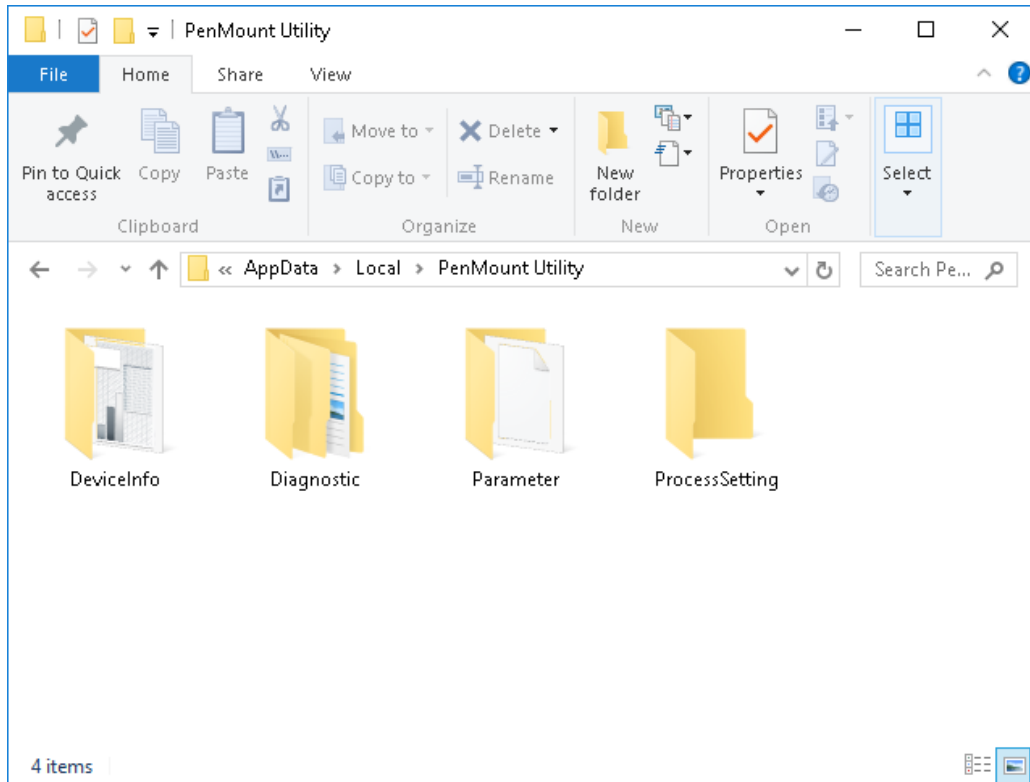


FIGURE 3

1.4.7 Folder Configure

The PCIMset remembers the last selected directory as the default value of next operation. For example, if user loads firmware file from “D:\Firmware”, the next time user launches “Load Firmware” button, it will list firmware files in the “D:\Firmware” directory.

PCIMset allows specifying the default folders for different actions, as shown in the below screenshot.



FIGURE 4

1.4.8 Log UI Parameters Information

Pressing this button will save all the parameter settings in human readable format from the connected device. This feature is useful when comparing the parameter differences of two devices with different CRC values.

	A	B	C	D	E
1					
2	Write Log Time : 2020/08/19 12 01 22				
3					
4	Application Version : PenMount PCIMSet 2.8.1.1				
5					
6	DLL Version : 1.4.0.7				
7					
8	Function : Log UI Parameters Information				
9					
10	Master Version : PM1310.6.2.0 Boot : 8.0				
11					
12	Core Version : 3.7.1.35				
13					
14	Device Interface : Auto Detect : USB				
15					
16	Parameters CRC : x7461				

FIGURE 5

1.4.9 Disable Data Report

When this option is checked, touch will be disabled when PCIMset is running.

1.4.10 Show Menu in Draw

When this option is checked, a menu button will appear in Draw mode. Please check chapter 6 for each option in menu.

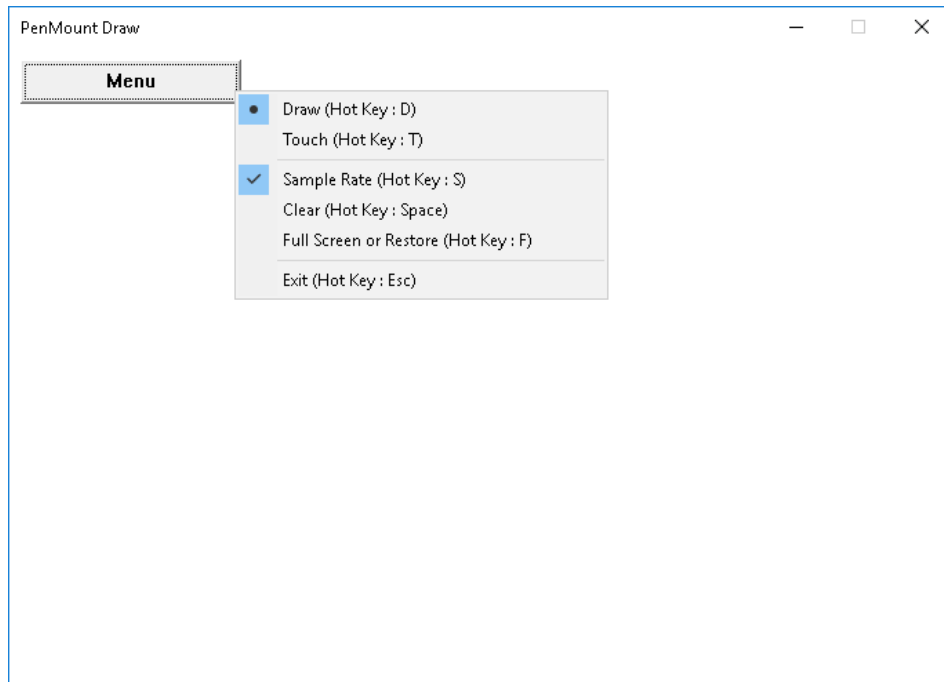


FIGURE 6

1.4.11 Reset Device

If device is not connected when utility starts up, it can still automatically detect when device is attached to USB interface. For RS-232 / UART / I2C interface, PCIMset should configure device by the PenMount Bridge, and the user can press the "Refresh" button to detect device.

Please notice that is no device connected, only "Draw", "Process Config", "Refresh", and "Information" pages can be accessed, and the reset button becomes "Refresh".

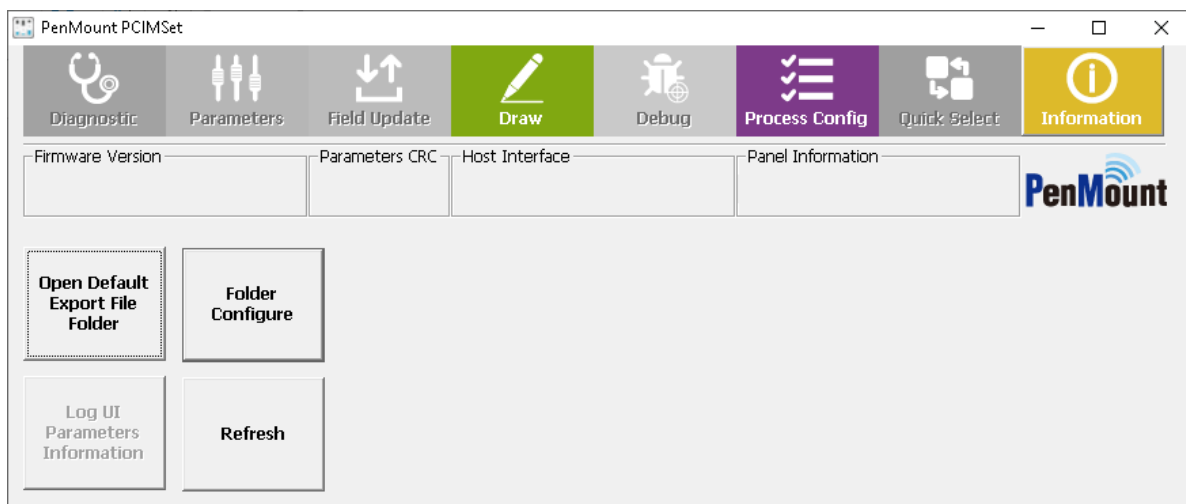


FIGURE 7

If the devices is connected, PCIMset enables “Reset Device” button. The user can reset device by this button.

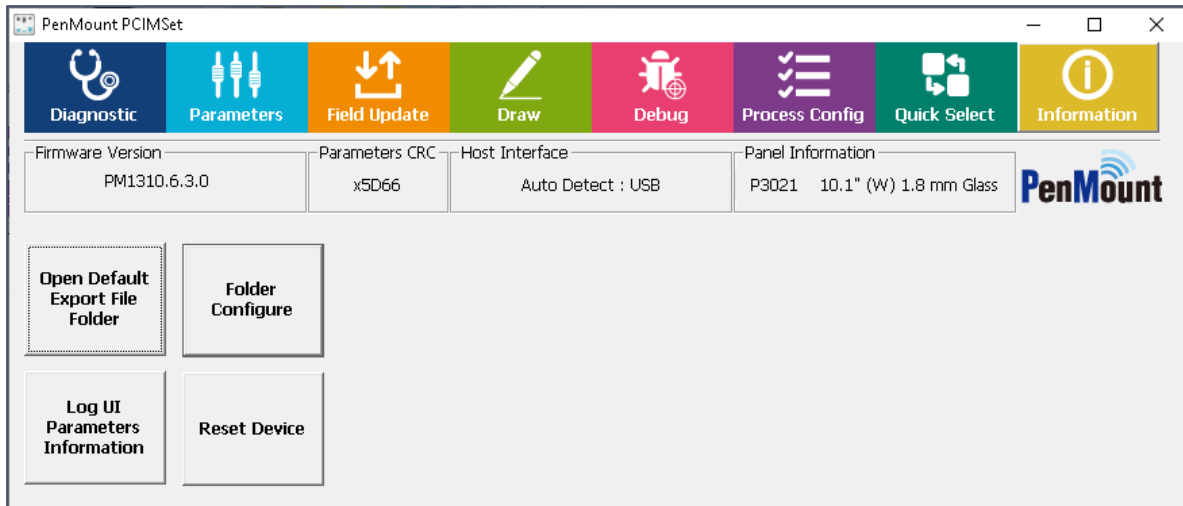


FIGURE 8

1.5 Special Notice

1. PenMount PCIMset can only support the setting and operation of one single device at one time.
2. Not all PenMount Utilities can be opened simultaneously.

1.6 Command Line Features

This version of PCIMset supports the following command line options. Please choose one of the following options.

Option	Description	Feature Reference
-os	Panel Quality (Open Short) Test	Section 2.1
-nl0	Noise Level Test, using pattern “NONE”	Section 2.2
-nl1	Noise Level Test, using pattern “WHITE”	
-nl2	Noise Level Test, using pattern “BLACK”	
-nl3	Noise Level Test, using pattern “CHECKERBOARD”	
-sr	Build System Reference	Section 2.4
-srns	Build System Reference (no dialog box for log saving)	Section 2.4
-psave	Saves parameters of the connected device to INI file.	Section 4
-pload	Loads parameters from specified INI file to connected	Section 4

	device	
-fu	Load specified firmware file and perform firmware update.	Section 5

2. Diagnostic

PCIMset provides standard product testing procedures, including:

- Panel Quality Test: test the electrical functions, including open-short test of PCI touch panels
- Noise Level: detect the size and area of the PCI touchscreen influenced by noise interference.
- 3D Module: graphical view for diagnosing raw signal.
- System Reference: allow user to rebuild the reference data used for adjusting environmental changes. This feature is only supported in some device firmware versions.

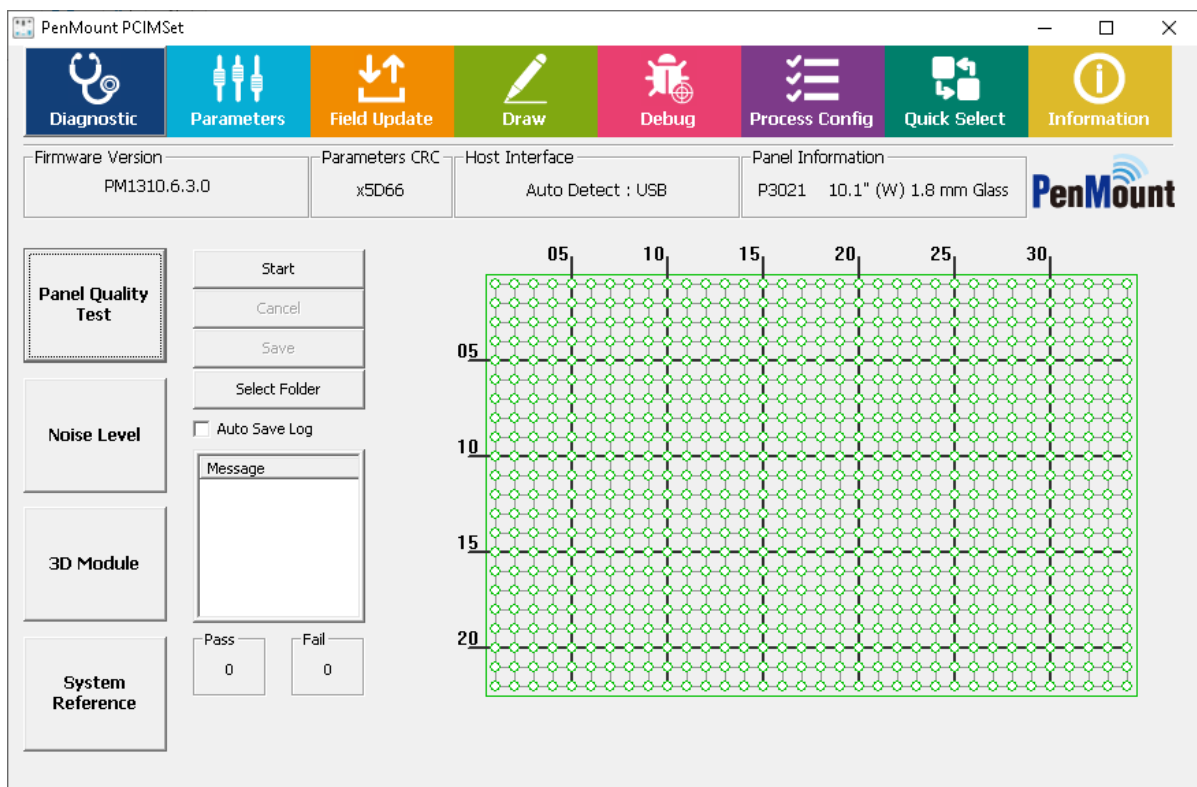


FIGURE 9

2.1 Panel Quality Test

The Panel Quality tests sensor and driver pins for possible open / short issues. To ensure the accuracy, please do not perform any touch action while the test is running.

Click the "Start" button; this will start electrical detection on the touchscreen. When a single test is running, status will display "START" and "progress" will rise from bottom to top.



FIGURE 10

Once detection is completed, the result will appear as the status. If the touchscreen is normal, PASS will be displayed. If it is abnormal, FAIL will be displayed. To the right side of the Status field is the “Pass & Fail” field, indicating the number of Passes or Fails after the program starts to run detection

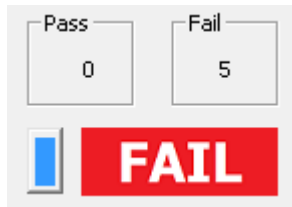


FIGURE 11

Meanwhile, the status of the touchscreen is shown at the right side of the window. Green means the node is normal and red means abnormal.

