

# PENMOUNT PCIMSET USERS' GUIDE FOR MICROSOFT WINDOWS

Version 2.7.3

2019/11/06

## 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 © 2019 All rights reserved

## Revision Table

Date	Revision	Changes
<b>29/Aug/2017</b>	2.3	Initial release version.
<b>03/Jan/2018</b>	2.4	<ul style="list-style-type: none"> <li>(1) Added "Parameters CRC" to page display items</li> <li>(2) Added 1.4.4: Log UI Parameters Information Button under Information item, can read/write UI Parameter.</li> <li>(3) Added Auto Save Log Button to 2.1.3 Open Short Test function.</li> <li>(4) Added 2.4.3 Options, "Switch on the System Reference Dialog Box" and "Auto Save Log Button" selections to System Reference function.</li> <li>(5) Changed 3.1 Export / Import Parameters file format from PMP to INI format in the Parameters item.</li> <li>(6) 3.9.3 Orientation, corrected Orientation display method.</li> <li>(7) 4.2 Firmware Update item, added "Writer Factory Default Parameter" and "Write Host Interface/Panel Parameters" selections.</li> </ul>
<b>20/Jul/2018</b>	2.5	<ul style="list-style-type: none"> <li>(1) 4.1: add description of utility supporting pfp files with virtual button settings.</li> <li>(2) 4.2: add description of utility automatically selects write factory default option when using PMF or PMC file.</li> </ul>
<b>31/Jan/2019</b>	2.6	<ul style="list-style-type: none"> <li>(1) 1.4: New options in the "Information" page.</li> <li>(2) 1.7: New command line options.</li> <li>(3) 2.4.3: New "Select Folder" option in "SR" page.</li> <li>(4) 3.7: New "Anti-noise" parameters.</li> <li>(5) 3.9.1: New Resolution Setting.</li> <li>(6) 4.1: New "pnc", "pnf", "pxc", and "pxf" format supported.</li> <li>(7) 4.3: New button to generate PFP file in the "Update"</li> </ul>

page.		
(8) 6.2: Remove “Log Noise Info” and combine the function into “Log Current Device Information”.		
(9) 7: New “Process Config” feature		
<b>06/Nov/2019</b>	2.7.3	(3) 7: Modify “Process Config” feature

# Table of Content

<b>PREFACE .....</b>	<b>I</b>
Disclaimer .....	i
Trademarks .....	i
Copyright.....	i
<b>REVISION TABLE .....</b>	<b>II</b>
<b>1. INTRODUCTION .....</b>	<b>7</b>
1.1 Supported Systems .....	7
1.2 Supported Devices .....	8
1.3 Summary .....	9
1.4 Checking Utility Information.....	9
1.4.1 Device Information.....	9
1.4.2 Application Version .....	10
1.4.3 Open Default Export File Folder .....	10
1.4.4 Log UI Parameters Information.....	11
1.4.5 Disable Data Report .....	11
1.4.6 Show Menu in Draw .....	11
1.5 Refresh and Reset Device .....	12
1.6 Special Notice .....	13
1.7 Command Line Features .....	13
<b>2. DIAGNOSTIC.....</b>	<b>14</b>
2.1 Open Short Test.....	14
2.1.1 Test Items.....	15
2.1.2 Test Result & Analysis .....	16
2.1.3 Save Test Results .....	18
2.1.4 Test Log .....	18
2.2 Noise Level .....	21

2.2.1	Execute test .....	21
2.2.2	Test Analysis .....	22
2.3	3D Module of Touch Signal.....	23
2.4	System Reference (SR) .....	26
2.4.1	Checking Status .....	26
2.4.2	Rebuild the System Reference .....	26
2.4.3	Options.....	27
<b>3.</b>	<b>PARAMETERS .....</b>	<b>29</b>
3.1	Main Features.....	30
3.2	Interface Parameters .....	31
3.2.1	Change Interface .....	32
3.2.2	I2C Address .....	32
3.2.3	Baud Rate.....	32
3.3	Panel Parameters .....	32
3.3.1	Choosing from a Preset.....	32
3.4	Finger Parameters .....	33
3.4.1	Sensitivity .....	33
3.4.2	Touch Points .....	33
3.5	Palm Parameters .....	34
3.5.1	Palm Rejection.....	34
3.6	Water Handling .....	34
3.6.1	Choosing a Water Handling Solution .....	34
3.7	Anti-Noise Parameters.....	35
3.7.1	Configure Noise Filtering .....	35
3.7.2	Enhanced Driving.....	36
3.7.3	Configuring Frequency Hopping.....	36
3.8	Coordinate Parameters.....	36

3.8.1	Calibration.....	37
3.8.2	Edge Compensation .....	40
3.8.3	Tail Orientation.....	40
<b>4.</b>	<b>FIELD UPDATE .....</b>	<b>41</b>
4.1	Load Firmware File .....	41
4.2	Update Firmware .....	42
4.3	Generate New PFP File.....	44
<b>5.</b>	<b>DRAW.....</b>	<b>46</b>
<b>6.</b>	<b>DEBUG.....</b>	<b>50</b>
6.1	Reset Touch Panel .....	50
6.2	Log Current Device Information.....	50
6.3	Show Notifications for Water Detection .....	53
6.4	Touch and Halt.....	53
<b>7.</b>	<b>PROCESS CONFIG.....</b>	<b>55</b>
7.1	Work Order Number .....	55
7.2	Load PFP File.....	56
7.3	Miscellaneous .....	56
7.4	Select Tests for Process List.....	58

# 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
<b>Desktop</b>	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) <sup>1</sup>
<b>Server</b>	Windows Server 2003 / R2
	Windows Server 2008 / R2
	Windows Server 2012 / R2
	Windows Server 2016 / 2019
<b>Embedded</b>	Windows XP Embedded / Standard 2009
	Windows Embedded Standard / POSReady 7
	Windows Embedded 8 Standard / 8.1 Industry
	Windows 10 IoT Enterprise

---

<sup>1</sup> 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 <sup>2</sup> C <sup>2</sup>
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
	PM2251	v	v	v
	PM2252	v	v	v
	PM2351	v		
	PM2300	v	v	v
PenMount P2-08 Series	PM1310	v	v	v
	PM2303	v	v	v
	PM1410	v	v	v
	PM1415	v		v

<sup>2</sup> The I<sup>2</sup>C, UART / RS-232 interface is supported by connecting through the PMT101 Adapter.

	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
<b>PCIMset</b>	Advanced firmware configuration	2.7.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.

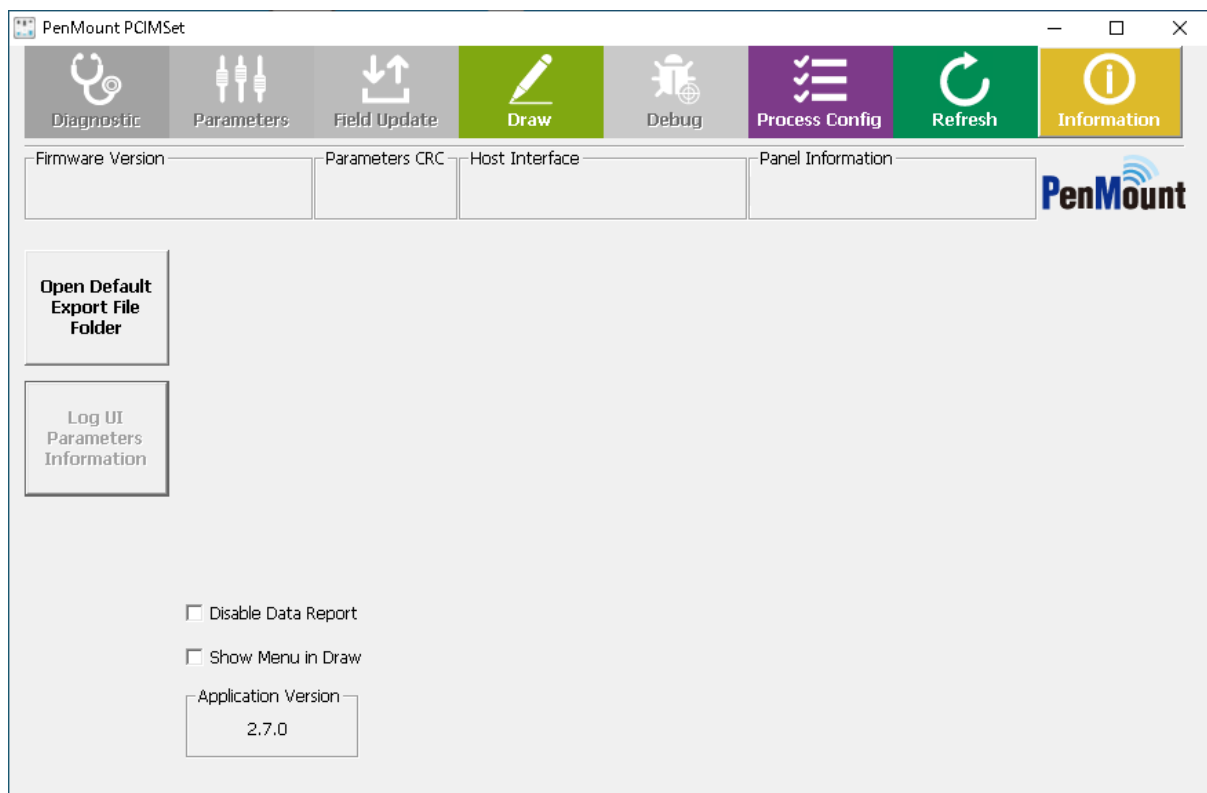


FIGURE 1

#### 1.4.1 Device Information

Connected device information consists of several parts:

- Master / Slave Firmware Version

The firmware version of the connected device

- Parameters CRC

Cyclic Redundancy Check (CRC) to be used for parameter error correction

- 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 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

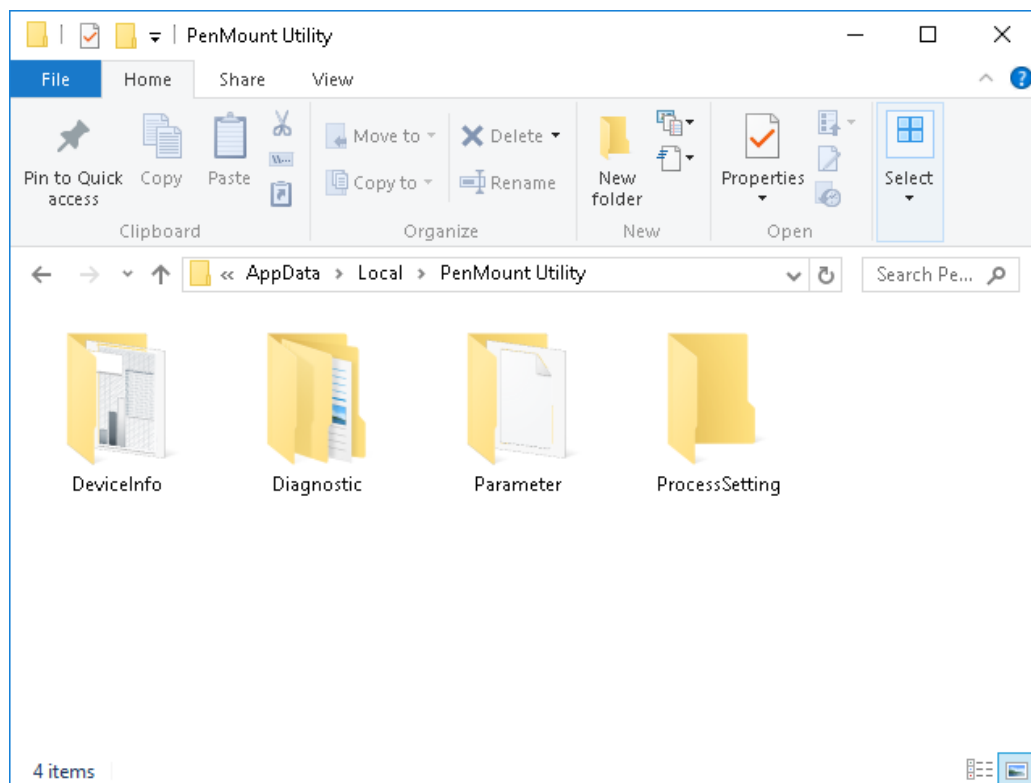


FIGURE 2

#### 1.4.4 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.

Application Version : PenMount PCIMSet 2.6.0				
Function : Log UI Parameters Information				
Master Version PM1310.6.0.1 Boot : 8.0				
Device Interface : USB (Auto Detect)				
Parameters CRC : x46A4				
Host Interface : Auto Detect				
Panel Size : P3007 8.4"				
Cover Lens : 1.8 mm Glass				

FIGURE 3

#### 1.4.5 Disable Data Report

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

#### 1.4.6 Show Menu in Draw

When this option is checked, a menu button will appear in Draw mode. Please check chapter 5 for each option in menu.