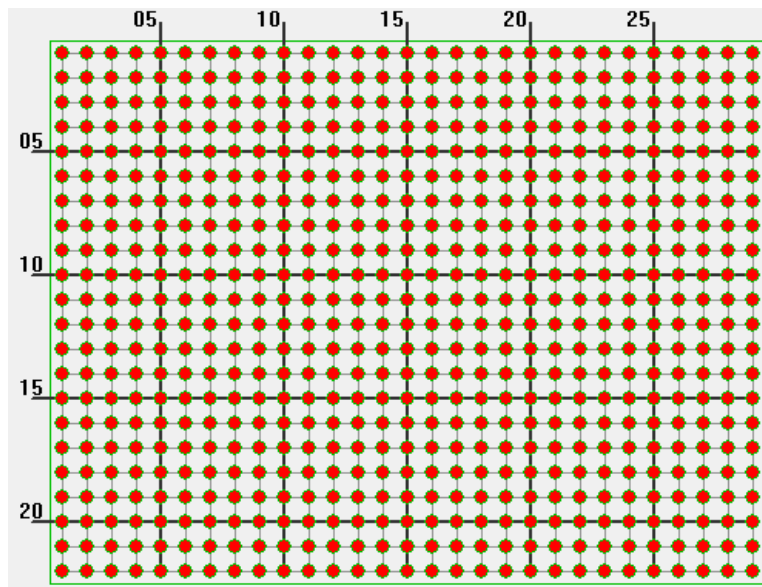


FIGURE 12

2.1.1 Test Items

When diagnosis starts, the program measures raw data from every node on touch panel. Three sets of raw data are collected for signal testing. The primary test items are as follows:

Items	Explanation
Debounce Check	If the three sets of raw data on all the nodes of the touch panels are distinctively different from one another and larger than Debounce Level, it is determined as abnormal.

Driver Pins Abnormal Check	Test the raw data of two consecutive driving pins (use the signals for the third test) and the difference between them should not be excessively large. If the raw data of over one third of the nodes of the two neighboring driving pins is over Driver Level, the driving pin with higher raw data will be marked “abnormal”.
Sensor Pins Abnormal Check	Test the raw data of two consecutive sensor pins (use the signals for the third test) and the differences should not excessive. If the raw data of over one third of the nodes of the two neighboring sensor pins is larger than Sensor Level, the sensor pin with higher raw data will be determined as a short circuit and marked “abnormal”.
Same Raw Data Check	If the three sets of raw data on all the nodes of the touch panels are identical, it is determined as abnormal.
Illegal Data Check	Checks whether raw data is negative.
Absolute Data Check	Checks whether raw data is within valid range.
Near Check	Checks whether the raw data of two adjacent driver lines/sensor lines is similar.
Flat Check	Checks whether the base is flat.

2.1.2 Test Result & Analysis

When diagnose ends, the program displays messages for each failed test items:

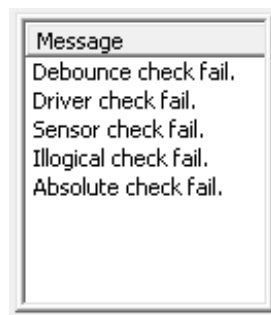


FIGURE 13

The table below lists possible messages.

Message	Description
PASS	All test item passed
Debounce check fail	Debounce Check failed
Driver check fail	Driver Pins Abnormal Check failed
Sensor check fail	Sensor Pins Abnormal Check failed

Same check fail	Same Raw Data Check failed
Illogical check fail	Illegal Data Check failed
Absolute check fail	Absolute Data Check failed
Near check fail	Near line raw data check failed
Flat check fail	Base flat check failed

After the test is completed, nodes with abnormal signals will be immediately indicated. They are usually classified in three types:

1. Single point abnormal

When the test result is “single point abnormal,” it is because the difference of the signal values for one location and the ambient nodes is too large. If the grounding for the system is not ideal, which may lead to touch instability, abnormality will be tested at different nodes during each test.

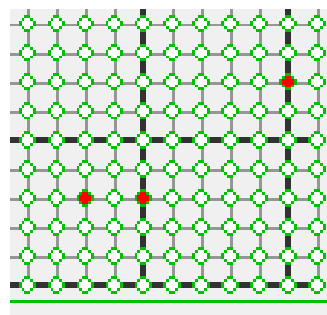


FIGURE 14

2. Whole pin abnormal

When the test result is “Whole pin abnormal,” it is usually either due to the open state of sensor/driving pin or too many abnormal nodes on the same pin.

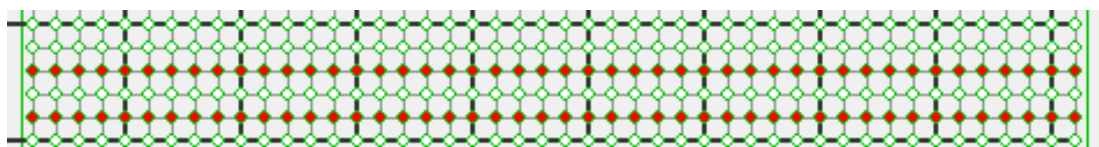


FIGURE 15

3. Whole panel abnormal

When the test result shows whole panel abnormal, it is usually because the signals detected never change during the process. When you are connecting the touch panel with the control board, if the cables are not connected properly, this will happen.

In some circumstances, it is hard to see where the problem is from the appearance of the product. You can run PCIScan and cross reference to determine whether the source of the problem is the control board or the touch panel.

2.1.3 Save Test Results

If the touch panel shows “signal abnormal,” you can save the results into a file and provide it to PenMount for further analysis. You can click “Save” after the test is completed. The “Select Folder” button allows changing of the target folder for saving test results.

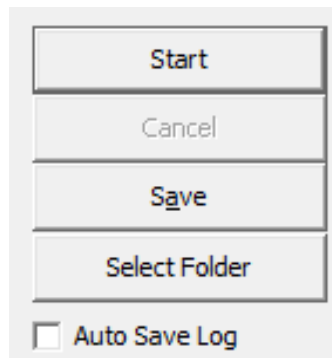


FIGURE 16

A dialogue box below will appear. The user must enter “Batch Number 1” and click OK to save. We suggest using the touch panel number as the “Batch Number” for future identification. The program will save the test results either in the “TestPass” or “TestFail” folder based on the test results under `$ProductNumber_ $BatchNumber_ $Month$Day$Hour$Minute$Second”.csv`.

- Auto Save Log

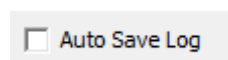


FIGURE 17

With this option checked, the “Save File” dialog will automatically appear.

2.1.4 Test Log

The program will save the detected signal in CSV file. The format of CSV is a text file, which can be opened with spreadsheet software such as Microsoft Excel.;

- Basic data

The beginning of the CSV file records data for the corresponding touch panel and controller. You can also see the threshold value for the test.

Write Log Time : 2020/08/20 17:50:33							
Application Version : PenMount PCIMSet 2.8.1.1							
DLL Version : 1.4.0.7							
Function : Open Short Test							
Firmware Version : PM1310.6.2.0 Boot : 8.0							
Core Version : 3.7.1.35							
Parameters CRC : x7461							
Panel Information : P3021 10.1" (W)							
Cover Lens : 1.1 mm Glass							
Batch1:	111						
Batch2:							
[Result]							
Diagnose:	Pass						
[Threshold]							
FH mode:	0						
[Open Short Test Threshold]							
Debounce	100	Driver Level:	100	Sensor Level:	100	Absolute Level:	100

FIGURE 18

- RawData

The CSV contains several sets of raw data which are the basis for judgment for each test.

[RawData]								
	0	1	2	3	4	5	6	7
1	493	498	499	503	501	503	509	
2	511	526	525	528	527	528	528	
3	514	528	528	530	531	533	533	
4	508	519	523	525	526	528	529	
5	501	509	510	512	519	519	519	
6	516	528	534	534	531	533	533	
7	517	528	528	531	532	532	539	
8	512	519	523	524	521	527	526	
9	518	525	527	528	530	530	533	
10	520	529	529	527	530	531	538	
11	519	531	535	537	535	533	538	
12	514	528	525	529	529	529	534	
13	516	524	527	527	530	532	539	
14	525	536	537	537	538	540	553	
15	534	535	540	538	542	541	558	
16	523	537	534	534	534	534	536	
17	528	534	536	538	540	538	545	
18	530	538	540	539	541	541	546	

FIGURE 19

Raw data is arranged in a two-dimensional array, which corresponds to the nodes on the sensor and the driver pin. The nodes with * are abnormal. From the raw data, you can presume the reason for the abnormality. In the example below, there is obviously less raw data coming from the nodes marked abnormal than the surrounding nodes.

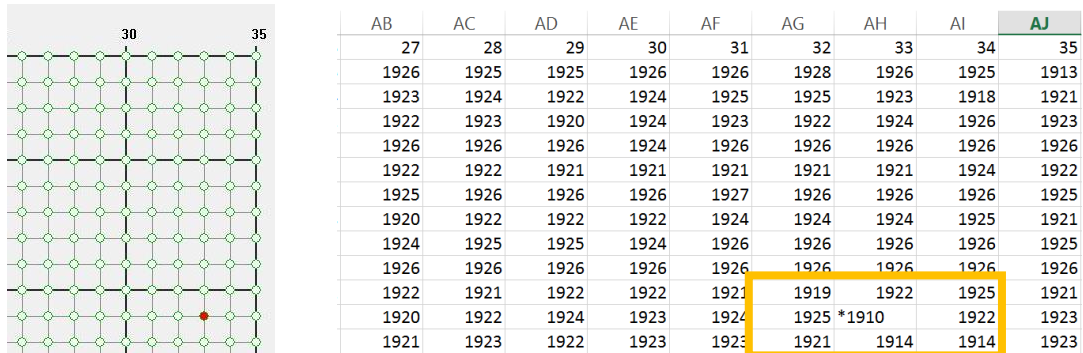


FIGURE 20

- PDData
This is the raw data used during the “Illegal Data Check”.
- SectData
This is the sector scan result. For reference only.
- SelfData
This is the abnormal scan result. For reference only.
- Raw Data Near
This is to check total delta of adjacent sensor and driver.
- Base Flat
This checks whether base is sufficiently flat.

2.2 Noise Level

The Noise Test mainly evaluates the degree of noise interference impact on the touch panel. Usually noise will affect measurement and large fluctuations will be produced. The program will display the “noise level” interface:

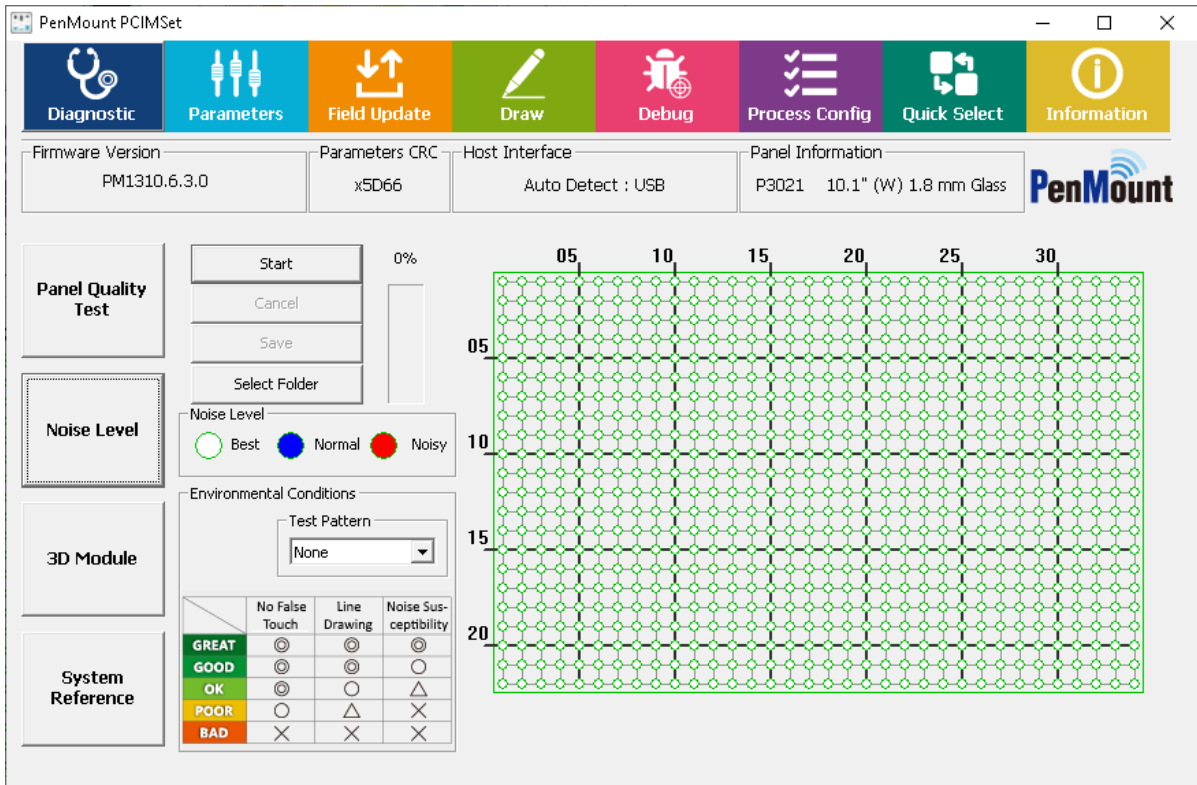


FIGURE 21

2.2.1 Execute test

Please click “Start” on the left side of the window to start running the test. To ensure test accuracy, please avoid any touch input during the test.

During this period of time, progress will be displayed in the window caption. All other utility features will be temporarily disabled during the test. Usually the test takes longer when using larger panel sizes. Please click “Cancel” if want to abort to sue other features.

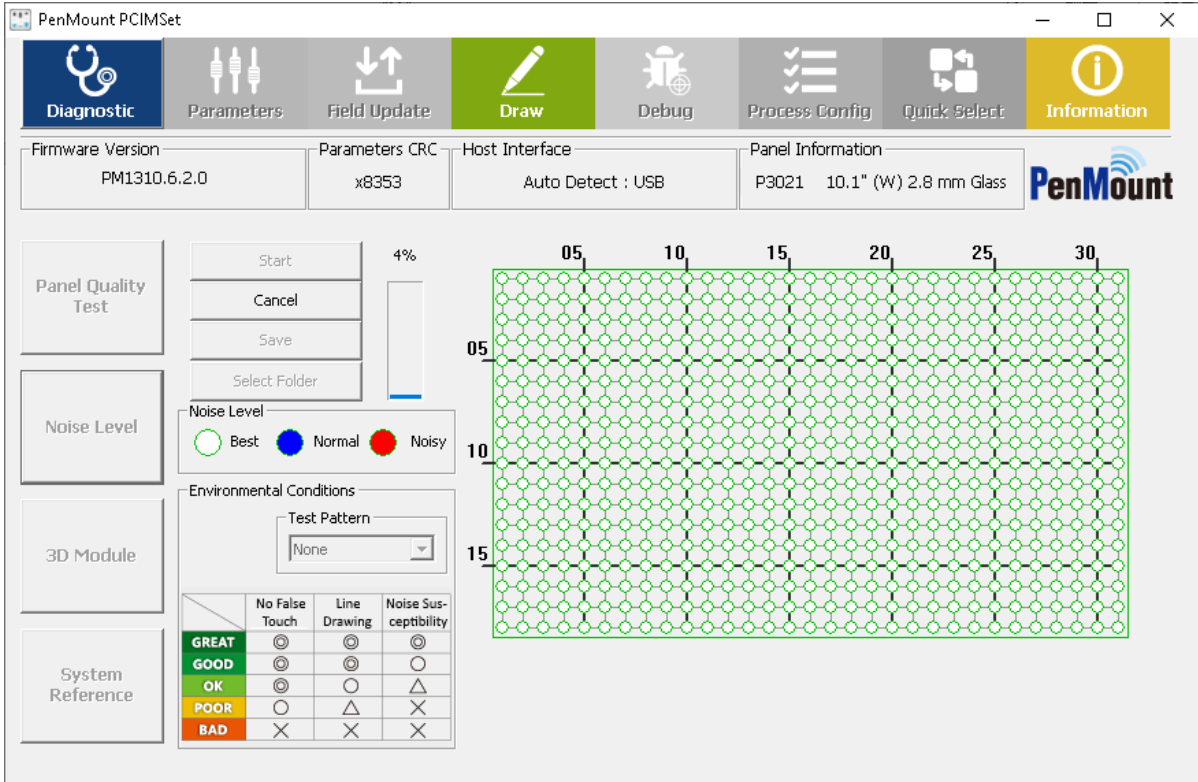


FIGURE 22

For testing LCD noise interference with specific display patterns, please change “Test Pattern”. Currently “White”, “Black”, and “Checkerboard” are supported. Please be aware that after pressing the “Start” button, the LCD will display the specified pattern in full screen mode until the test finishes.

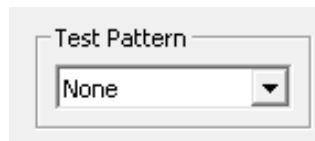


FIGURE 23

2.2.2 Test Analysis

According to the standard deviation calculated from the raw data, the program will categorized nodes on the touch panel as “Best”, “Normal,” and “Noisy” and mark them respectively in white, blue, and red.

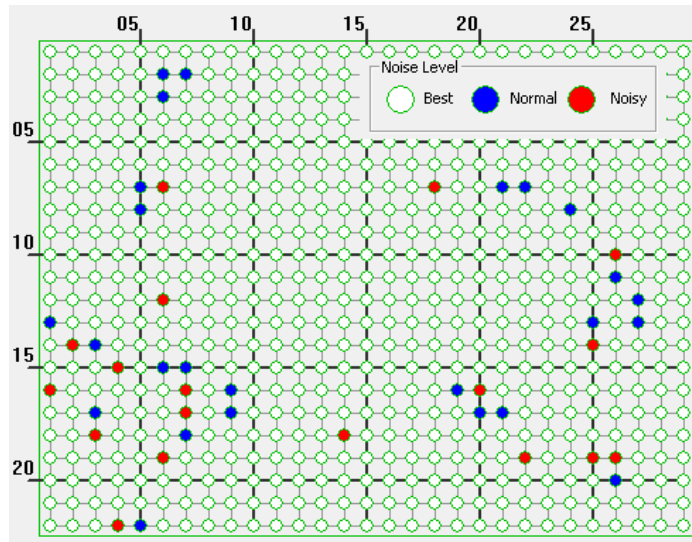


FIGURE 24

The right side of the program indicates the degree of signal changes in the nodes on the touch panel.

Nodes marked with a red circle indicate a greater change in the signal value measured and it may be unstable.

To give the user a better idea of overall signal changes, the program will analyze and show the environmental criteria, and classified in 5 levels: "GREAT", "GOOD", "OK", "POOR", and "BAD".

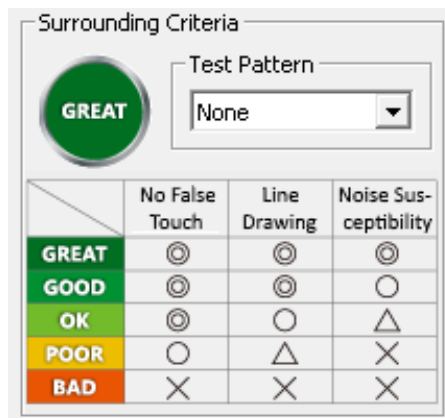


FIGURE 25

Generally speaking, please try to lower noise interference by increasing the air gap between touch panel and LCD, bring environmental conditions to a least "OK" level.

2.3 3D Module of Touch Signal

Pressing the "3D Module" button launches the 3D module for inspecting touch or noise signals. Please prepare a mouse or keyboard before launching this feature, because touch will be disabled during the entire process.

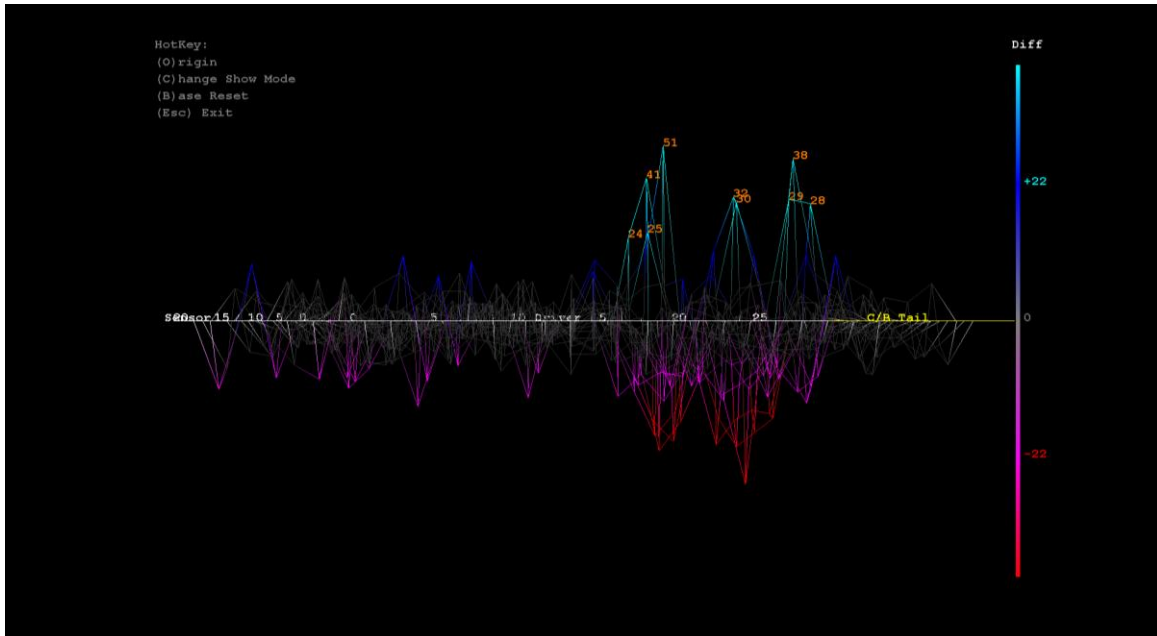


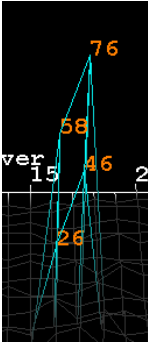
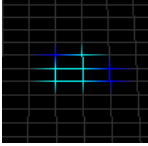
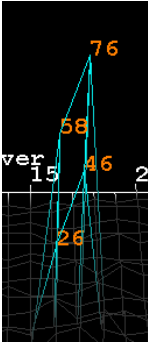
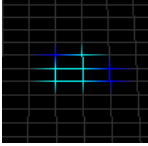
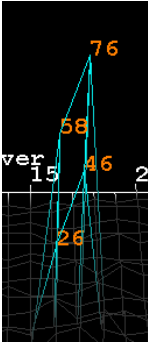
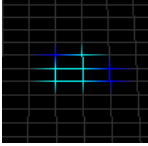
FIGURE 26

The program will use different colors to show the signal strength.

Colors	Signals
Cyan	Larger positive signals, possibly identified as finger touch
Blue	Smaller positive signals, usually caused by environmental noise
White	Normal signal and No touch
Magenta	Smaller negative signals, usually caused by environmental noise
Red	Larger negative signals, possibly caused by water, etc.

The 3D module supports several hotkey listed in the table below.

Colors	Actions
top	5 degree X axis counterclockwise rotation
down	5 degree X axis clockwise rotation

left	5 degree Y axis counterclockwise rotation				
right	5 degree Y axis clockwise rotation				
+	Zoom in				
-	Zoom out				
O	Restore to default angle: 225 degree X axis counterclockwise rotation, 270 degree Z axis clockwise rotation				
B	Reinitialize the base signal				
C	<p>Change displayed mode.</p> <div style="border: 1px solid green; padding: 5px;"> <p>Mode</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Mode 1</td> <td style="width: 50%; padding: 5px;">  </td> </tr> <tr> <td style="width: 50%; padding: 5px;">Mode 2</td> <td style="width: 50%; padding: 5px;">  </td> </tr> </table> </div>	Mode 1		Mode 2	
Mode 1					
Mode 2					

2.4 System Reference (SR)

The “System Reference” is supported in most P2-06 and P2-08 device firmware, which is essential when using firmware water handling features (WD / WP). Without SR built, environmental changes could cause unexpected behaviors.

If the “System Reference” button is greyed out, it means that the device firmware does not support system reference.

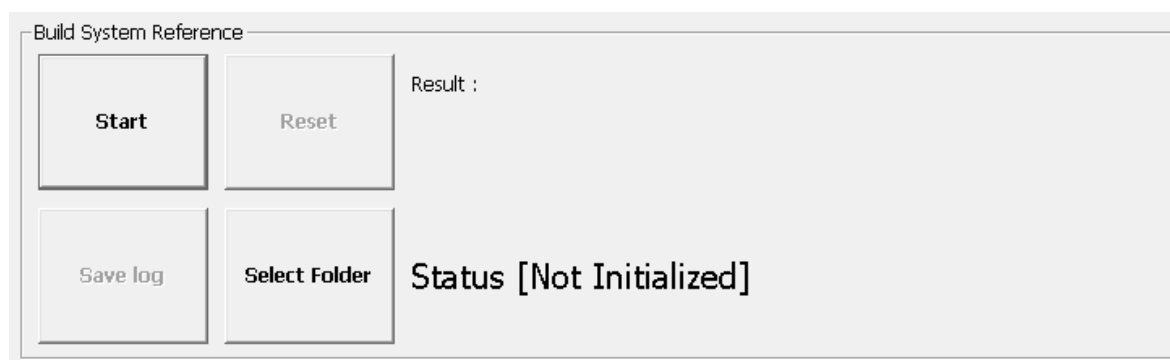


FIGURE 27

2.4.1 Checking Status

The utility shows the current status on screen, and can be one of the following:

Status	Description
Active	The system reference is built and in use
Not Initialized	The device does not have a valid system reference. Please press start to rebuild it.

In the following cases, the utility will check the reference status and prompt rebuild a new set of reference data.

- A new touch controller is connected.
- Firmware update is performed.
- The setting of touch panel size or cover lens thickness has changed.

2.4.2 Rebuild the System Reference

Before proceeding to rebuilding the system reference, please check the following:

1. The touch panel is connected to control board properly.
2. The touch screen surface is clean, and free of objects such as water, hands, fingers, etc...

3. The build environment is noise free (check using 3D module).
4. Check the LCD type, and specify a proper background color in PCIUtility.ini file, which will be used during construction.

```
[Build System Reference]
Background=0
```

Background	Displayed Mode
0	White background
1	Black background

The rebuild process should take a few seconds after pressing the “Start” button, please wait until the progress bar proceeds to 100%.

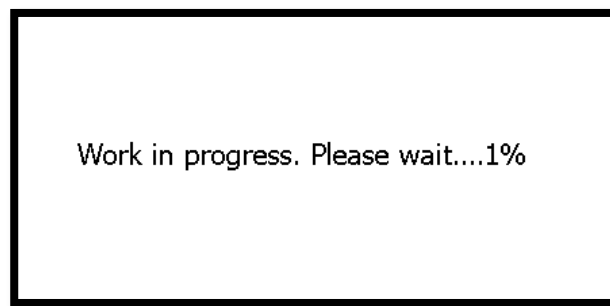


FIGURE 28

If the touch panel is not connected properly, or having environmental interference, the utility will display a warning message after build completes. User must confirm whether to accept the build result by pressing the Yes or No button.

Environmental interference. Build anyway ?



FIGURE 29

PCIMset will display a “FAIL” message if user presses the “No” button, and utility will roll back to previous settings.

2.4.3 Options

There are two options that user can adjust:

- Select Folder

Select the destination folder that log file will be saved to.

- Auto Save Log

With this option checked, the “Save File” dialog will automatically appear after the SR construction operation finishes.

- Switch on the System Reference Dialog Box

When this option is checked, the PCIMset will notify user for SR construction when it detects that SR is not initialized.

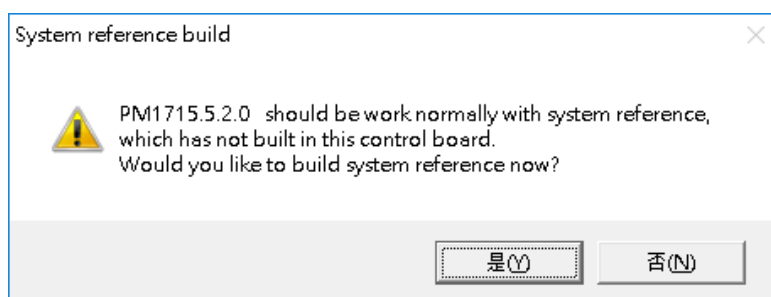


FIGURE 30

3. Quick Select

This panel includes convenient way for switch between different operation modes.

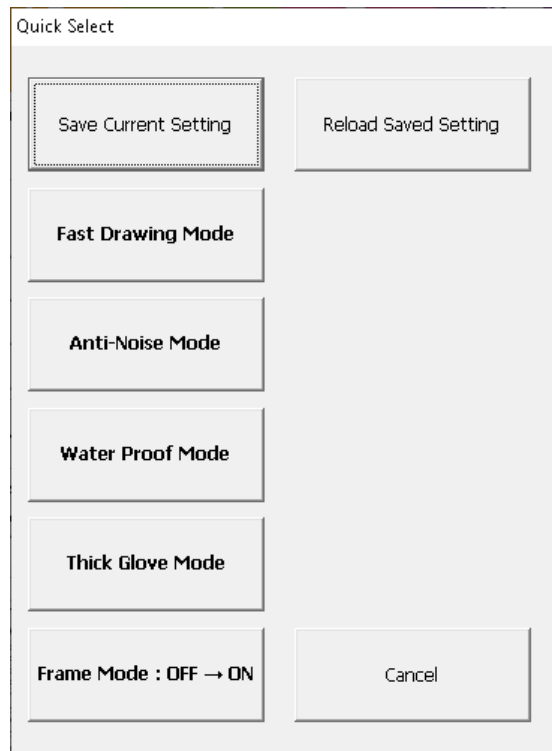


FIGURE 31

The “Save Current Setting” and “Reload Saved Setting” are basically the same as the “Import Parameters” and “Export Parameters” feature in the Parameters Panel.

The supports modes are listed below:

Mode	Feature	Side Effect
Fast Drawing Mode	Allow smooth drawing	Environmental noise will have greater impact.
Anti-Noise Mode	Maintain normal touch operation in environments with high noise.	Lesser sampling rate.
Water Proof Mode	Prevents abnormal touches caused by water.	Lesser sampling rate.
Thick Glove Mode	Allow touch operation with thick gloves	Environmental noise will have greater impact.