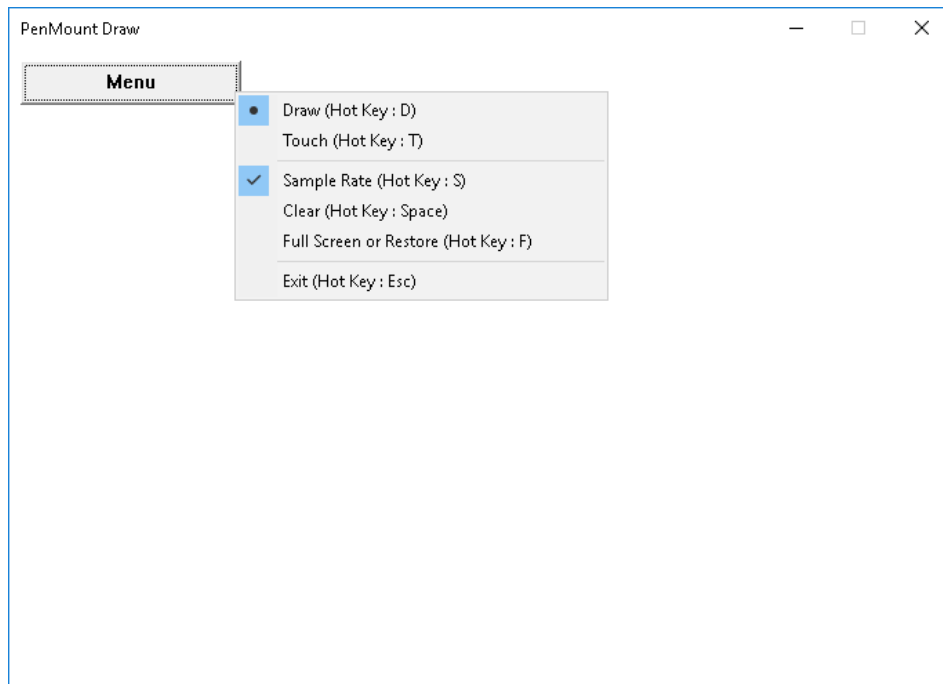


FIGURE 4

## 1.5 Refresh and Reset Device

If device is not connected when utility starts up, it can still automatically detects 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.

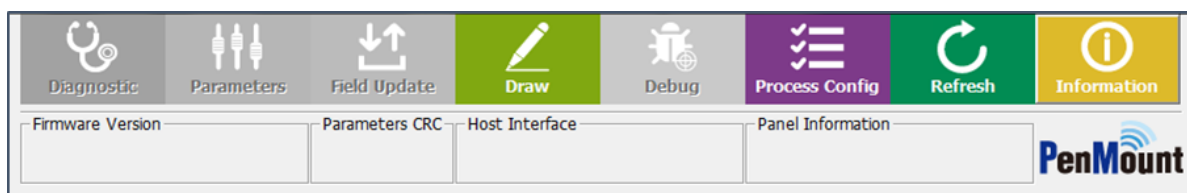


FIGURE 5

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

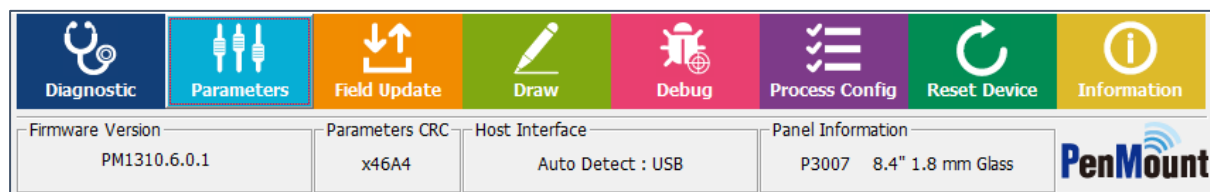


FIGURE 6

## 1.6 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.

## 1.7 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	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

## 2. Diagnostic

PCIMset provides standard product testing procedures, including:

- Open-Short Test: test the electrical functions 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.

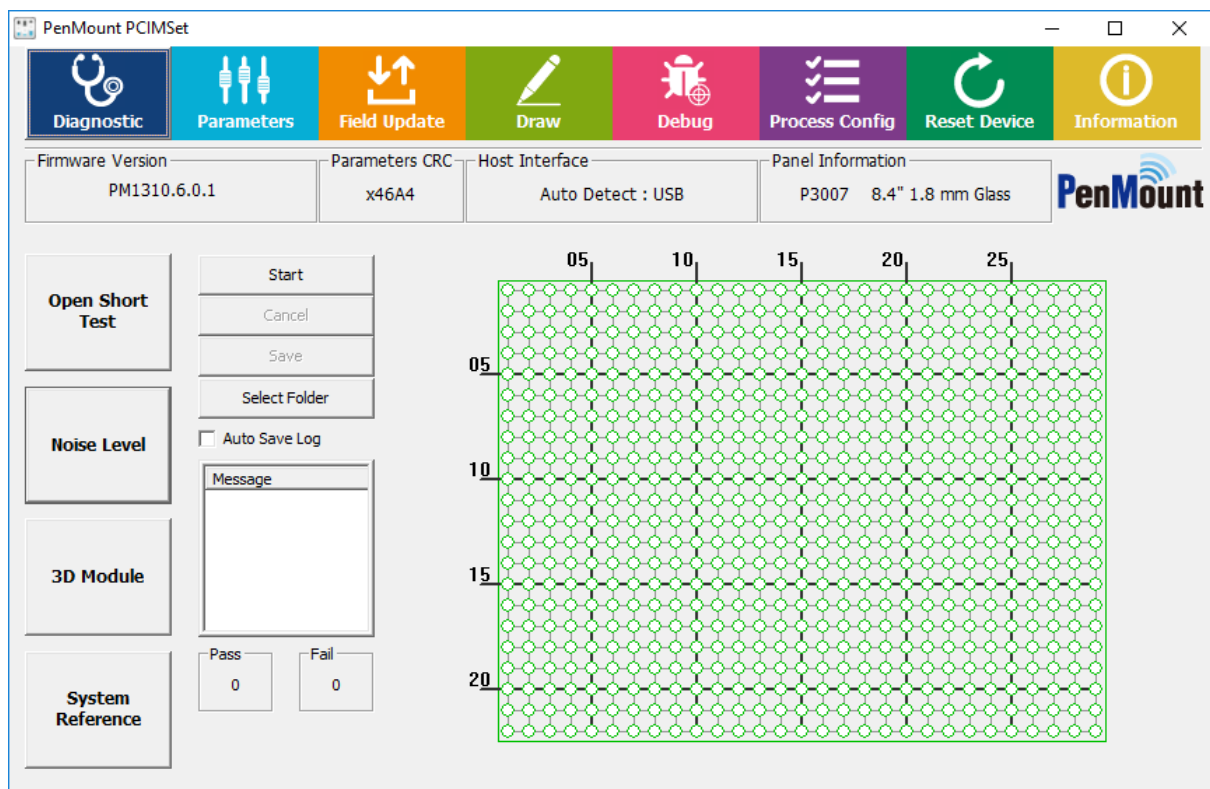


FIGURE 7

### 2.1 Open Short Test

The "Open Short" 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 8

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

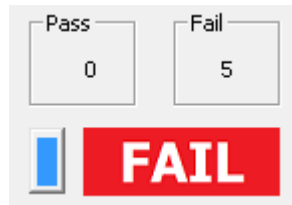


FIGURE 9

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.

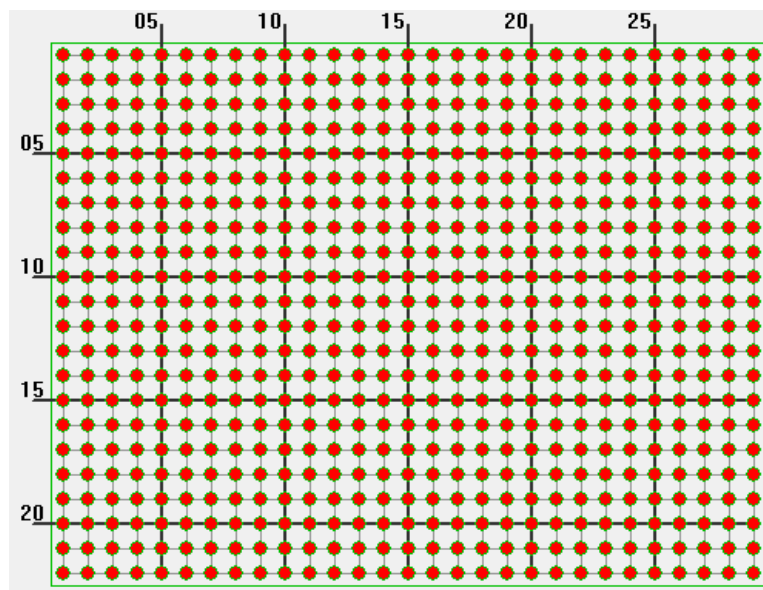


FIGURE 10

### 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
<b>Debounce Check</b>	If the three sets of raw data on all the nodes of the touch panels are distinctively different from one another and larger than LevelC, it is determined as abnormal.
<b>Driver Pins</b>	Test the raw data of two consecutive driving pins (use the signals for the third test)



<b>Abnormal Check</b>	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 LevelE, the driving pin with higher raw data will be marked “abnormal”.
<b>Sensor Pins Abnormal Check</b>	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 LevelE, the sensor pin with higher raw data will be determined as a short circuit and marked “abnormal”.
<b>Same Raw Data Check</b>	If the three sets of raw data on all the nodes of the touch panels are identical, it is determined as abnormal.
<b>Illegal Data Check</b>	Checks whether raw data is negative.
<b>Absolute Data Check</b>	Checks whether raw data is within valid range.
<b>Near Check</b>	Checks whether the raw data of two adjacent driver lines/sensor lines is similar.
<b>Flat Check</b>	Checks whether the base is flat.

### 2.1.2 Test Result & Analysis

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

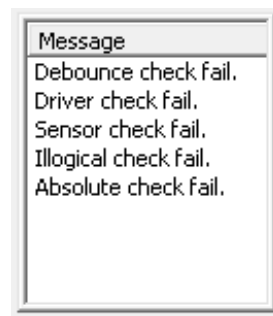


FIGURE 11

The table below lists possible messages.

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

<b>Same check fail</b>	Same Raw Data Check failed
<b>Illogical check fail</b>	Illegal Data Check failed
<b>Absolute check fail</b>	Absolute Data Check failed
<b>Near check fail</b>	Near line raw data check failed
<b>Flat check fail</b>	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.

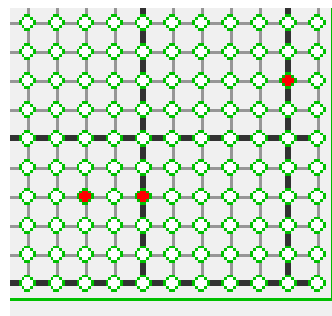


FIGURE 12

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.

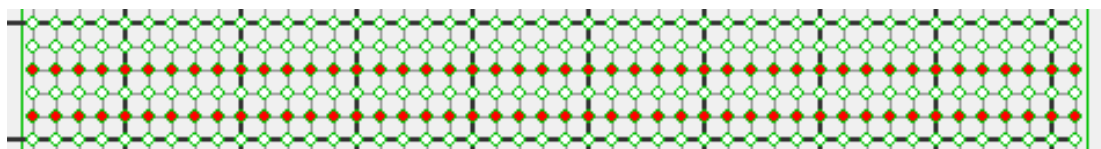


FIGURE 13

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.

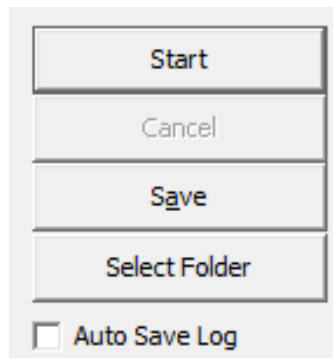


FIGURE 14

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

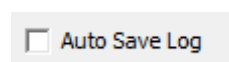


FIGURE 15

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.

Application Version : PenMount PCIMSet 2.6.0							
Function : Open Short Test							
Firmware Version : PM1310.6.0.1 Boot : 8.0							
Parameters CRC : x46A4							
Panel Information : P3007 8.4"							
Cover Lens : 1.8 mm Glass							
Batch1: 1							
Batch2:							
[Result]							
Diagnose: PASS							
[Threshold]							
FH mode: 13							
LevelB:	0	LevelC:	100	LevelE:	280	LevelF:	100

FIGURE 16

- 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 17

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.

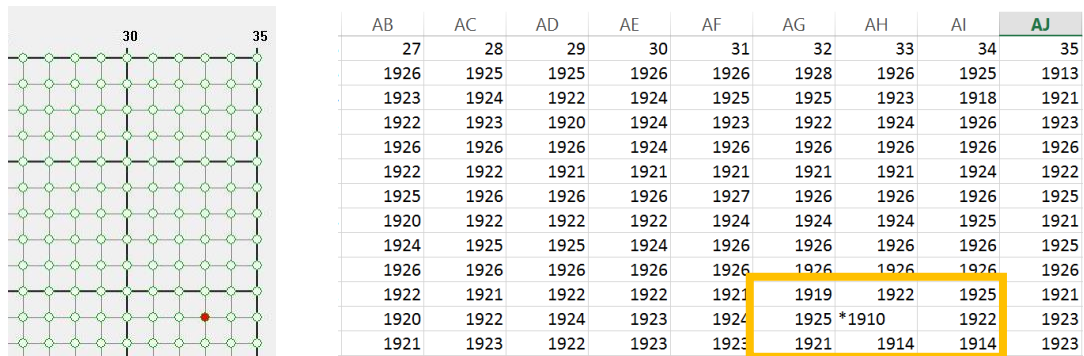


FIGURE 18

- 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:

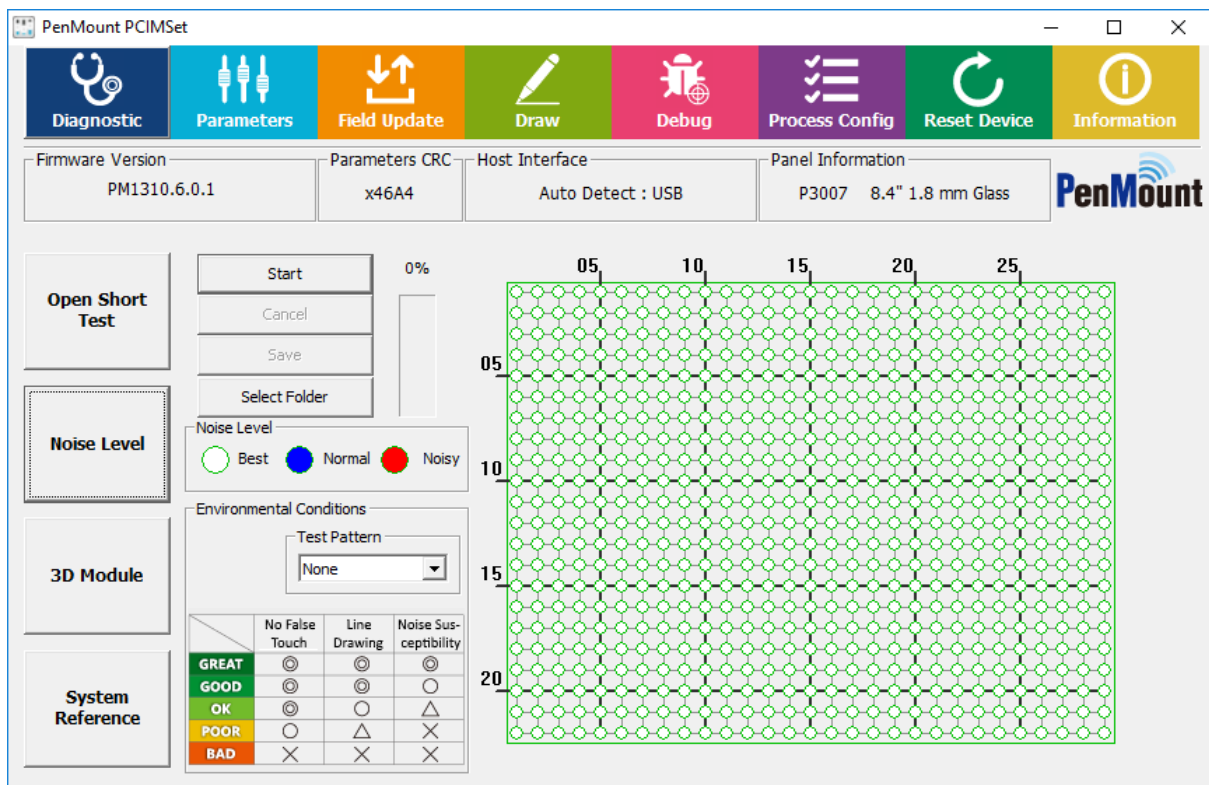


FIGURE 19

### 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.

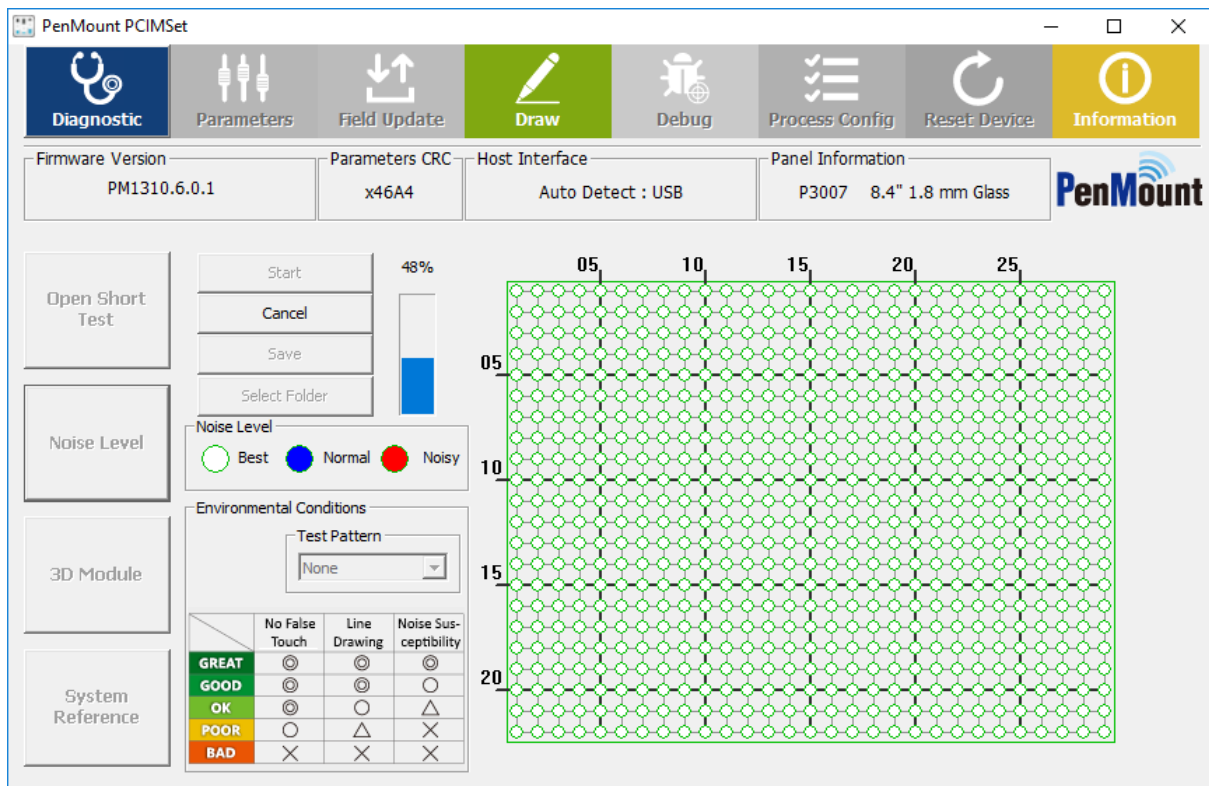


FIGURE 20

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.

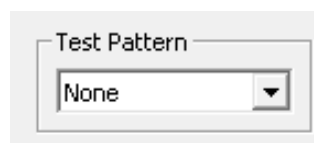


FIGURE 21

## 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.

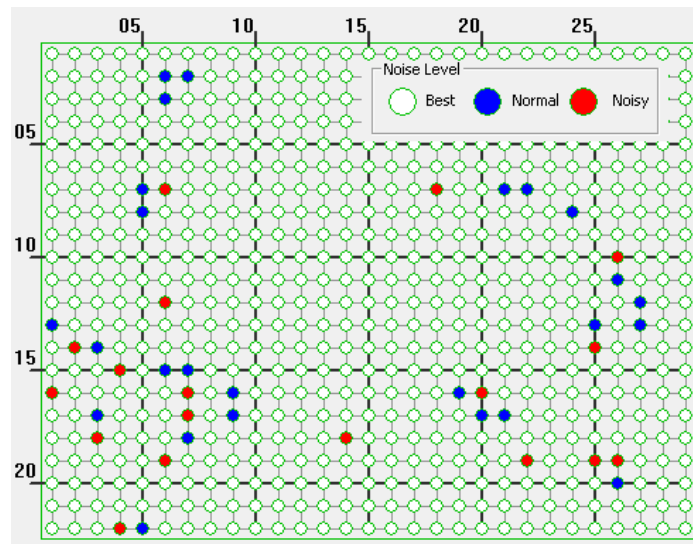


FIGURE 22

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”.

Surrounding Criteria

Test Pattern

None ▼

	No False Touch	Line Drawing	Noise Susceptibility
GREAT	⊙	⊙	⊙
GOOD	⊙	⊙	○
OK	⊙	○	△
POOR	○	△	×
BAD	×	×	×

FIGURE 23

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.



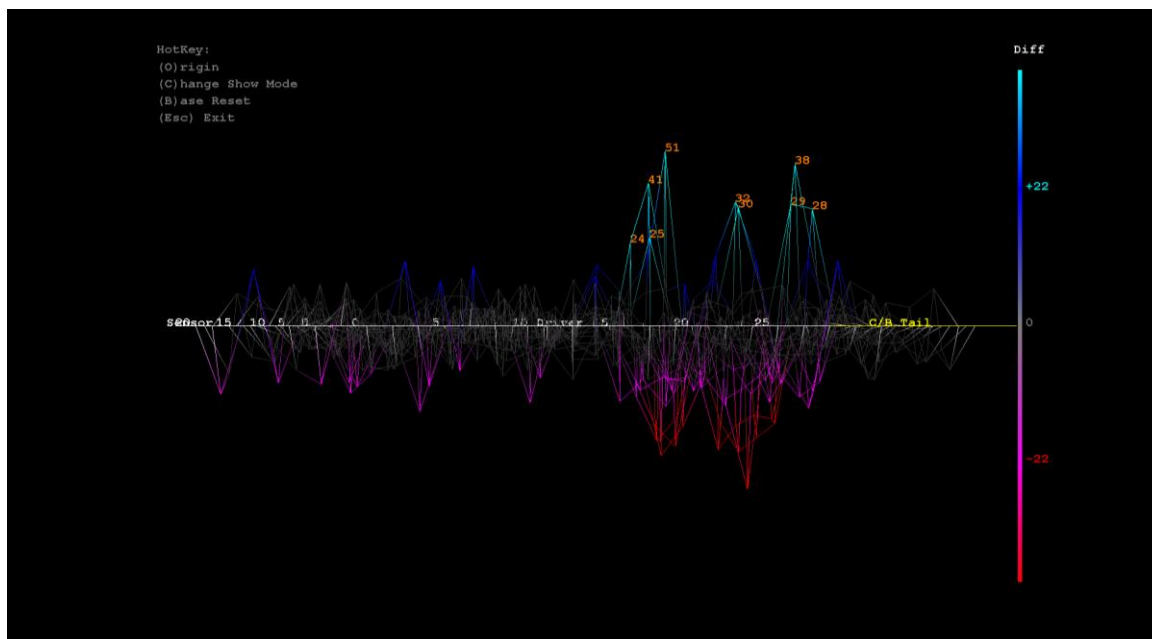


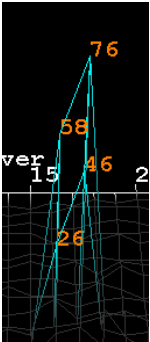
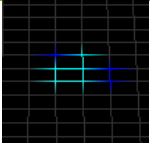
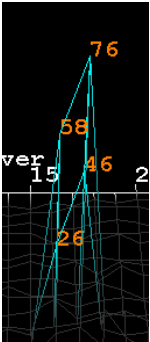
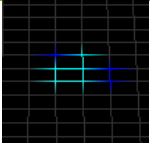
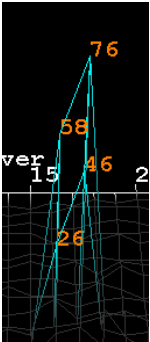
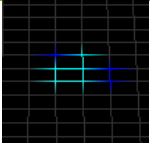
FIGURE 24

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

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

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

Colors	Actions
<b>top</b>	5 degree X axis counterclockwise rotation
<b>down</b>	5 degree X axis clockwise rotation

<b>left</b>	5 degree Y axis counterclockwise rotation						
<b>right</b>	5 degree Y axis clockwise rotation						
<b>+</b>	Zoom in						
<b>-</b>	Zoom out						
<b>O</b>	Restore to default angle: 225 degree X axis counterclockwise rotation, 270 degree Z axis clockwise rotation						
<b>B</b>	Reinitialize the base signal						
<b>C</b>	<p>Change displayed mode.</p> <table border="1"> <thead> <tr> <th colspan="2">Mode</th></tr> </thead> <tbody> <tr> <td><b>Mode 1</b></td><td>  </td></tr> <tr> <td><b>Mode 2</b></td><td>  </td></tr> </tbody> </table>	Mode		<b>Mode 1</b>		<b>Mode 2</b>	
Mode							
<b>Mode 1</b>							
<b>Mode 2</b>							

## 2.4 System Reference (SR)

The “System Reference” button is enabled if device supports this feature.