The following chart compares the major parameter differences between each mode when using device firmware V6.3 or later versions.

Modes		Standard	Fast Drawing	Anti-Noise	Water Proof	Thick Glove
Sensitivity		0	0	0	0	+3
Water Handling		OFF	OFF	OFF	Water Performance	OFF
Palm Rejection		ON	OFF	ON	ON	OFF
Anti-Noise	Spike Filter	Normal	Lite	Enhanced	Normal	Normal
	Enhanced Driving	OFF	OFF	ON	OFF	ON
	Double ADC Average	OFF	OFF	ON	OFF	OFF
	Frequency Hopping	Normal	Lite	Enhanced	Normal	Normal
Max Contact Number		Default	Default	Default	1	Default

3.1 Frame Mode

When touch panels are mounted on LCD with thicker frame design, it would not be easy for a finger to touch the UI elements near the edge.

For firmware V6.3 and later, switch to frame mode enables the “Thick Frame Bezel” parameter.

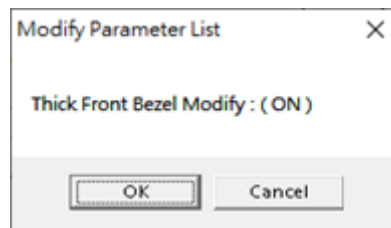


FIGURE 32

For firmware V6.2 or earlier, switch to frame mode adjust the sensor / driver lines used by device firmware to work with thicker frames.

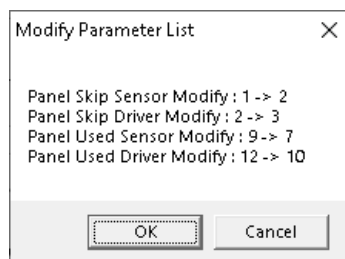


FIGURE 33

The definitions of Skip Sensor, Skip Driver, Used Sensor, and Used Driver are defined as below.

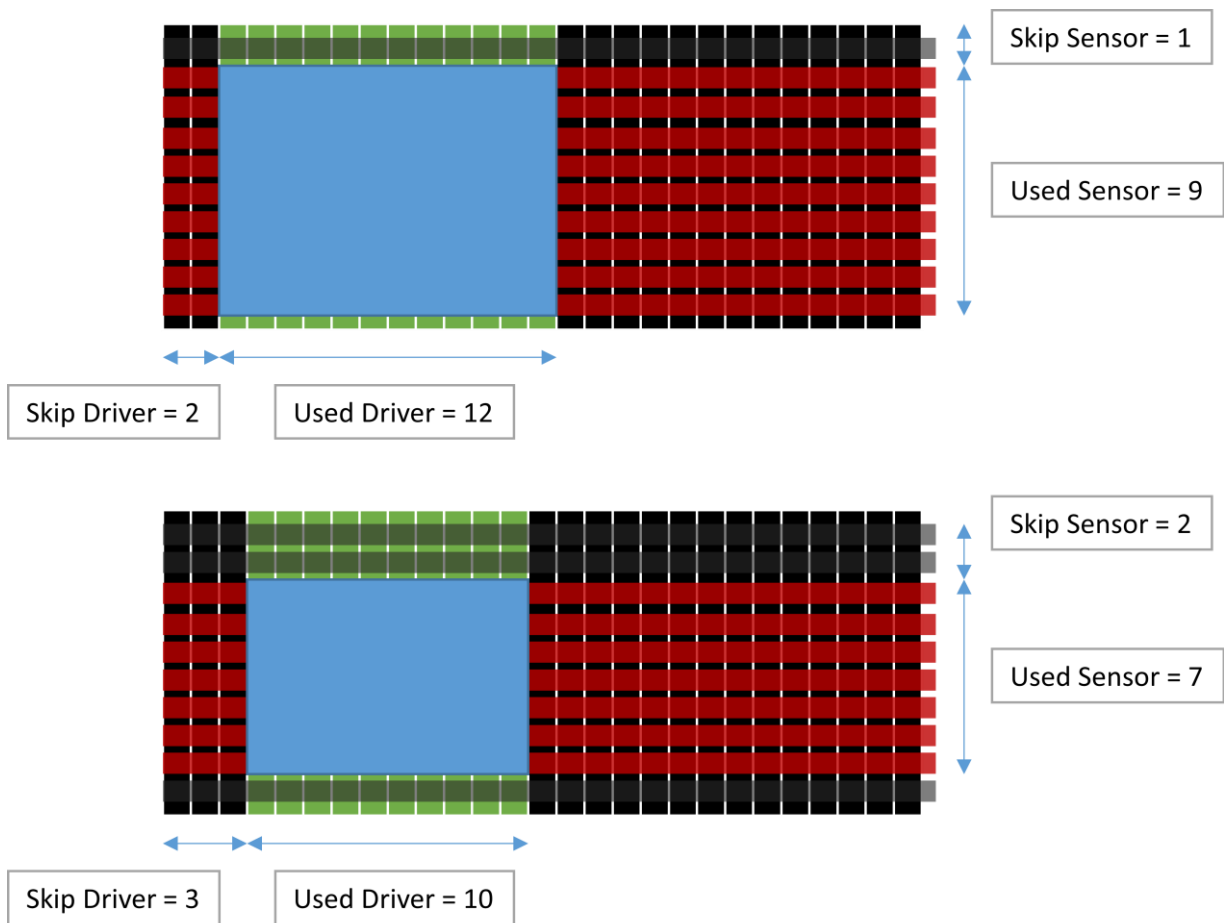


FIGURE 34

Please notice that click button several times might significantly decrease accuracy. To revert settings, please use the “Write Factory Default Parameter” button or do firmware update again.

4. Parameters

Parameters provide an interface to flexibly fine tune PenMount firmware settings.



FIGURE 35

- The “Apply” Button
Applied all the parameter changes. Any unapplied change will be lost when closing the utility.
- The “Export Parameters” Button
Export the firmware parameter values into a text file with “.ini” extension.
- The “Import Parameters” Button
Import the firmware parameter values from a text file with “.ini” extension. Only parameter files for the same firmware version can be imported.
- The “Write Factory Default Parameters” Button
Reload the firmware parameters to factory default. However, the parameter of host interface and panel size will not be changed.

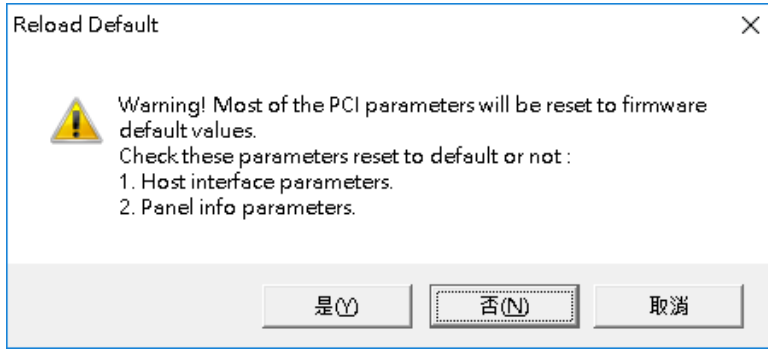


FIGURE 36

4.1 Main Features

The Parameters configuration interface includes the following features.

1. The Parameters Panel

Parameters are categorized into different tabs. For example, parameters related to anti-noise layout can be found in the “Ant-Noise” tab. When adjusting a parameter, its features and side effects are shown in the quick reference.

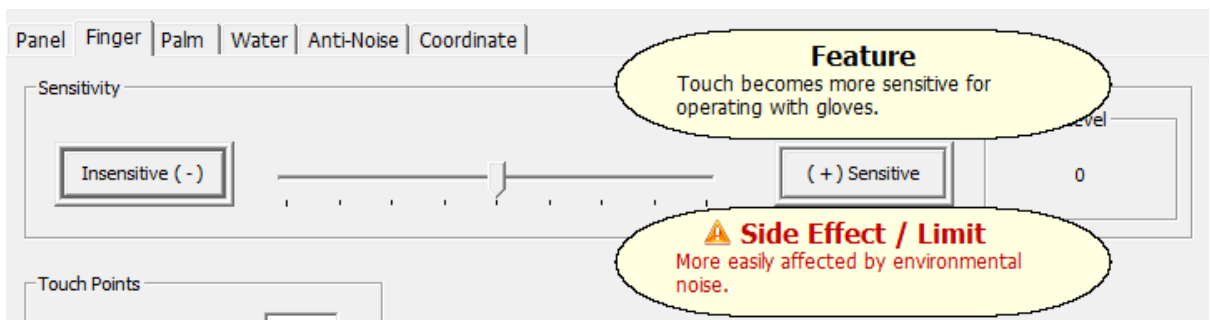


FIGURE 37

● Grayed out Options

Any parameter in gray is not adjustable. In the following example, “Change Interface” is not adjustable, because the firmware supports interface auto detection, so there is no need to manually assign the connection interface.



FIGURE 38

- Hidden Options

Any parameter that is not displayed also means that it is not adjustable. In the following example, when using older firmware versions such as PM1410 V2.1, the utility only displays “Panel”, “Finger”, “Water”, “Anti-Noise” and “Coordinate” tabs with a few adjustable options.

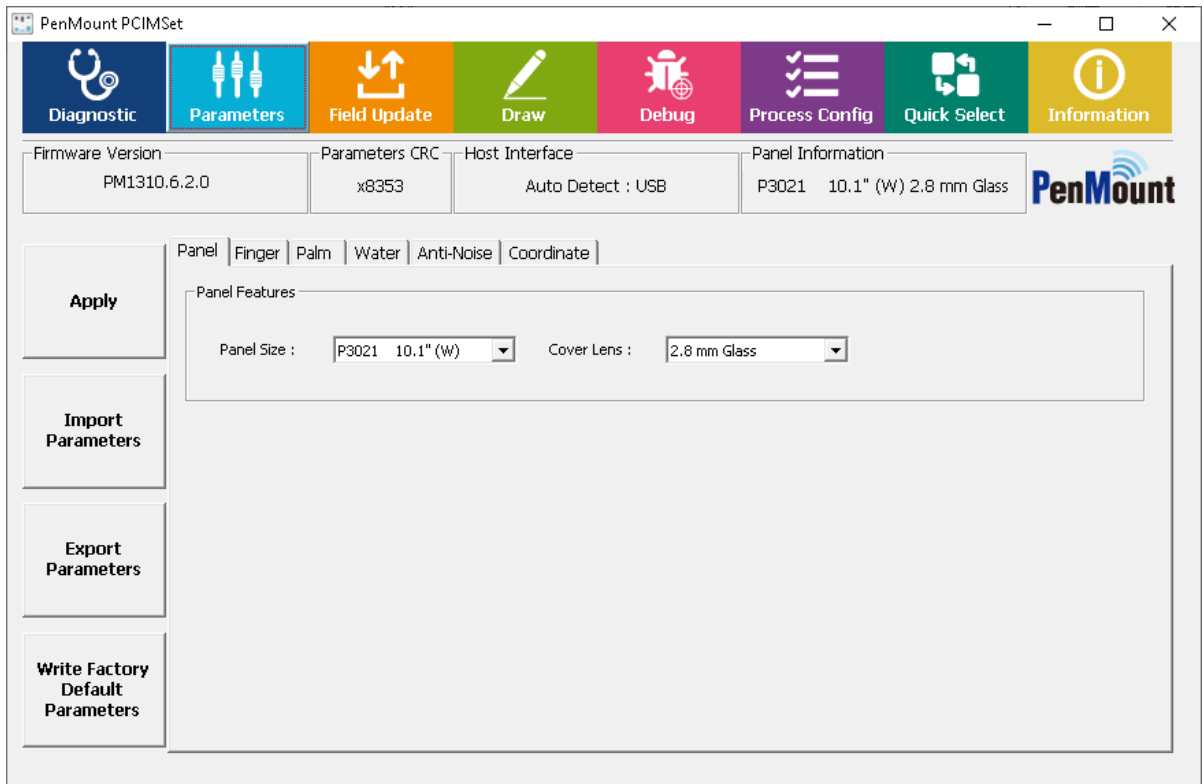


FIGURE 39

4.2 Interface Parameters

Users can change interface settings in the “Interface” tab.

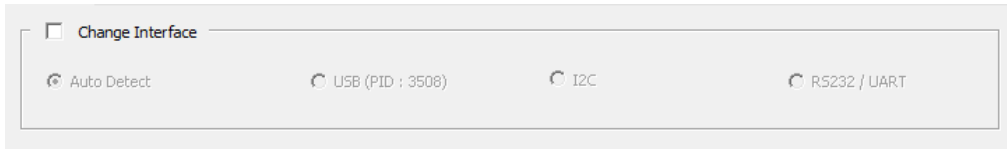


FIGURE 40

4.2.1 Change Interface

User can manually specify the connection interface when using PenMount COF products. For control boards, since the firmware can automatically detect connection interfaces, this field is not adjustable.

4.2.2 I2C Address

The slave address default as 0x38 when using I²C connection.

4.2.3 Baud Rate

The transfer baud rate is used for UART/RS-232 connection.

For compatibility with PenMount device drivers, meanwhile PCIMset does not allow changing baud rate.

4.3 Panel Parameters

The panel tab allows users to specify the desired panel size, either from a preset or from manually setting up the skipped driver / sensor pins.

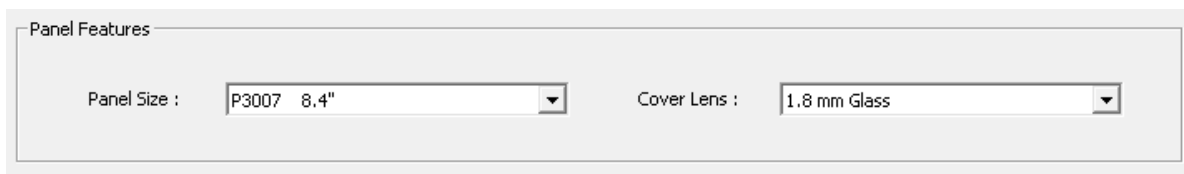


FIGURE 41

4.3.1 Choosing from a Preset

Standard PenMount firmware versions support a number of panel sizes and cover lens thicknesses. By selecting a preset, firmware will apply different configurations to parameters.

1. Panel Size

Each PenMount firmware supports several panel size presets. For example, choosing the 'P3030 12.1" (W)' will setup firmware parameters to support the AMT P3030 12.1-inch touch panel.

2. Cover Lens

Each PenMount firmware supports several cover lens thickness parameters, with the following standard thicknesses: 1.1mm, 1.8mm, 2.8mm, and 4.0mm. Please choose the nearest thickness from the list that most closely matches your cover lens.

4.4 Finger Parameters

The parameters in this tab are for tuning finger detection.