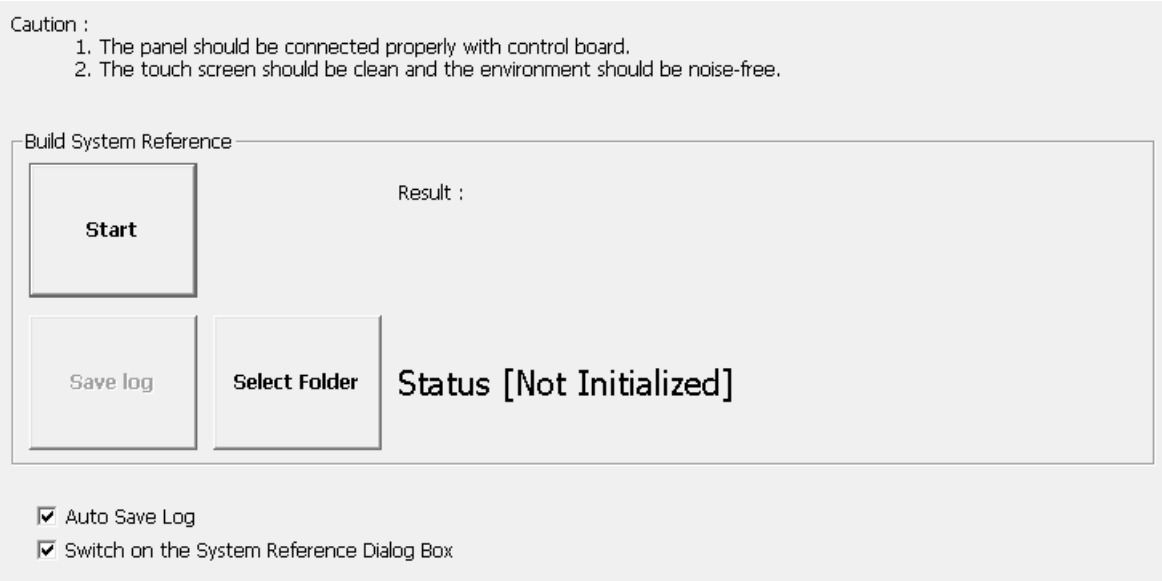


FIGURE 25

### 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).

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

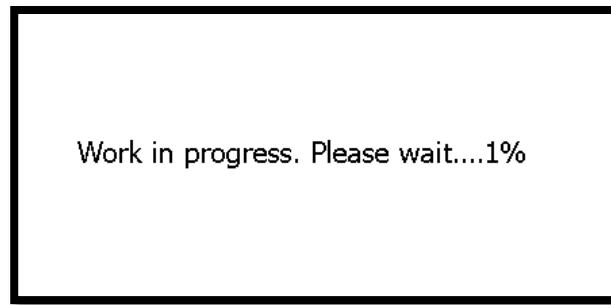


FIGURE 26

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 ?

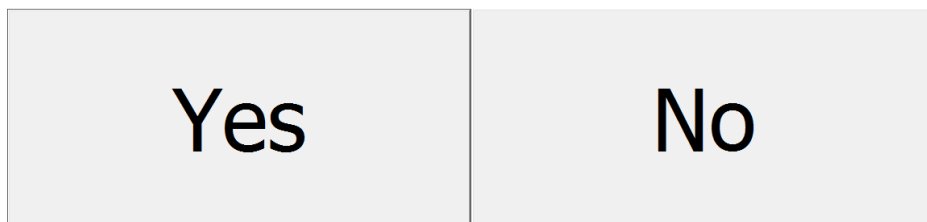


FIGURE 27

tility 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.

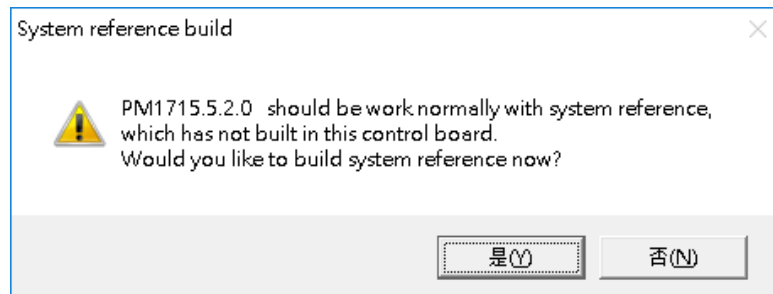


FIGURE 28

### 3. Parameters

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



FIGURE 29

- 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.

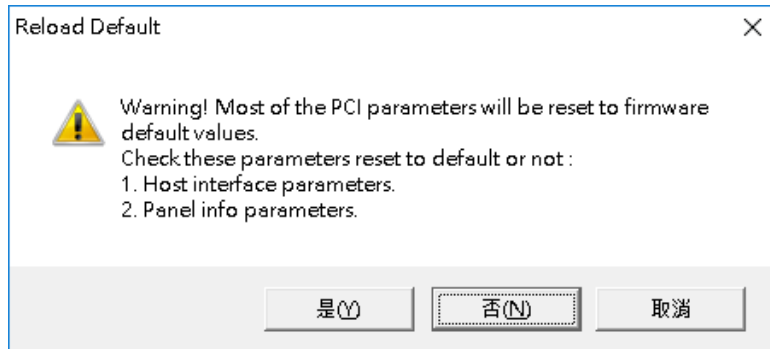


FIGURE 30

### 3.1 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.

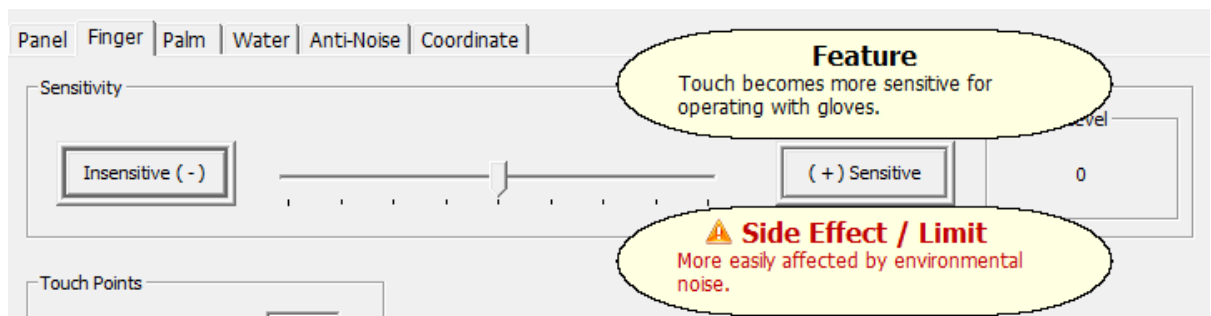


FIGURE 31

#### ● 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.

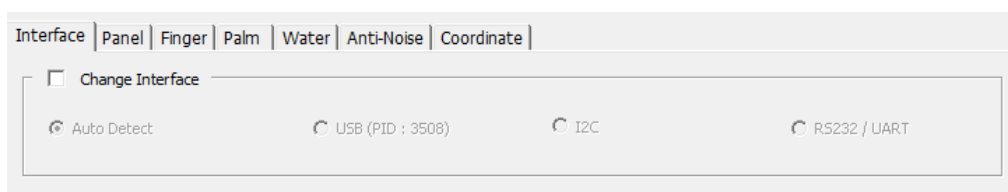


FIGURE 32

- 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.

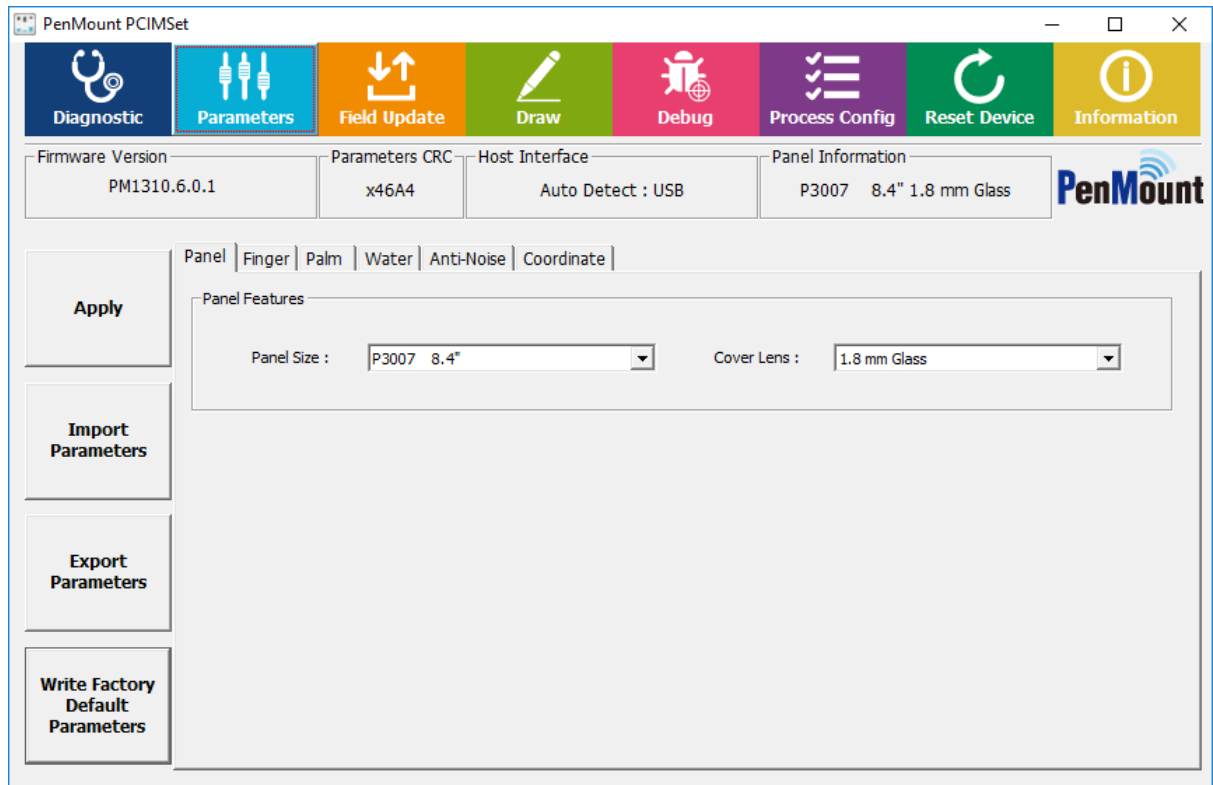


FIGURE 33

## 3.2 Interface Parameters

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



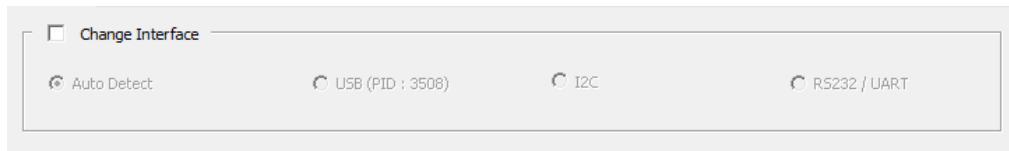


FIGURE 34

### 3.2.1 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.

### 3.2.2 I2C Address

The slave address default as 0x38 when using I<sup>2</sup>C connection.

### 3.2.3 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.

## 3.3 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.

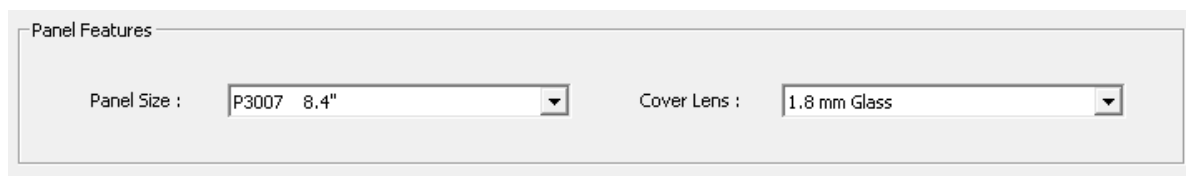


FIGURE 35

### 3.3.1 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.

## 3.4 Finger Parameters

The parameters in this tab are for tuning finger detection.

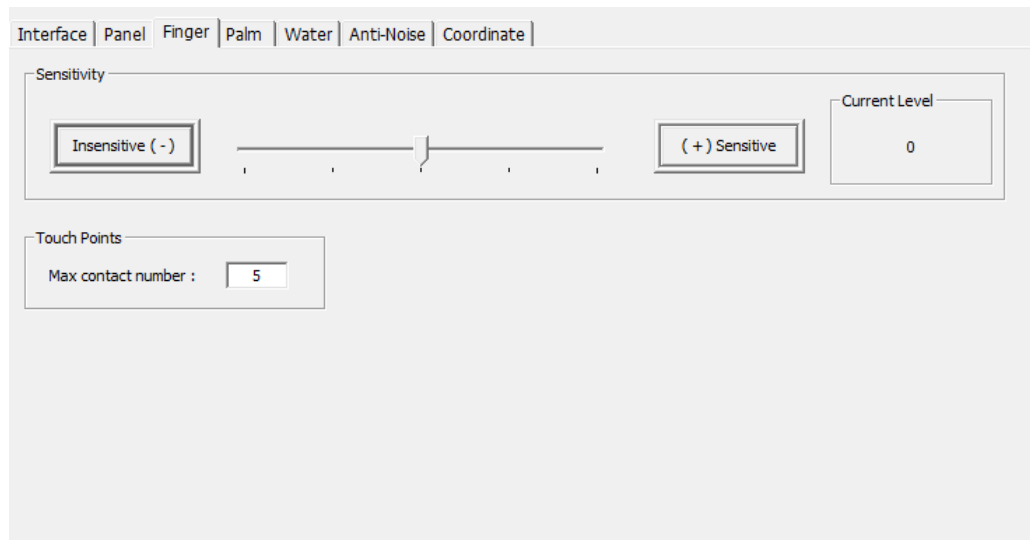


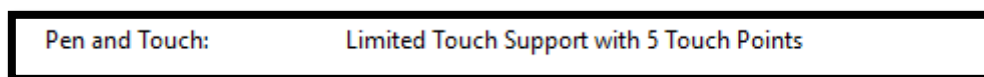
FIGURE 36

### 3.4.1 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.

### 3.4.2 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.

## 3.5 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 37

### 3.5.1 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.

## 3.6 Water Handling

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

### 3.6.1 Choosing a Water Handling Solution

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

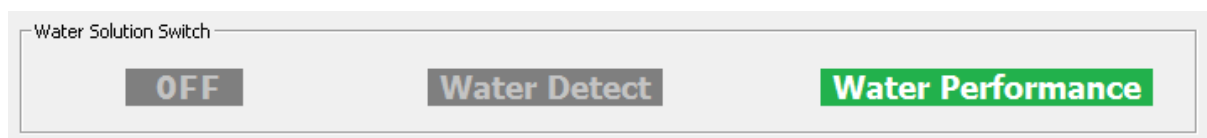


FIGURE 38

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

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

### 3.7 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.

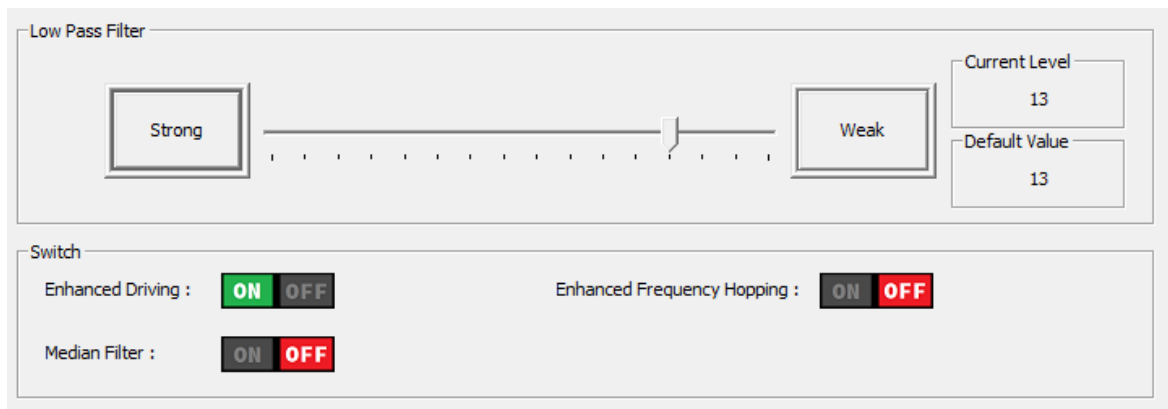


FIGURE 39

#### 3.7.1 Configure Noise Filtering

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

Filter Type	Supported Firmware Versions	Noise Filtering Result	Sample Rate
Low Pass Filter	V1.0 and later	Good	Within spec
Median Filter	V6.1 and later	Better	Slightly reduced

Please notice that the “Low Pass Filter” scroll bar is only enabled when “Median Filter” is disabled (switched OFF and device reset). Choosing a stronger value 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
--------	------

### 3.7.2 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.

### 3.7.3 Configuring Frequency Hopping

Currently PCI Parameters do not support manually configuring frequency hopping because the firmware will choose the best settings automatically. Since firmware V6.1, a new “Enhanced Frequency Hopping” method is introduced, which can better handling environments with higher noise.

Frequency Hopping Type	Supported Firmware Versions	Noise Handling Result	Sample Rate
Normal	V1.0 and later	Good	Within spec
Enhanced	V6.1 and later	Better	Moderately Reduced

## 3.8 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.

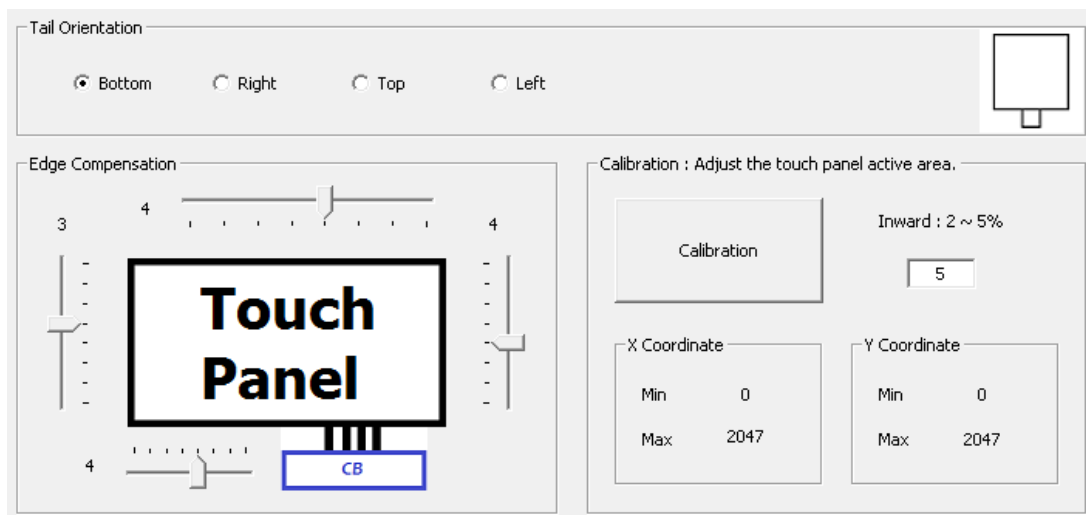


FIGURE 40

### 3.8.1 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.

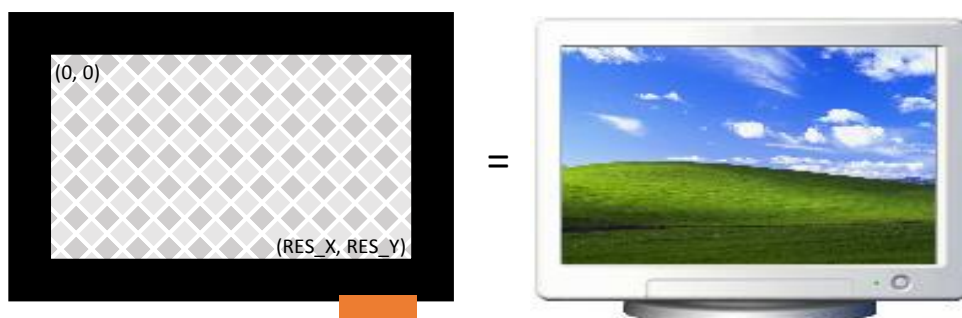


FIGURE 41

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).

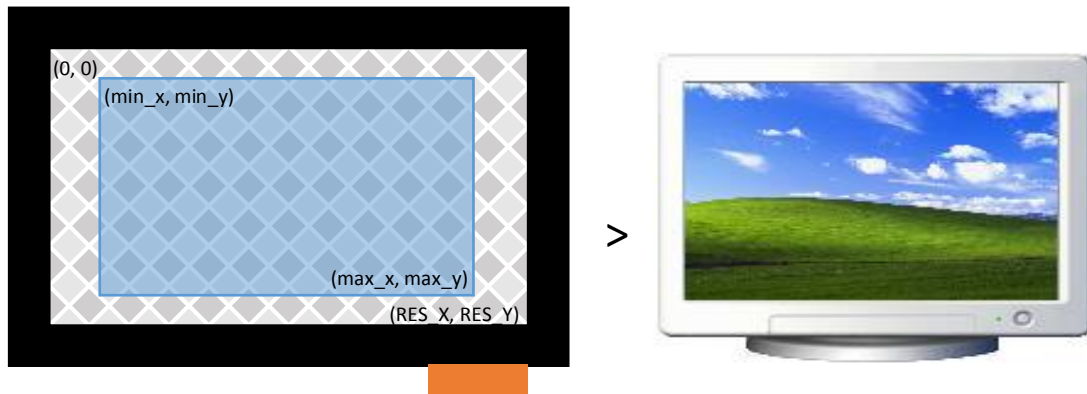


FIGURE 42

## (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".

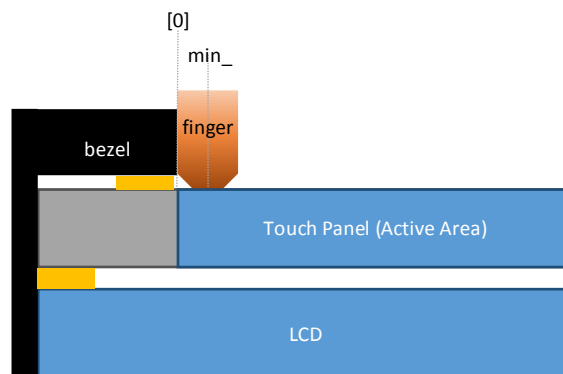


FIGURE 43

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\_Y<sup>3</sup> range.

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

### 3.8.1.1 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.

---

<sup>3</sup> 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.