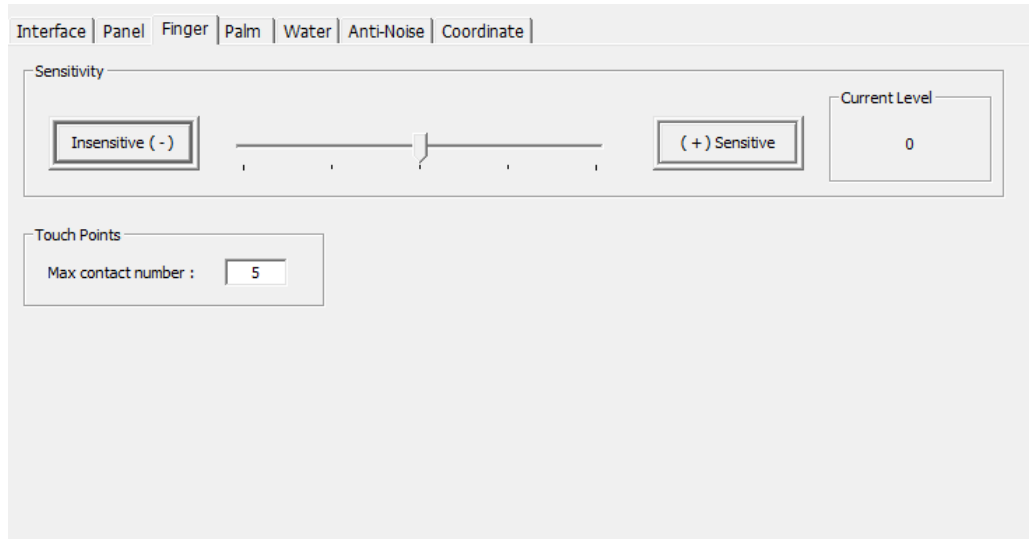


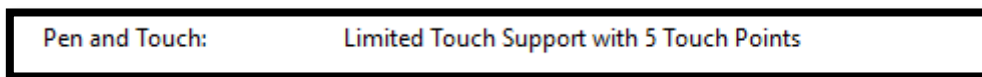
FIGURE 42

4.4.1 Sensitivity

Touch sensitivity can be adjusted with a slider. User can either use the slider or press the “Insensitive” and “Sensitive” buttons. By default, sensitivity level is 0, setting to positive values increases sensitivity and setting to negative values decreases sensitivity.

4.4.2 Touch Points

The maximum contact number limits how the number touch contacts reported to the system. For example, if the value is 1, the device supports single touch only, and other touch signals will not be sent to the system. This value will also be displayed in the Windows “System” Control Panel item.



For standard PenMount firmware, this value is adjustable. But the maximum value range is still limited by the firmware default. For example, if the firmware can support a maximum of 5 contacts, users cannot set this value to 10.

4.5 Palm Parameters

If the PenMount firmware supports palm rejection, there will be a “Palm” tab in the PCI Parameter utility. Palm rejection is used to detect and ignore large contact areas.



FIGURE 43

4.5.1 Palm Rejection

This is the overall switch for the firmware palm rejection feature. When this is turned OFF, all other palm features will be grayed out and a palm on the touch panel will be scanned and reported as touch event.

4.6 Water Handling

The water handling feature includes choosing between different modes and tweaking parameters to compromise between performance and reliability.

4.6.1 Choosing a Water Handling Solution

The PenMount firmware supports two different water handling modes: Water Detection (WD), and Water Performance (WP).

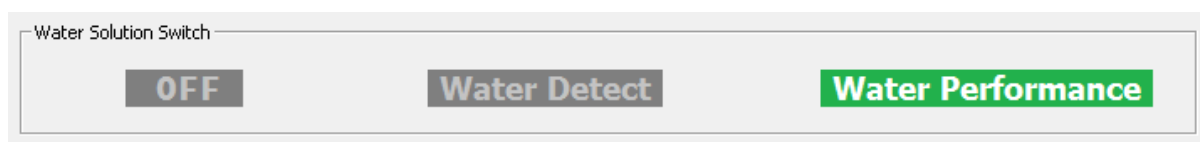


FIGURE 44

Users must choose one of the supported modes, or “OFF”, if water handling is not the main concern.

Modes	Water Handling
Water Detection Mode	Stop reporting all touch data
Water Performance Mode	Supports touch in dry area, lock to single touch if water can cause false

	touch points
--	--------------

Please notice that when choosing WD or WP, building system reference is required to prevent unexpected behaviors during environmental changes.

4.7 Anti-Noise Parameters

In anti-noise parameter tab, users can Configure the “Low pass filter” and switch “Enhanced Driving” to decrease the impact of noise.

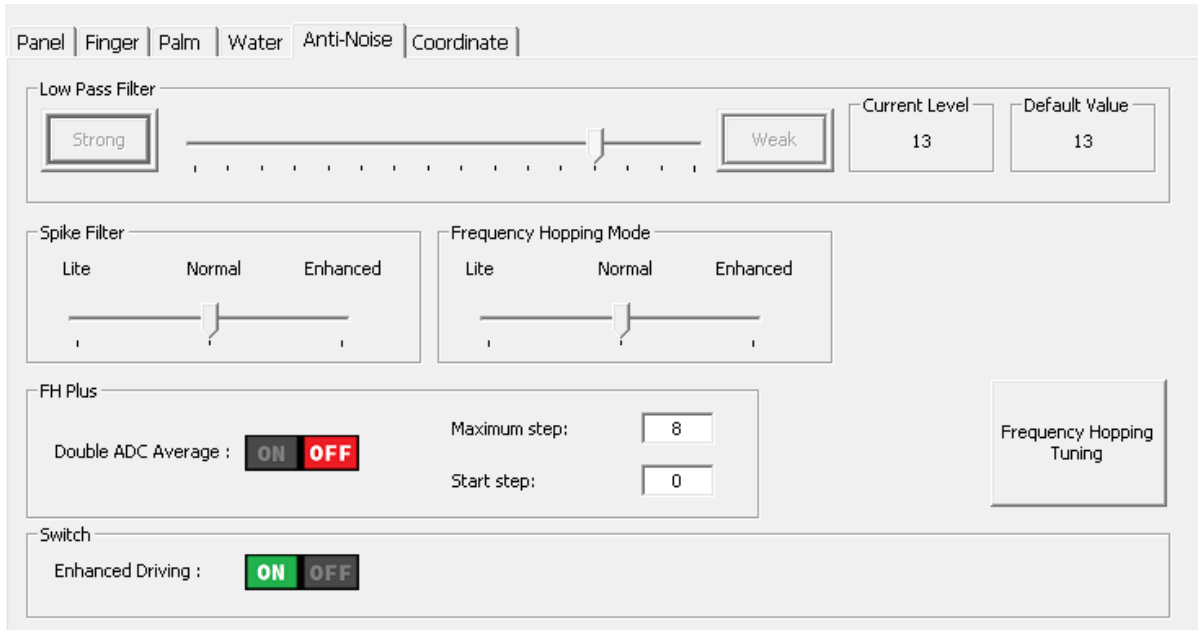


FIGURE 45

4.7.1 Configure Spike Noise Filtering

The PenMount firmware may use one of the following noise filtering methods:

Firmware Support	Spike Filter Settings		
	Lite	Normal	Enhanced
V6.2 and later	V	V	V
V6.1 and later	V		V
V1.0 and later	V		

Both methods are designed for eliminating the influence of noise jitter, and “Spike Filter” can give better result when dealing with ESD.

The “Low Pass Filter” setting will only be effective if “Spike Filter” is switched to “Lite” mode. Choosing a stronger value of “Low Pass Filter” will cause slower signal changes. The lower filter value can affect the base update time in KBU (keep base update) mode, so it needs to be fine-tuned for the best result.

Low Pass Filter	Keep Base Update Speed
-----------------	------------------------

Weak	Fast
Strong	Slow

4.7.2 Enhanced Driving

Enable enhanced driving for noisy environments, thicker cover glass, or glove touch to achieve better SNR and finger resolution at the expense of accuracy on the edge.

4.7.3 Configuring Frequency Hopping

The frequency hopping is most important for anti-noise.

4.7.3.1 Frequency Hopping Mode

The Frequency Hopping Modes Options provide user to leverage between touch performance and anti-noise.

Firmware Support	Lite(0)	Normal (1)	Enhanced (2)
V6.2 and later	V	V	V
V6.1 and later		V	V
V1.0 and later		V	

4.7.3.2 Advanced Frequency Hopping Options

Firmware V6.3 further supports some advanced frequency hopping features such as the Double ADC Average. This is another Feature that supports pulse type noise suppression.

4.7.3.3 Frequency Hopping Tuning

Choosing a good value for the touch firmware’s drive wait parameter can greatly improve touch stability, especially when other anti-noise parameters are turned OFF for fast drawing. The “Frequency Hopping Tuning” can help evaluate a good value for the “Drive Wait” parameter after a series of data collecting. Will ask for user input during the evaluation.

The utility will prompt for the following options before proceeding the evaluation process. Using the default values are good for most cases.

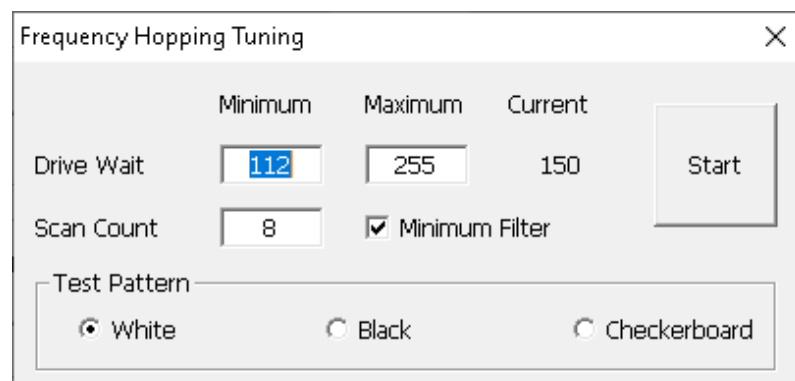


Figure 46

A. Options

- **Current Drive Wait**
The current drive wait parameter value used by touch firmware.
- **Minimum / Maximum Drive Wait**
The range of “Drive Wait” parameter values to be evaluated.
- **Scan Count**
Controls the accuracy for “Drive Wait” evaluation.
- **Minimum Filter**
If this option is checked, the utility will automatically hide drive wait evaluation results that could make touch scanning unstable under certain circumstances, therefore the candidate values will be fewer.
- **Test Pattern**
Provide different background patterns during testing. The checkboard pattern shall be the strictest test environment, however, if no candidate found, please use white or black test pattern depending on the type of LCD.

B. Procedures

- After pressing “Start”, the utility enters the data collection phase. Please follow the instructions on screen to touch and release finger.

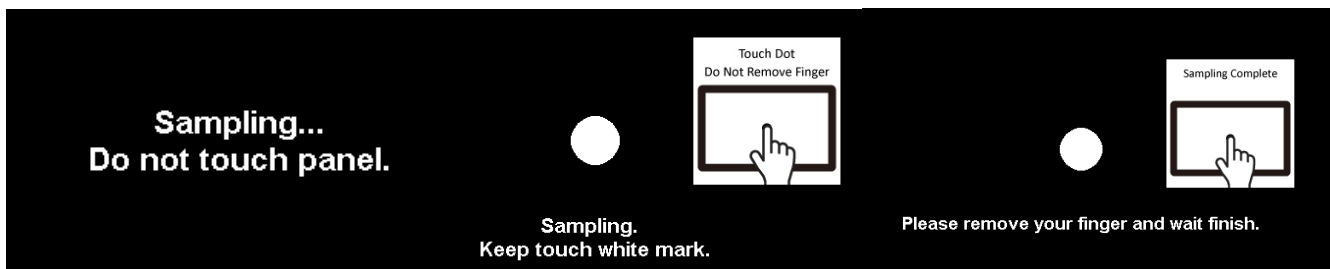


Figure 47

- After evaluation finishes, the utility will automatically select one of the candidate drives wait values as the new parameter. The evaluation result is marked with different colors.

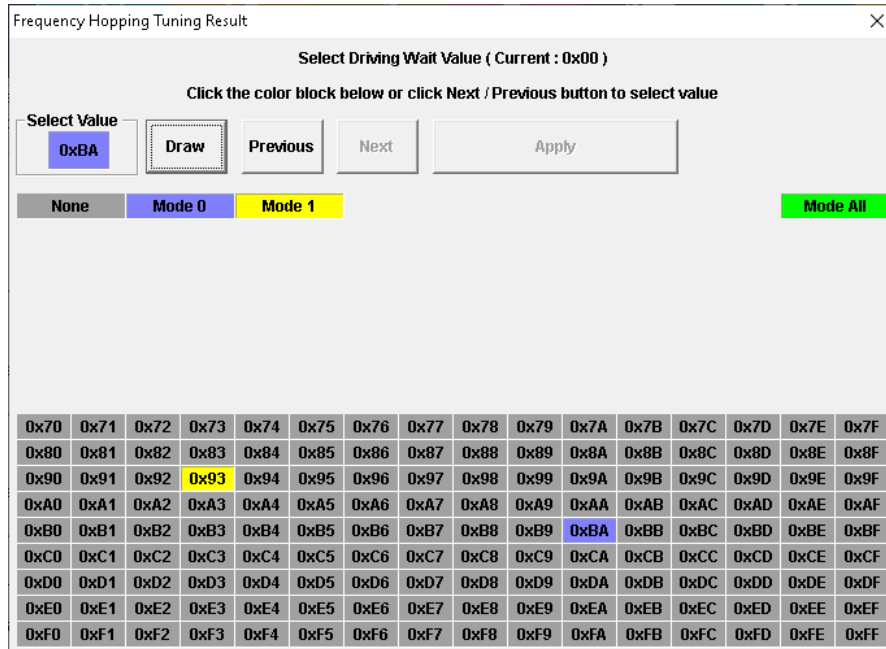


Figure 48

Cell Color	Description	Candidate
Green	Drive Wait value good for all FH modes	YES
Blue	Drive Wait value good for FH mode 0	YES
Yellow	Drive Wait value good for FH mode 1	YES
Grey	Drive Wait value not good for all FH modes	NO

- Draw Button: Test touch function with selected driving wait parameter candidate.
- Previous / Next Button: Use to navigate between different driving wait candidates.
- Apply Button: After Draw button is pressed, and test result meets requirement, use this button to apply new settings.
- X Button: To abort the evaluation process.

4.8 Coordinate Parameters

After the PenMount firmware applies low pass, smoothing, and other filters to the sensed touch data, it will proceed to the final step according to the parameters in the “coordinate” tab to map data to the user specified display size, before sending them to the system.

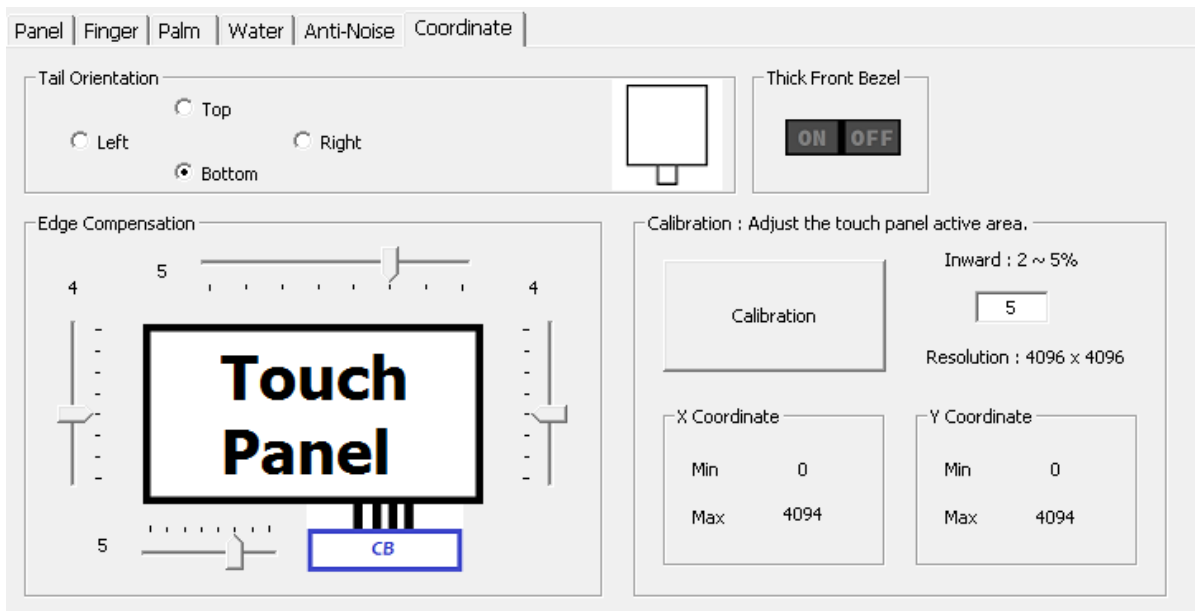


FIGURE 49

4.8.1 Calibration

Although the term “calibration” for some PCAP devices means calibrate the “base signal” for the current environment, for PenMount it means calibrate the coordinates of the touch area to match the user defined region.