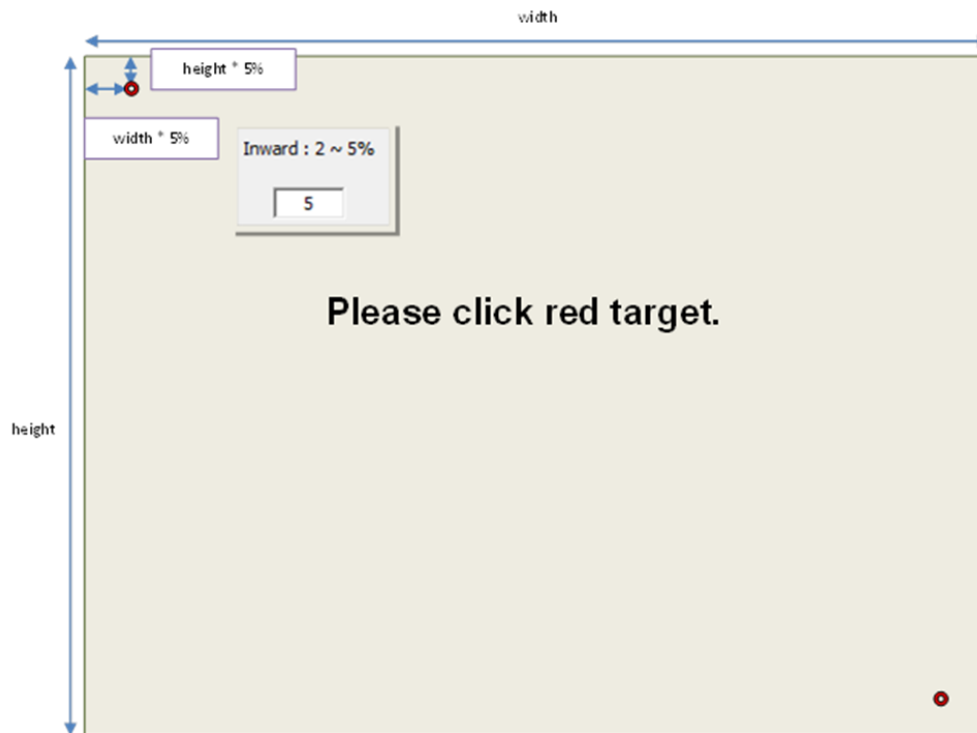


FIGURE 44

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

### 3.8.1.2 Test Stage

The calibration UI proceeds to the test stage after it collects the minimum and maximum axes values. During this stage, there is a third red square and users must press it. This stage can be skipped by pressing the F9 key. The firmware will automatically apply new settings if users skip the test, or when the test is successful.



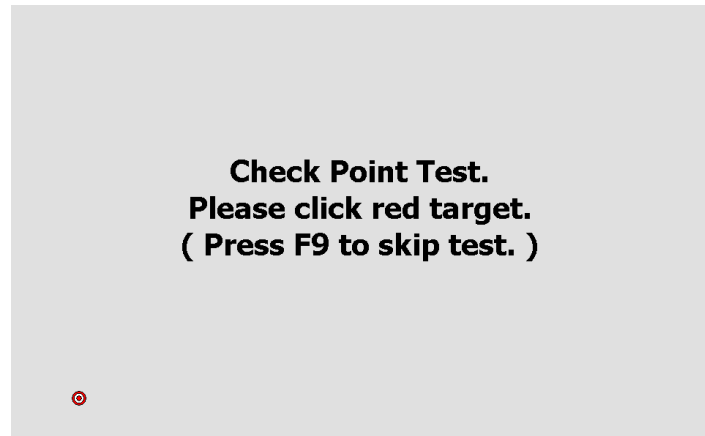


FIGURE 45

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.

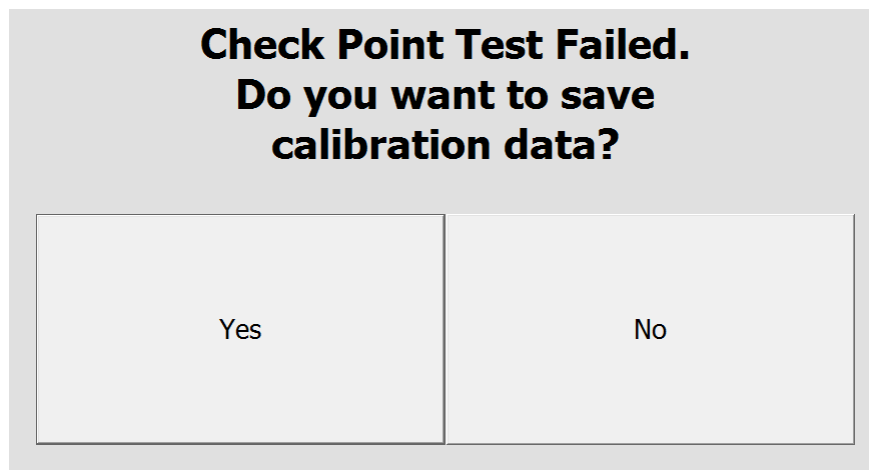


FIGURE 46

### 3.8.2 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.

### 3.8.3 Tail Orientation

The firmware supports four rotational degrees compared to tail orientation.

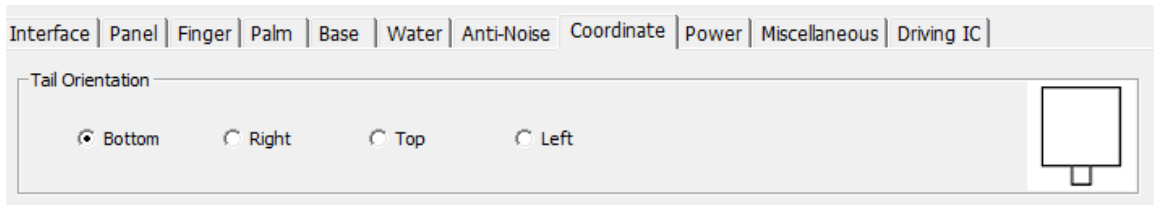


FIGURE 47

## 4. Field Update

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

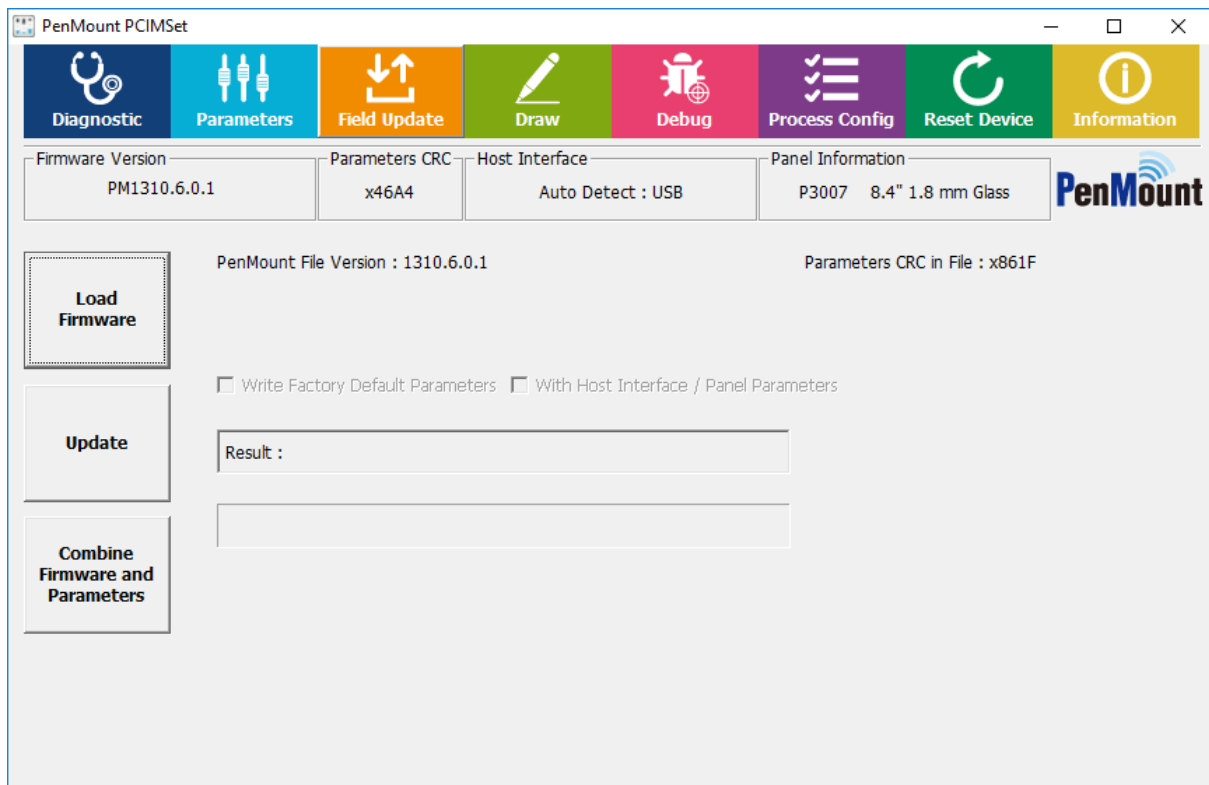


FIGURE 48

### 4.1 Load Firmware File

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



FIGURE 49

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 will also display the CRC values of parameter settings and virtual key settings in target file.

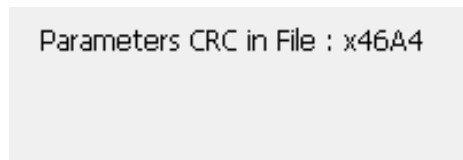


FIGURE 50

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

## 4.2 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.

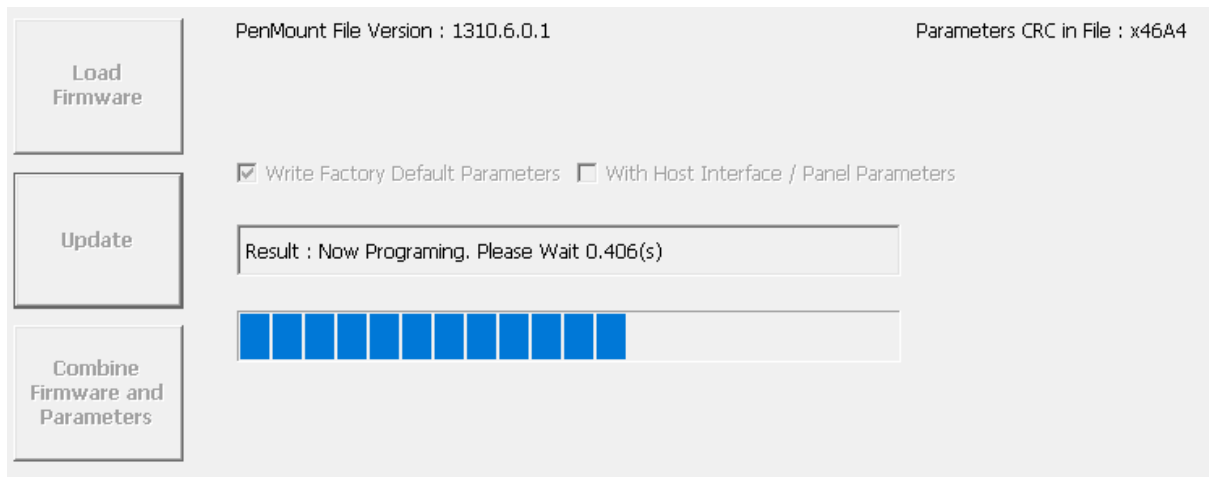


FIGURE 51

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.

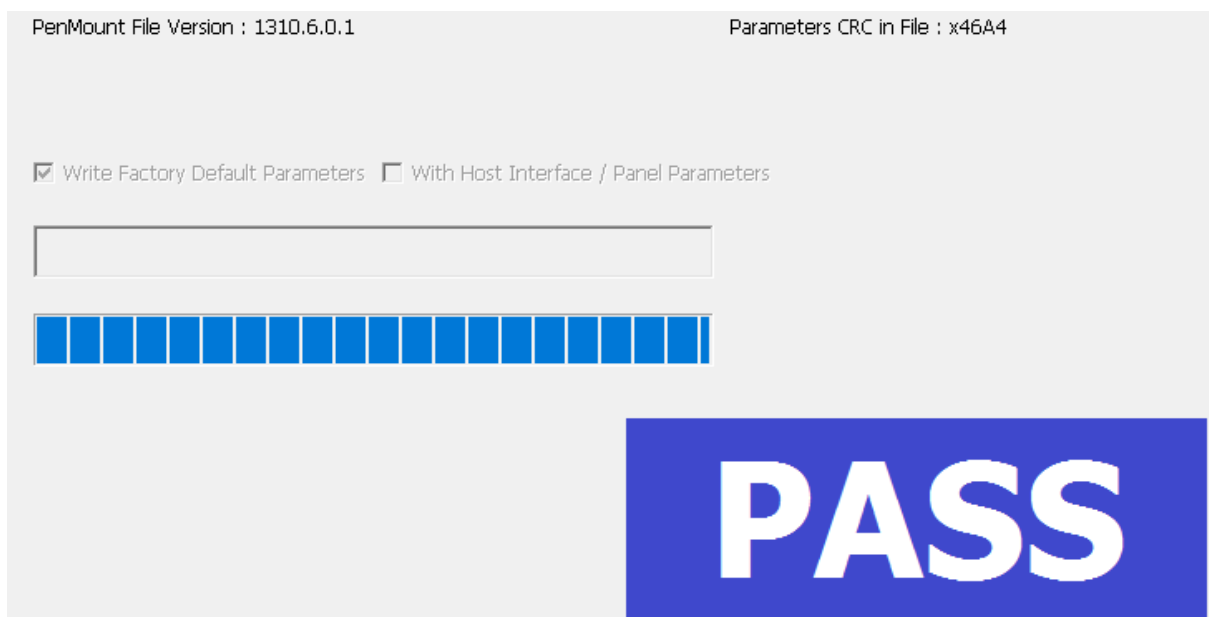


FIGURE 52

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



FIGURE 53

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.

### 4.3 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 “Browse for Folder” dialog to allow saving the PFP file to the target folder.

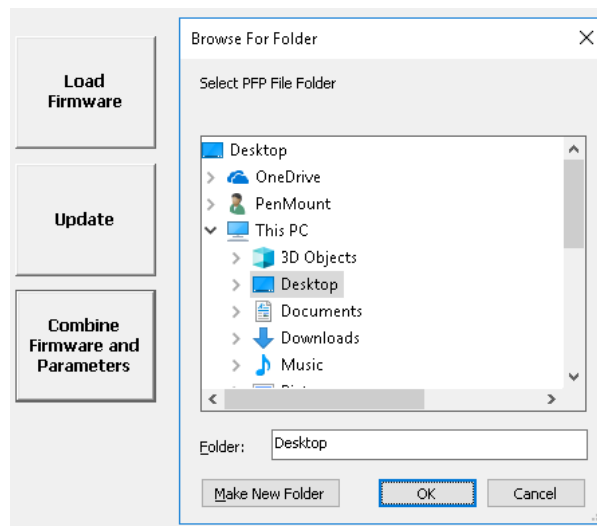


FIGURE 55

If the loaded firmware is not the same with current firmware, a warning message will be shown

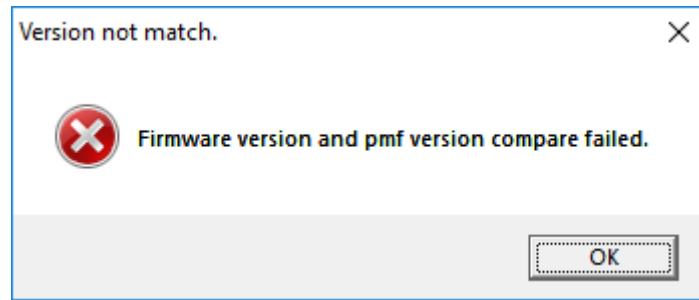


FIGURE 56

## 5. 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:

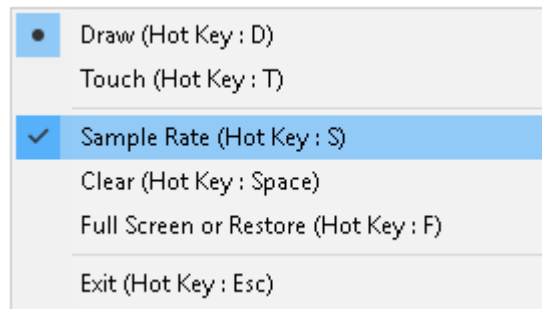


FIGURE 57

- Draw Mode

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

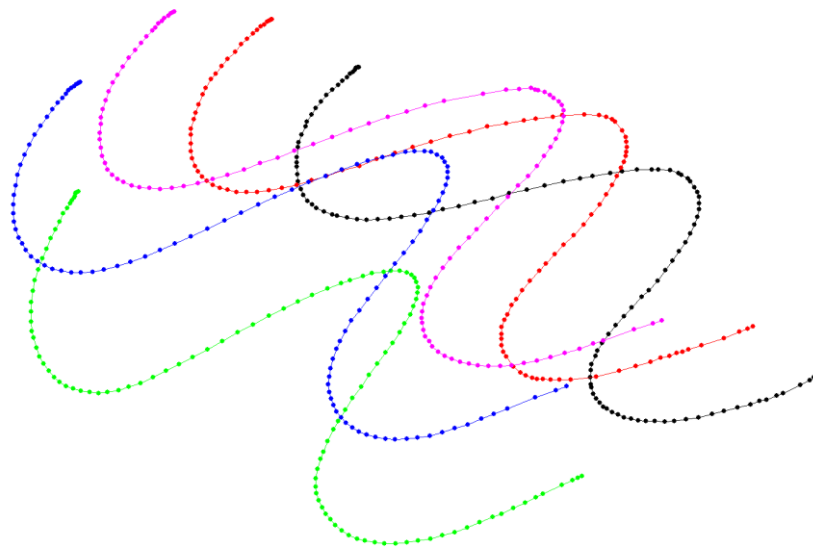


FIGURE 58

- Touch Mode

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



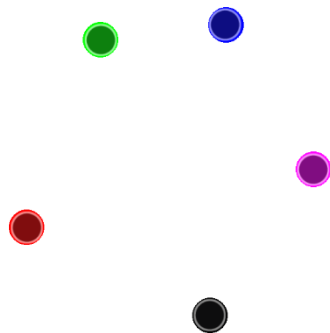


FIGURE 59

- 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

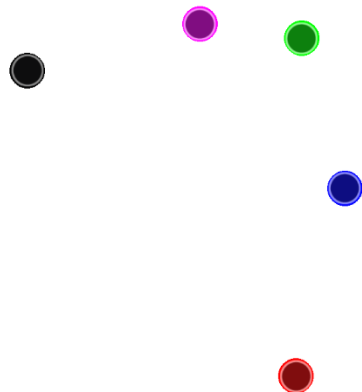


FIGURE 60

- 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.

## 6. Debug

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

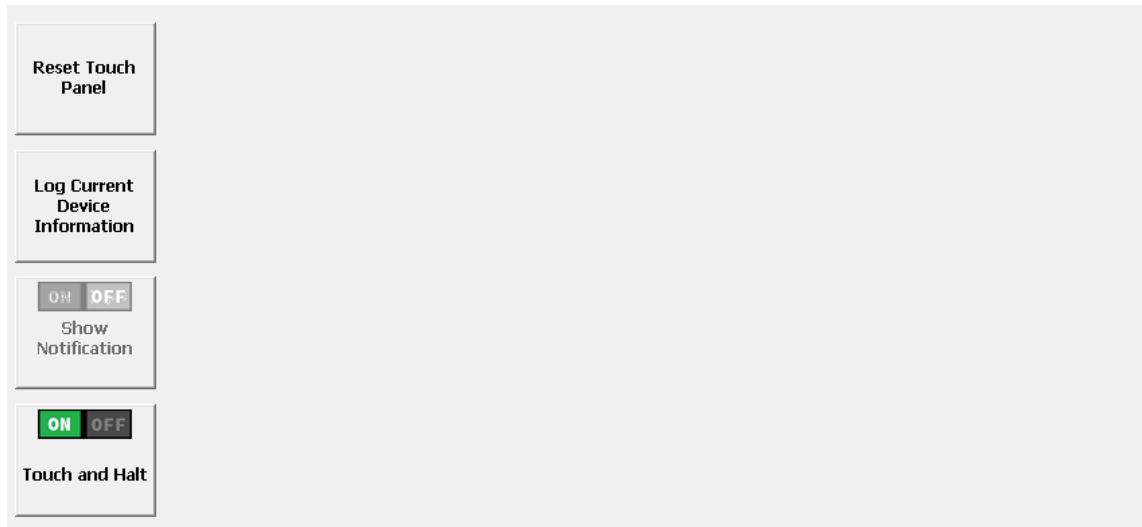


FIGURE 61

### 6.1 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.

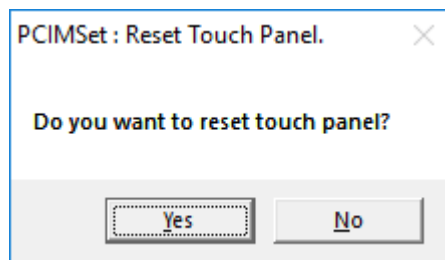


FIGURE 62

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

### 6.2 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.

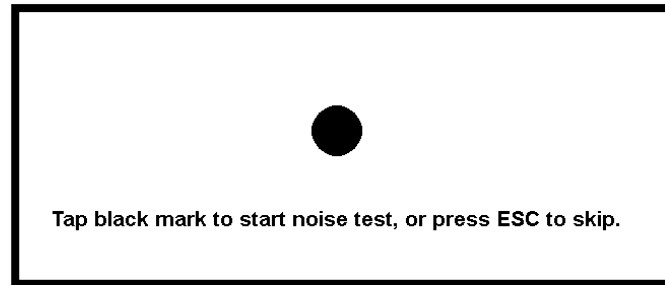


FIGURE 63

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

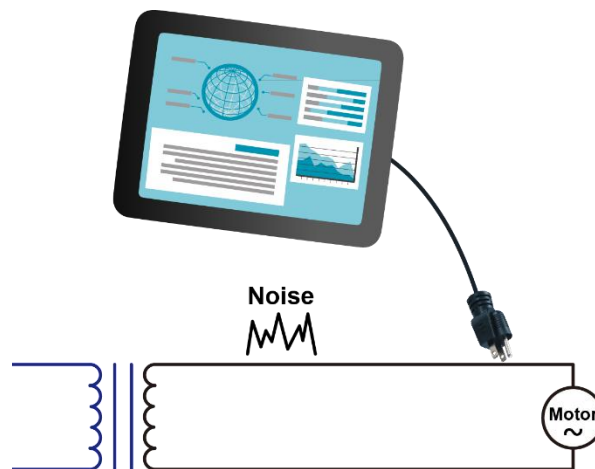
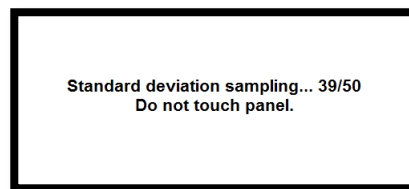


FIGURE 64

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

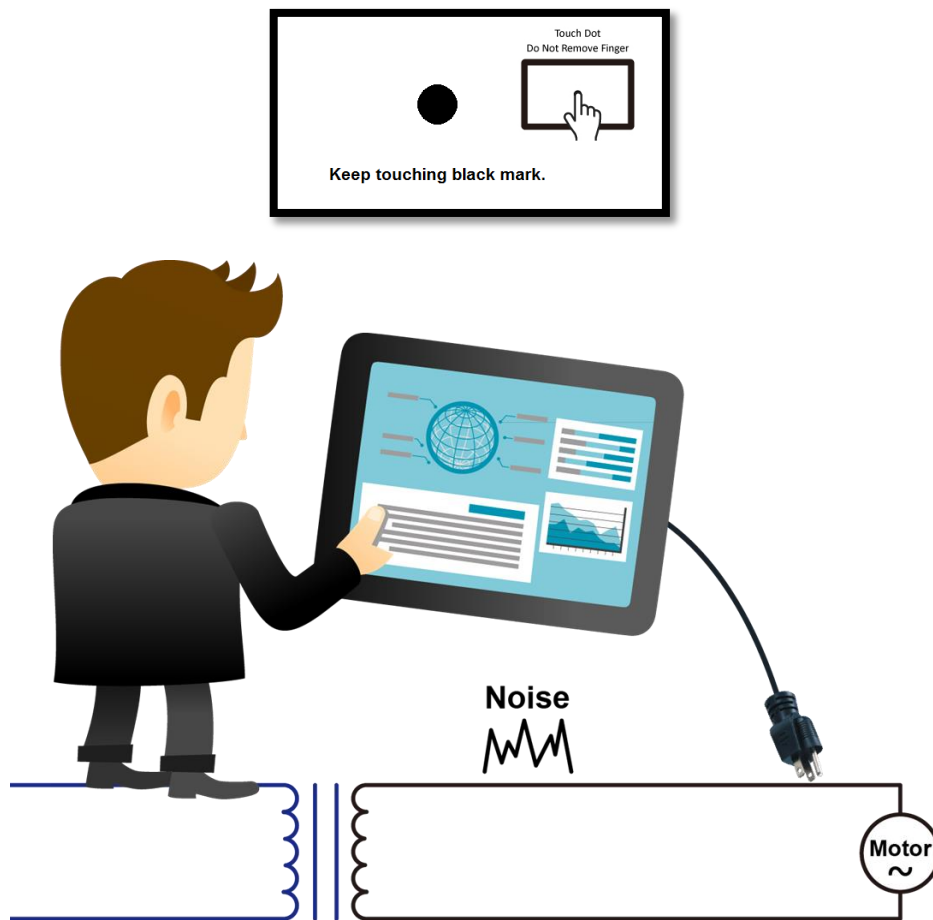
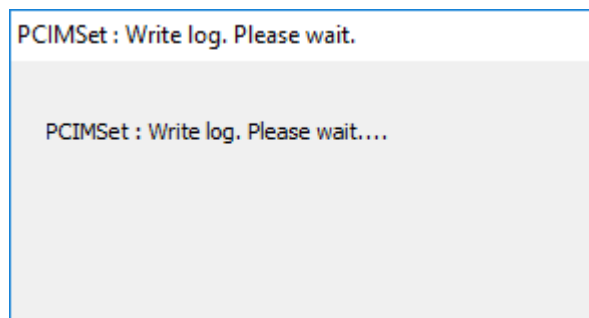