By default, the PenMount firmware maps the whole touch panel active area to the display, meaning when touching the top left corner, it sends (0,0) as its position, and sends (RES_X, RES_Y) for the lower right corner.

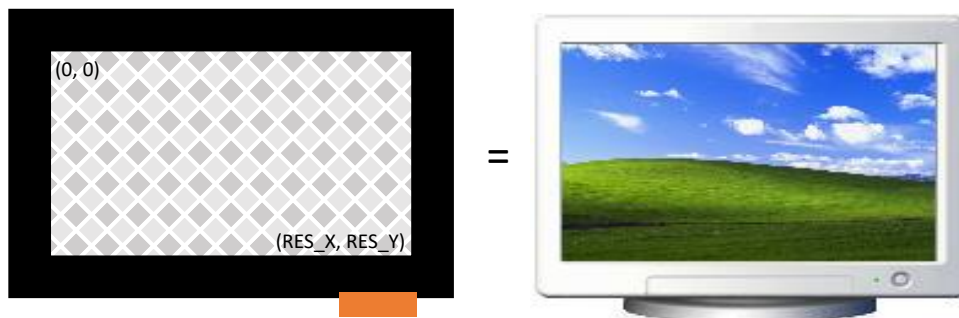


FIGURE 50

There are two common cases that need calibration:

- (1) When Touch panel is larger than the LCD

On systems that use touch panels larger than the actual display size, the display will be mapped to the part of the touch panel from (min_x, min_y) to (max_x, max_y).

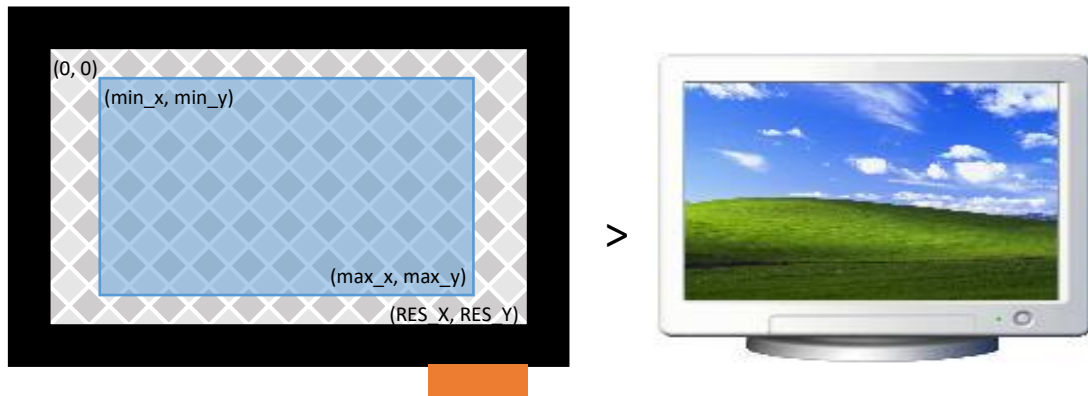


FIGURE 51

(2) When Using Front Bezel

On systems with displays designed with a front bezel, it can be harder for fingers to reach the edges. The touch position reported by firmware is near the center of a finger, and in the following diagram, it's represented by min "min_x".

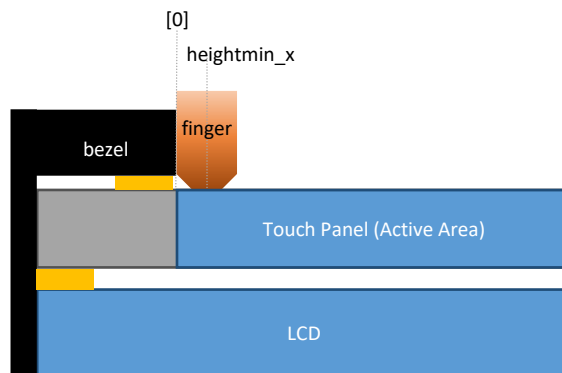


FIGURE 52

Calibration can be completed by:

- (1) Manually setting up the minimum and maximum values for the X and Y axes.

The values should be calculated and converted to a 0 to DIP_RESO_X and DIP_RESO_Y³ range.

- (2) Pressing the "Calibration" button to launch the helper UI.

4.8.1.1 Data Collection Stage

Please follow the instructions on screen by pressing the two red squares in top-left and bottom-right corner. The program will calculate the minimum and maximum values for the X and Y axes when finished.

³ The "DIP_RESO_X" and "DIP_RESO_Y" value can be 4095 when using firmware V6.1 USB interface, or 2047 for any other case.

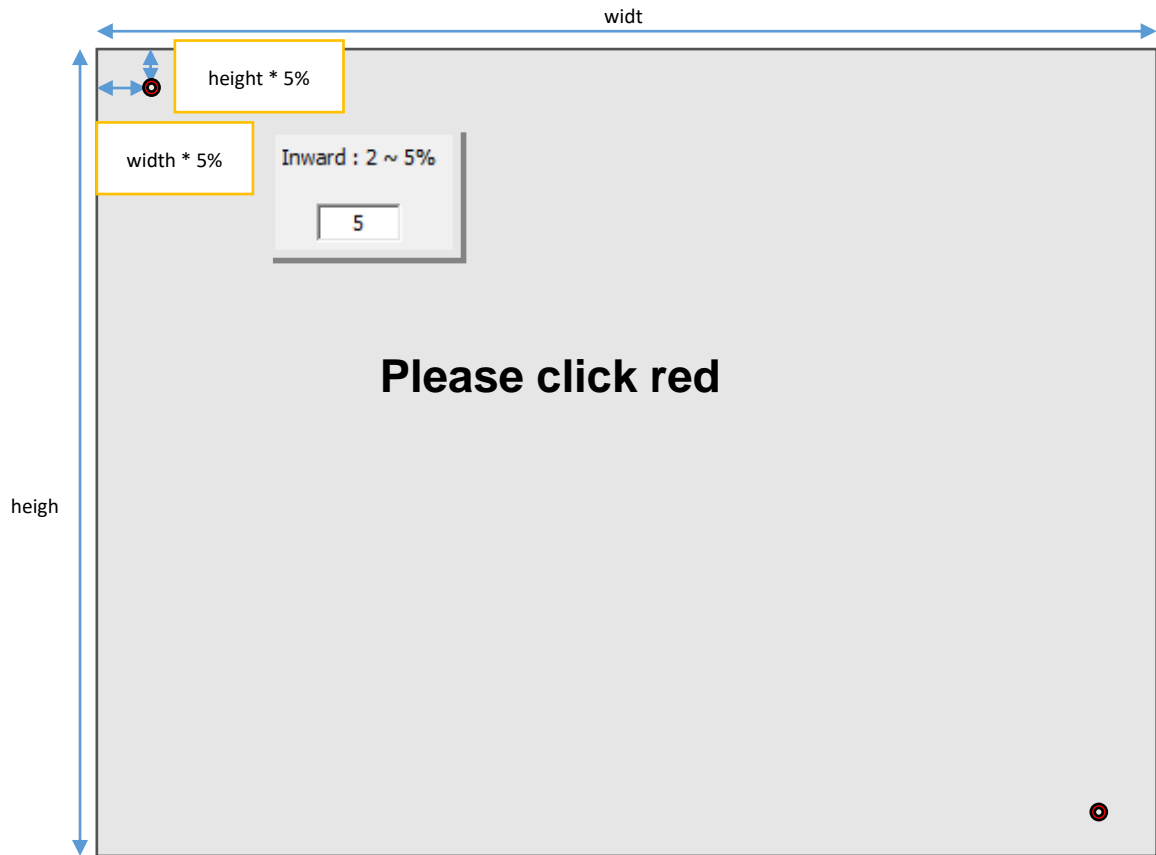


FIGURE 53

The “inward” setting helps users touch the red square easier, especially when performing calibration on a LCD with front bezels.

4.8.1.2 Test Stage

If the test fails, the program will prompt for another confirmation and users can still choose to apply the calibration result by pressing the “yes” button on screen.

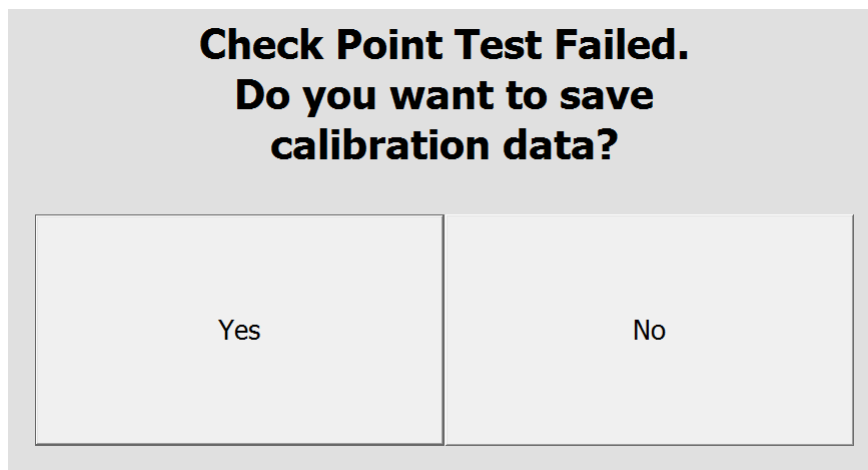


FIGURE 54

4.8.2 Edge Compensation

When the PenMount controller is released from the factory, the firmware’s default active area setting for the LCD monitor corresponds to that of the touch panel and the active area sizes of hardware and software are the same. However, due to resolution, the active areas for hardware and software can be slightly different. To adjust this, please click “Edge Compensation”.

When the edges of the touch panels do not function smoothly, please set the edge compensation value higher to improve functionality.

4.8.3 Tail Orientation

The firmware supports four rotational degrees compared to tail orientation.



FIGURE 55

4.8.4 Edge Adjustment

5. Field Update

The field update page allows user to change controller firmware version.

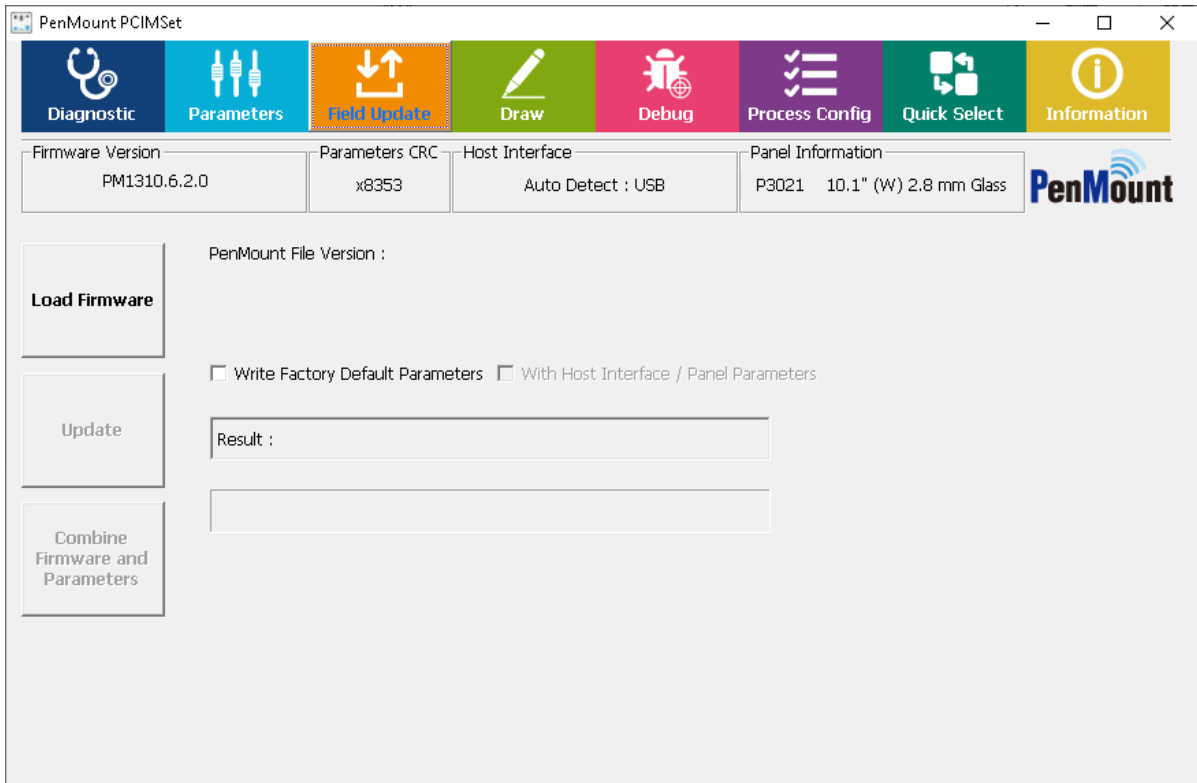


FIGURE 56

5.1 Load Firmware File

Please press “Load Firmware” under “Field Update” and click the file you want to update in the dialogue box.

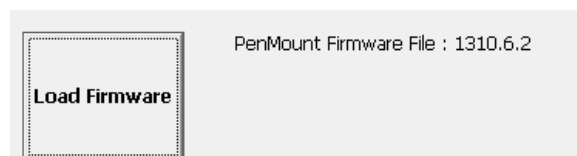


FIGURE 57

The format of the firmware supported by PenMount is suitable for

- (1) “pmf”, “pnf”, or “pxf” format for one single IC
- (2) “pmc”, “pnc”, or “pxc” format for multiple ICs.
- (3) “pfp” format for combination of firmware and parameters.

The pfp file format that includes virtual button settings are also supported in this utility version, which may also display the CRC values of “Parameter”, “ND Base”, or “Virtual Key” when corresponding data is included in target file.

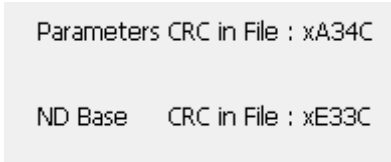


FIGURE 58

Please note, if the firmware file is not consistent with the controller connected during the update, the update will not proceed.

5.2 Update Firmware

After you load firmware files, please click “Update” button to proceed. There are two options available:

- Write Factory Default Parameters

This option is selected by default when updating with PMF or PMC file format. This option is not selectable when using PFP file format.

With this option set, firmware parameters will be reset to default values after update finishes. When only check this option, host interface / panel and other firmware parameters will remain unchanged.

- Write Host Interface / Panel Parameters

This option is only adjustable when “Write Factory Default Parameters” is turned ON. With this option set, host interface and panel parameters will also be reset to default values after update finishes.

During the update, all the button settings will be locked temporarily to prevent update failure due to inadvertent selection.

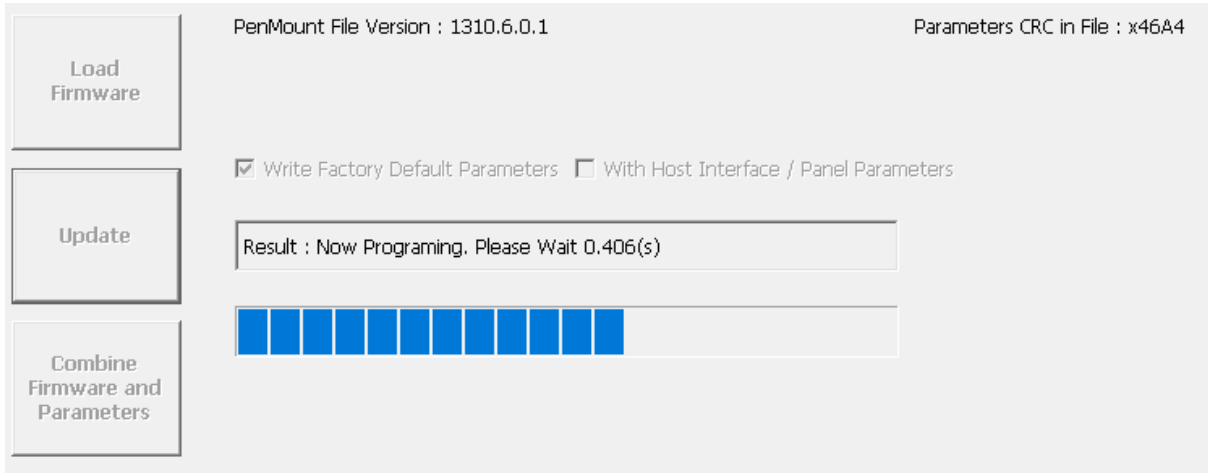


FIGURE 59

Please wait until update reaches 100%. During the update, please do not interrupt the power supply. After the firmware update is completed, you will see the “PASS” mark.

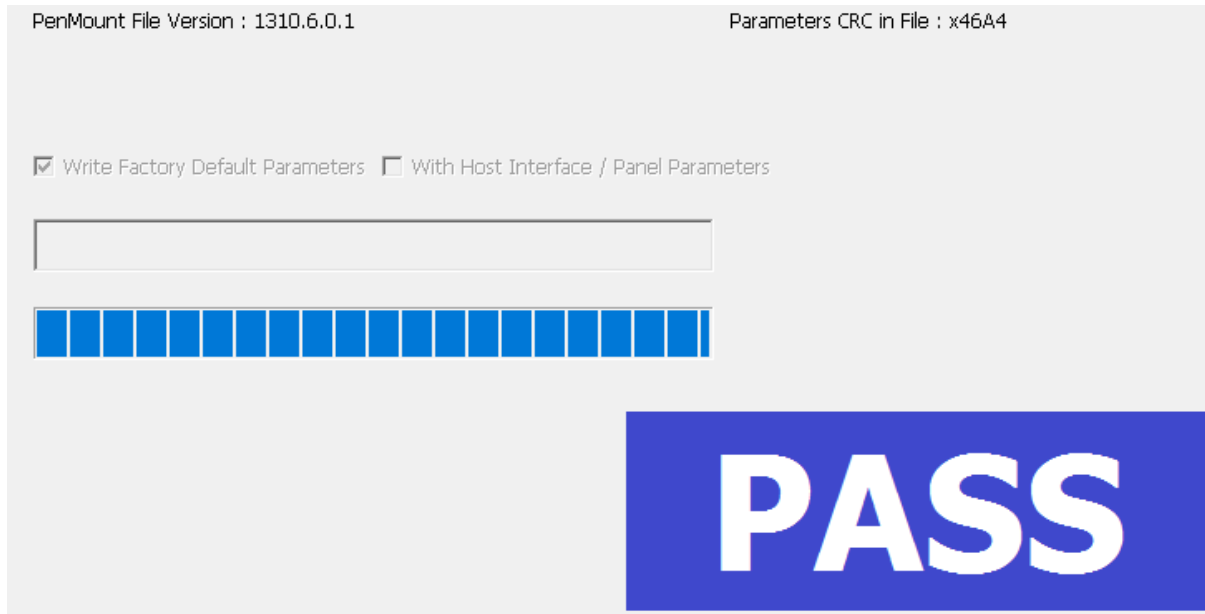


FIGURE 60

If the update fails due to an unavoidable factor, you will see the “FAIL” mark and the error messages.



FIGURE 61

If this happens, you will find firmware info remains in “Boot Loader” mode. You can click the “Update” button again to restart the update process.

5.3 Generate New PFP File

With PCIMset V1.6 and later, users can generate new PFP files with existing firmware files. The newly generated PFP file will contain all the parameter settings of the connected device.

Users should press “Load Firmware” to load the current firmware with correct controller and version, then press “Combine Firmware and Parameters” button will to combine the firmware and parameter file. If the loaded firmware is correct, PCIMset will pop up “Browser for Folder” dialog to allow saving the PFP file to the target folder.

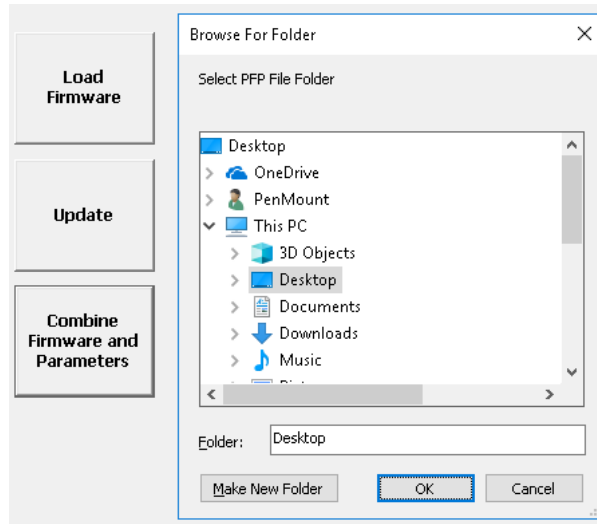


FIGURE 62

The newly generated PFP file will contain all the parameter settings of the connected device.

6. Draw

In Drawing mode, user can examine whether breaking or point hopping will occur when drawing lines and provides a mechanism for measuring sample rate.

Item	Description	
Operating systems	Windows XP and later versions	
Support Index1	1P	Black
	2P	Red
	3P	Green
	4P	Blue
	5P	Magenta
	6P	Cyan
	7P	Brown
	8P	Yellow
	9P	Purple
	10P	Orange
Switch to Draw Mode	"D" key	
Switch to Touch Mode	"T" key	
Sample Rate Test Hotkey	"S" key	
Clear Screen	"Space" key	
Toggle Full Screen	"F" key	

The program will show a white canvas in full screen mode, allowing the user to test the touch drawing feature. If you need advanced functions, please "Press and Hold" with your finger or click the right mouse button for the functions indicated below:

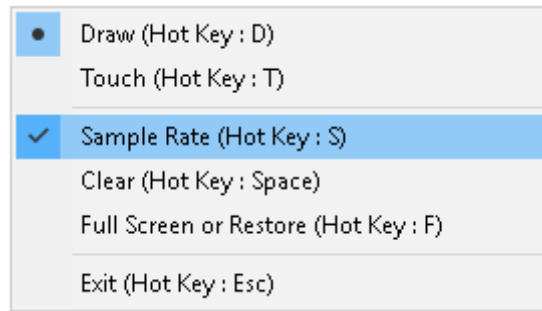


FIGURE 63

- Draw Mode

Switch to draw mode. In this mode, the program will label touch points in different colors.

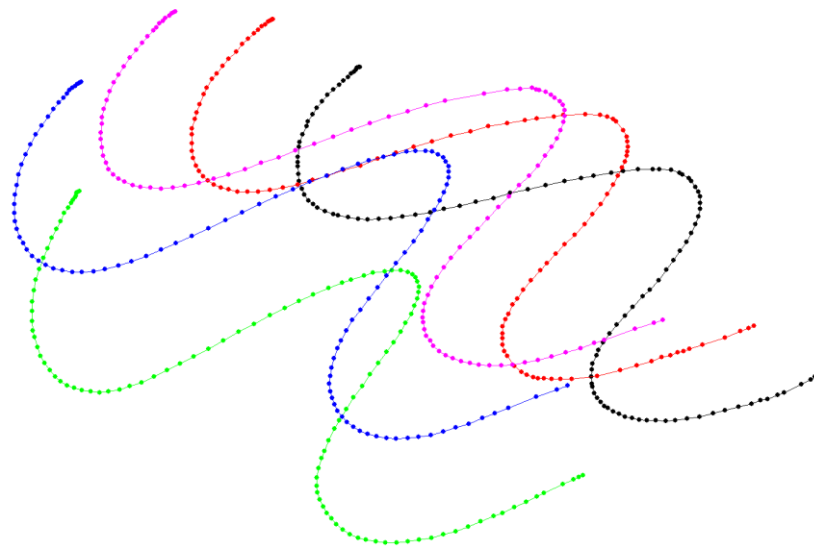


FIGURE 64

- Touch Mode

Switch to touch mode. In this mode, only the touch point location of your finger is shown.

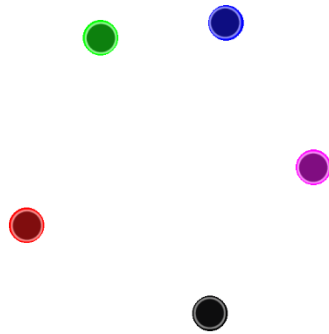


FIGURE 65

- Sample Rate

After touch input, it will take approximately one second for the program to calculate and show the Sample Rate of each touch point. For example, Point 0: 116 means 116 points per second. When the Sample Rate is higher, drawing will be more precise.

Point 0 : 109
 Point 1 : 109
 Point 2 : 109
 Point 3 : 109
 Point 4 : 109

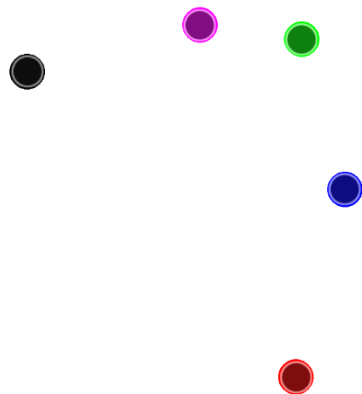


FIGURE 66

- Clear

Clean the canvas.

- Full Screen or Restore

Switch between full screen display and windowed display.

- Exit

Exit the program.

Note: After entering Draw mode, please do not connect or disconnect devices. Otherwise, touch will not function.

7. Debug

The debug panel provides several features for analysis of touch status and debugging touch issues.

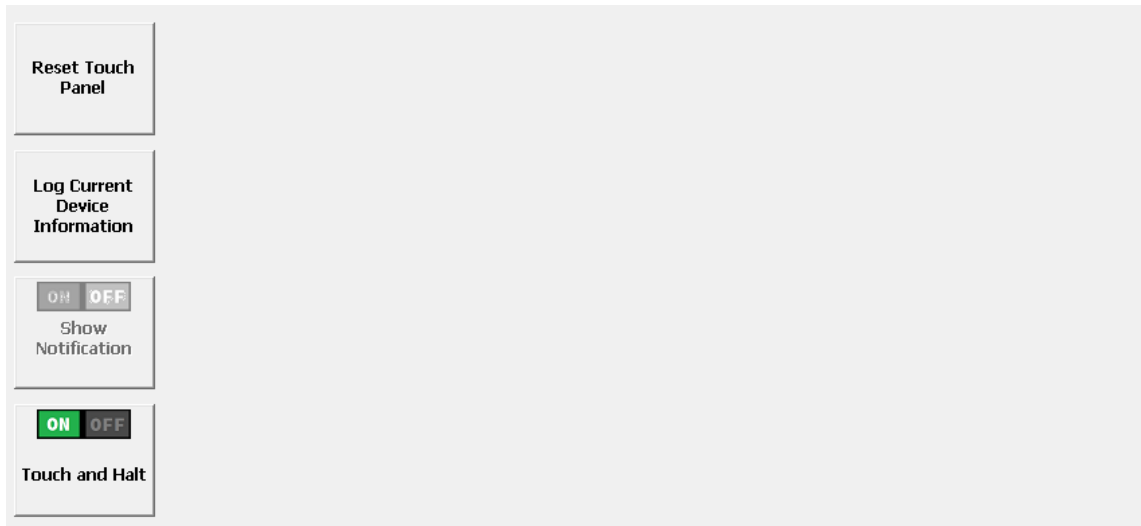


FIGURE 67

7.1 Reset Touch Panel

Choosing this option will force the PenMount touch device to be reinitialized. There will be a message box asking for user confirmation, please choose “Yes” to perform device reset and wait until the “Reset touch panel finish” message appears.

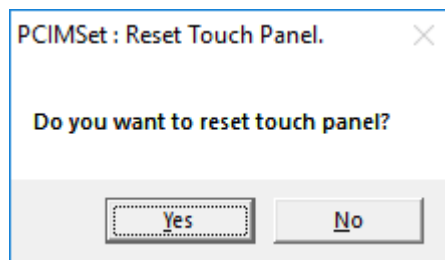


FIGURE 68

Reset touch panel may help resolve some touch malfunction issues when panel is affected by environmental changes such as temperature, water, or noise.

7.2 Log Current Device Information

Choosing this option will save firmware information to file which can be provided to the PenMount team for issue debugging. Due to the amount of information, the whole process could take several seconds.

As a practical condition, the human body and the system cannot share the same ground. The touch panel performs normally when it is isolated. However, the touch panel may be interfered with when a human touches the panel. This is because noise may come from a different ground.

This function can guide the user to obtain information step by step and save this information in the directory that the user specified.

When user starts the test, tap the black mark to start noise test.

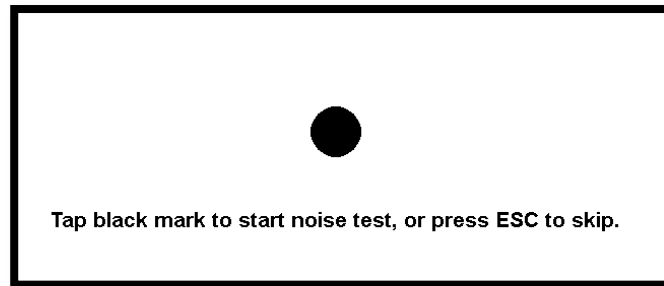


FIGURE 69

Then, do not touch panel while the firmware is sampling.

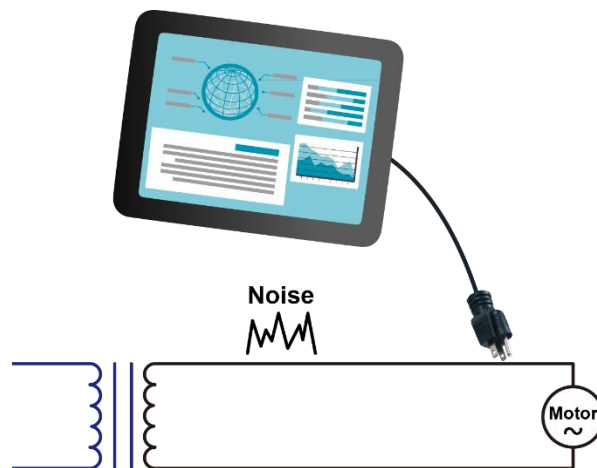
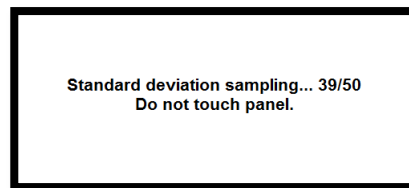


FIGURE 70

When the screen shows the black point, please keep touch it until the process is finished.