FIGURE 65

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



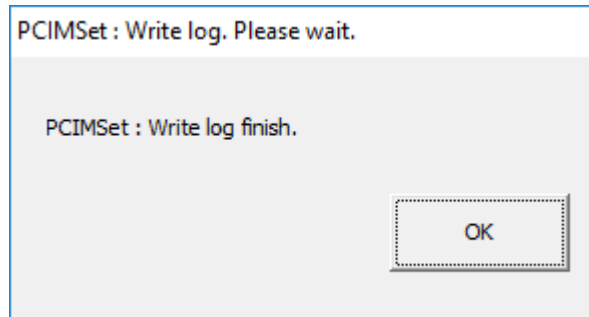


FIGURE 66

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

### 6.3 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.

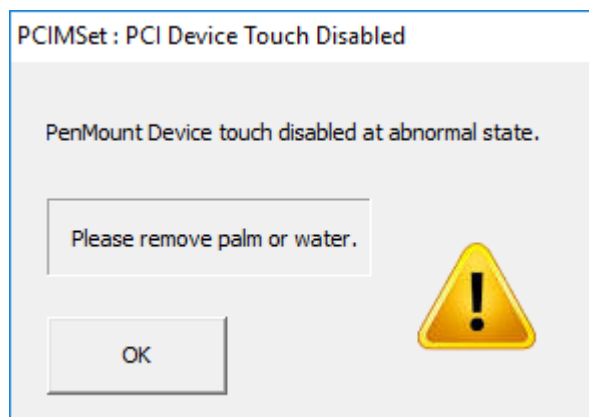


FIGURE 67

### 6.4 Touch and Halt

The touch and halt feature is supported by PenMount firmware version later then 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.

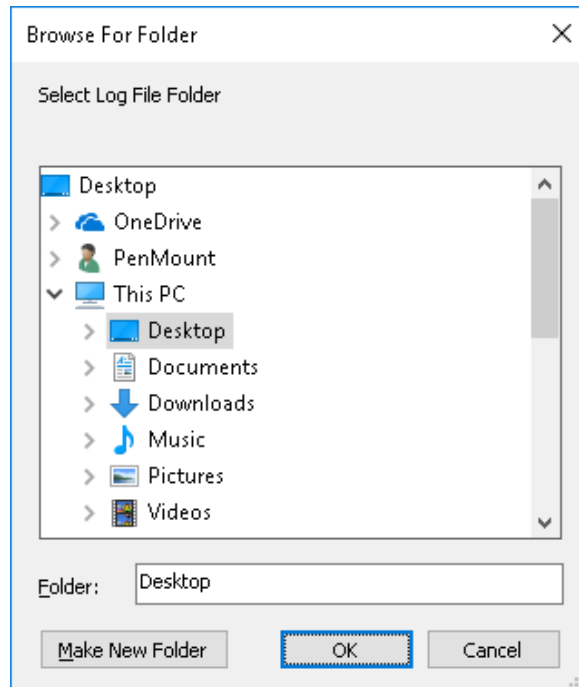


FIGURE 68

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.

## 7. 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.

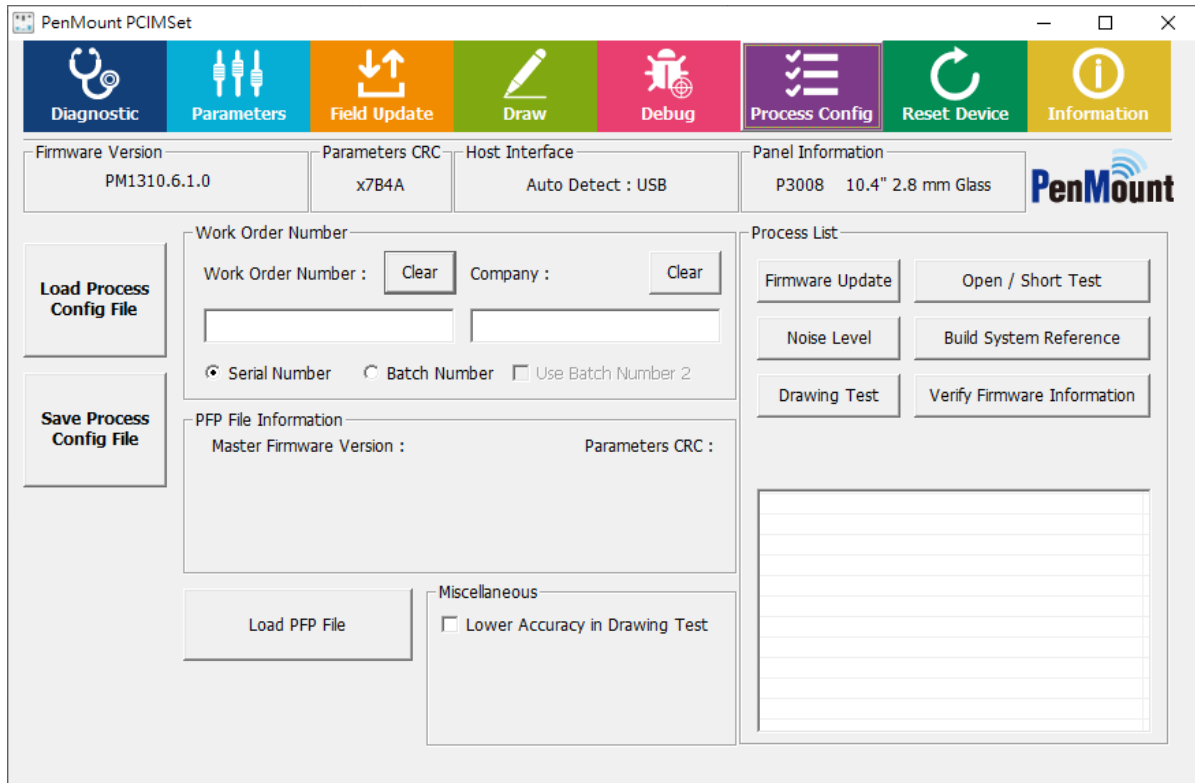


FIGURE 69

- Log Process Config File  
Log the existed process configuration file to check detail or modify the setting. The pfp file should be put the same directory with Process Config File or PCIMset(PD).
- Save Process Config File  
Save the current setting the in the process configuration file. If the setting is not complete, PCIMset won't save Process Config File.
- Load PFP File  
Load the PFP file to set up the process configuration file

### 7.1 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 70

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.

## 7.2 Load PFP File

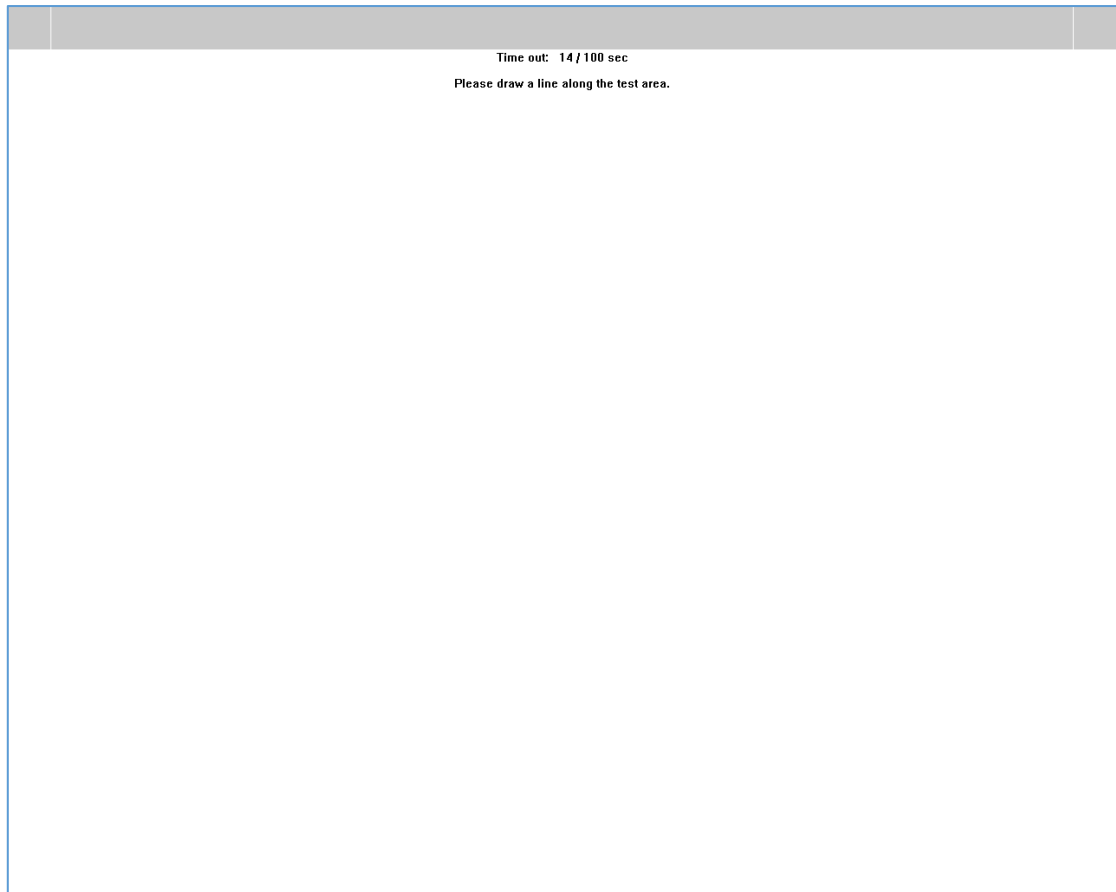
Please provide a valid PFP file by using the “Load PFP File” button. After that, the information of the file will be displayed in utility.

FIGURE 71

## 7.3 Miscellaneous

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 shows the normal test area for drawing test, and the test area when the user can switch on “Lower Accuracy Test in Drawing Test”.



**FIGURE 72**



FIGURE 73

7.4 Select Tests for Process List

There are six selectable of tests. Please click on each button to add the test to Process List.

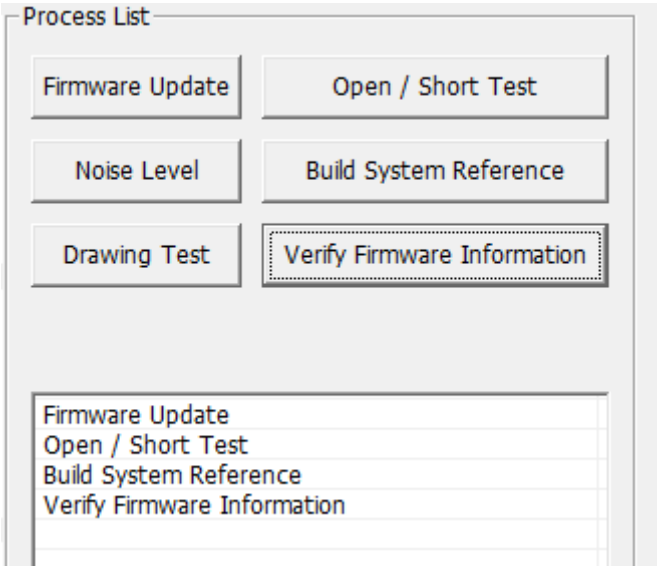


FIGURE 74

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.
<b>Verify Firmware Information</b>	To verify if the device firmware matches the selected PFP file.	