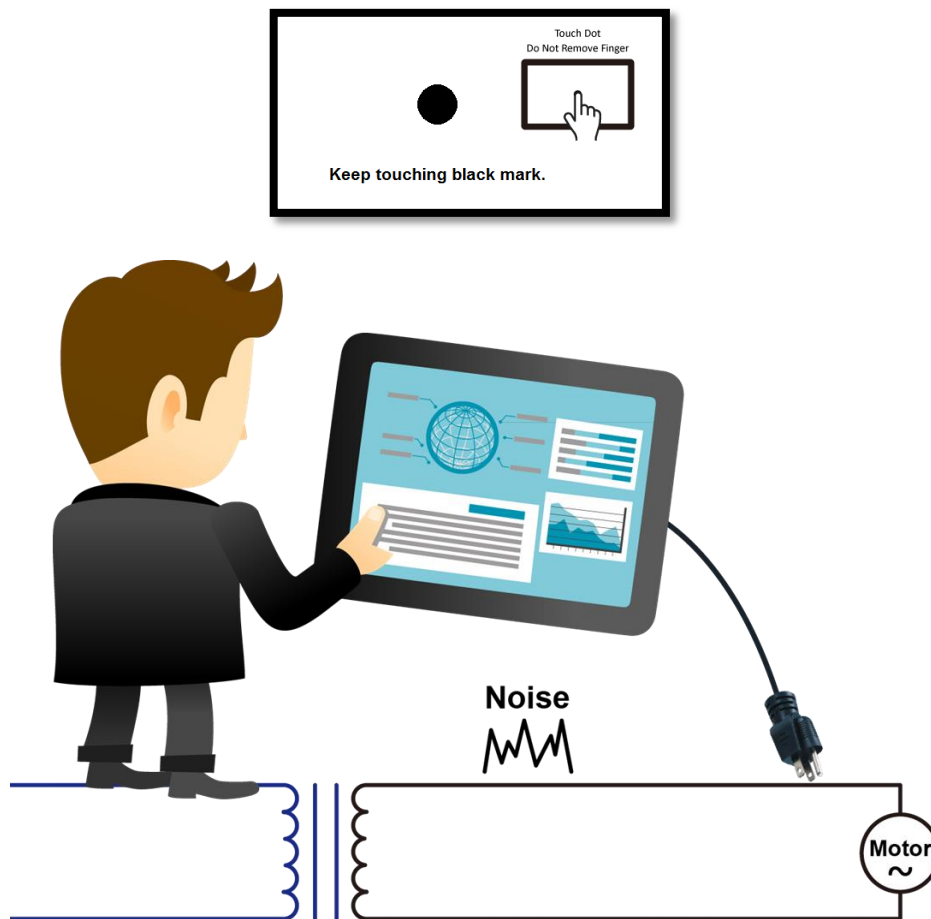
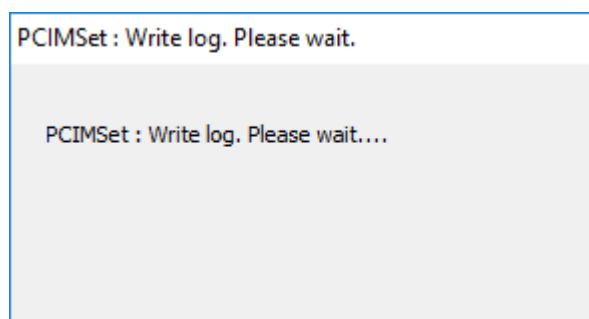


FIGURE 71

Finally, please wait for the "Write log finish" message to appear.



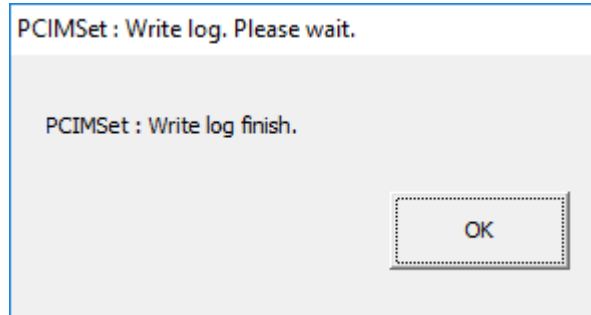


FIGURE 72

The file consists of the useful information for debugging touch issues.

7.3 Show Notifications for Water Detection

When firmware is using “Water Detection” mode, touch will be disabled when firmware detects water on touch panel surface.

Choosing the “Show Notification” option enables more conspicuous notifications when touch is disabled. The warning dialog box will disappear after several seconds.



FIGURE 73

7.4 Touch and Halt

The touch and halt feature is supported by PenMount firmware version later than 5.2.0, which is used for debugging touch issues. If this field is grayed-out, it means that the firmware does not support this feature.

When enabling, utility will ask user to choose a folder to store firmware information.

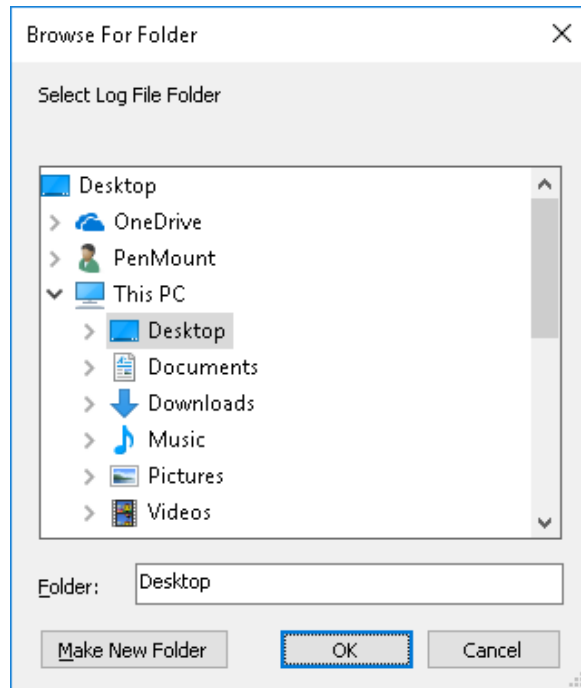


FIGURE 74

After enabling, each touch operation will trigger the firmware to cease scanning, and allow the utility to retrieve the most accurate information from device. This feature will be switched back to disabled state after utility finishes saving data.

8. Process Config

“Process Config” is the feature that allows generating process configuration files to be used in PenMount production line utility for processing the configured tasks.

This feature is accessible without PenMount device connected.

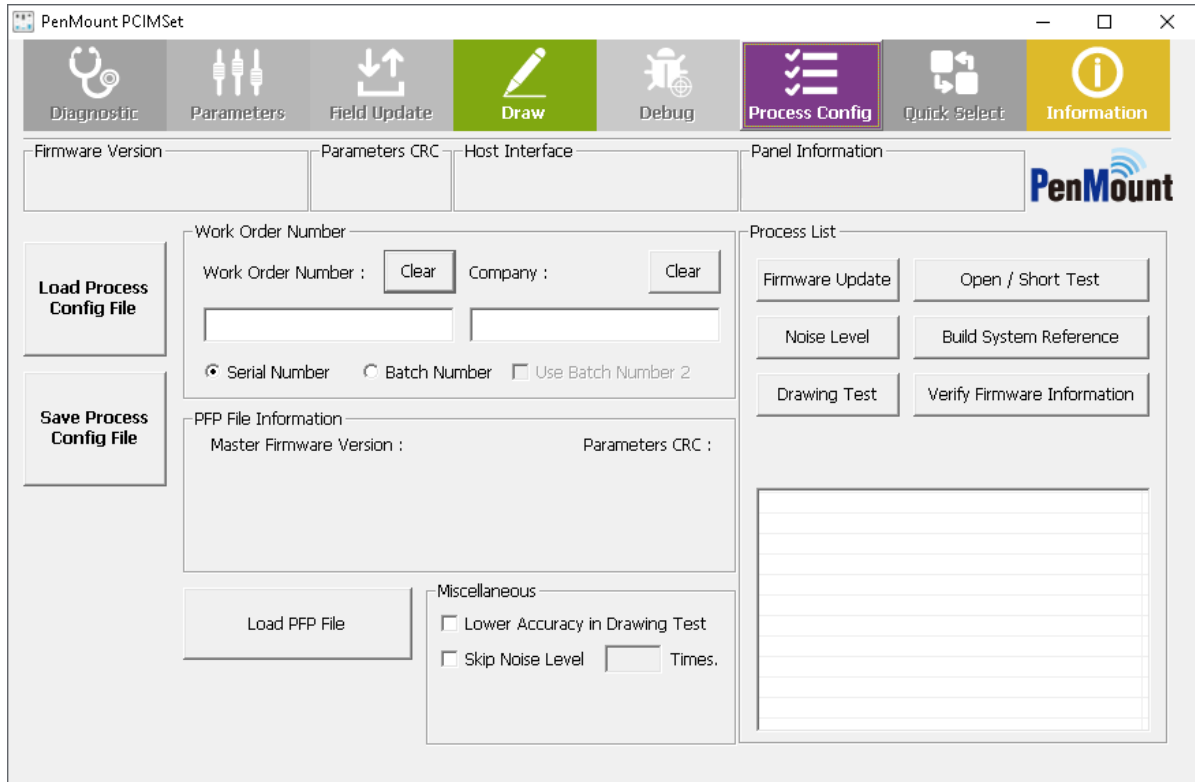


FIGURE 75

- **Load Process Config File**
Log the existed process configuration file to check detail or modify the setting.
- **Save Process Config File**
Save the current setting the in the process configuration file.
- **Load PFP File**
Load the PFP file to set up the process configuration file

8.1 Work Order Number

A “Process Config” file is a plan text file with INI extension. The following information is necessary to create a new file.

The work order number is defined by project or by company.

FIGURE 76

Choose the “Batch Number” or “Use Batch Number 2” option when output file is for batch test.

Choose the “Serial Number” option when output file is for individual test.

8.2 Load PFP File

Please provide a valid PFP file by using the “Load PFP File” button. After that, the information of the file will be displayed in utility.

FIGURE 77

8.3 Miscellaneous

Several options are available for tweaking the test flow.

- Lower Accuracy in Drawing Test

User can select drawing test to check if the PCAP can be draw smoothly. However, sometimes the user test without LCM and the accuracy may be affected. The user can switch on “Lower Accuracy Test in Drawing Test” to improve the production line efficiency.

The next two figures show the normal test area for drawing test, and the test area when the user can switch on “Lower Accuracy Test in Drawing Test”.

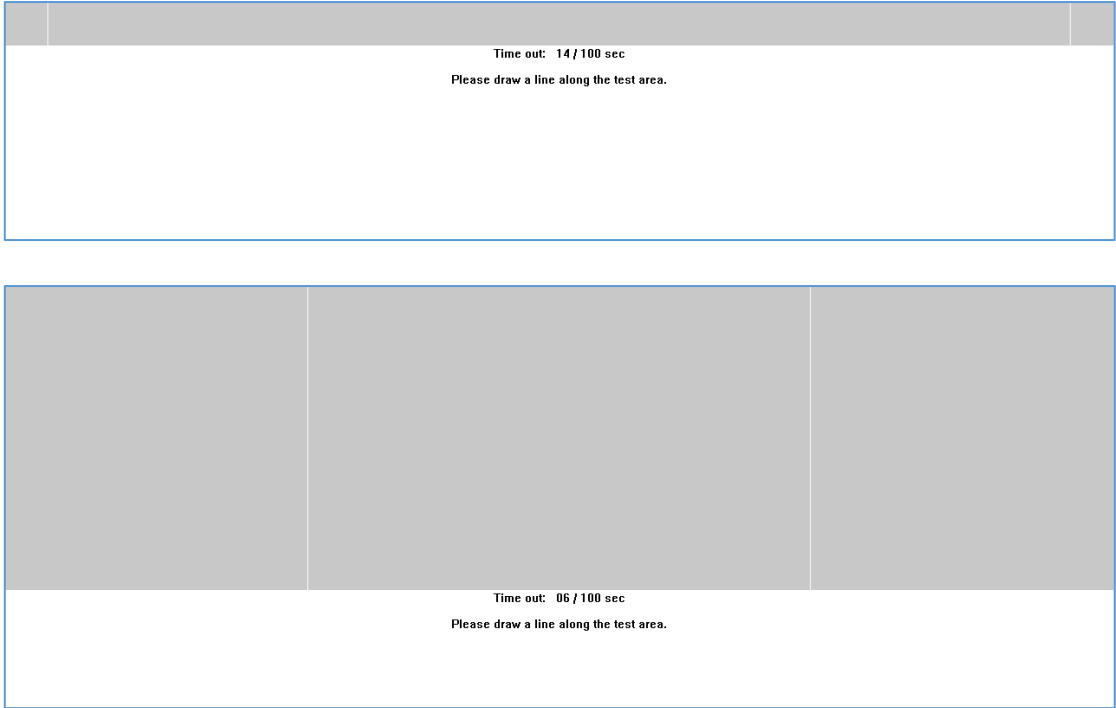


FIGURE 78

- Skip Noise Level N Times

Noise Level Test costs a lot of time. When performing batch tests for multiple control boards, it is not always necessary to do noise level test each run. In this case, user can specify the skip times in this field.

For example, if set up “Skip Noise Level 2 Times”, the test flow may become as below.

Test #	1	2	3	4	5	6	7
Do Noise Test	YES	SKIP	SKIP	YES	SKIP	SKIP	YES

8.4 Select Tests for Process List

Each button under the Process List group is represents a specific task. Please click on the desired button to add the task to Process List. To remove it, please click the button again.

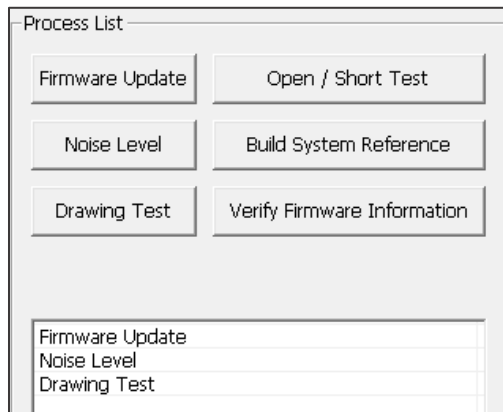


FIGURE 79

The process order is determined by the task selection sequence. In the example above, the selection order is “Firmware Update”, “Build System Reference”, and “Drawing Test”, and the PenMount production line utility will also follow this order to perform tasks.

Task	Description	Option
Firmware Update	Update firmware with the selected PFP file.	
Open / Short Test	Do open short test	
Noise Level	Do noise level test with pattern “WHITE”, “BLACK”, and “CHECKERBOARD”	
Build System Reference	Build system reference	
Drawing Test	Do instructed draw test to verify touch functionality and within acceptable accuracy.	Low Accuracy in Draw Test When this option is selected, “Draw Test” will allow much relaxed passing conditions.
Verify Firmware Information	To verify if the device firmware matches the selected PFP file.	