



PiMPro Smart Series User Guide

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Table 1 - PiMPro Smart Series PIM Analyzer Specifications

Description	Typical Specifications	
Electrical Specifications		
Frequency Bands	Receive Range (MHz)	Transmit Range (MHz)
LTE 700 (PiMPro Smart Series Dual Band 700)	698 - 722 (RX1), 780 - 798 (RX2)	745.6 - 769.4 (TX1), 732.6 - 734.4 (TX2)
APT 700 (PiMPro Smart Series Dual Band 700A)	703 - 748 (RX1), 825 - 845 (RX2)	758 - 776 (TX1), 788 - 807 (TX2)
GLOBAL 700A/EURO 800	728 - 733 (RX1), 832 - 851 (RX2)	783 - 810 (TX1), 758, 821 FIXED (TX2)
LTE 800 (PiMPro Smart Series 800)	832 - 862	811 - 821 (TX1), 791 - 795 (TX2)
Cellular 850 (PiMPro Smart Series 850)	824 - 849	864 - 871 (TX1), 881.6 - 894 (TX2)
GSM 900 (PiMPro Smart Series 900)	890 - 915	925 - 937.5 (TX1), 951.5 - 980 (TX2)
DCS 1800 / UMTS 2100 (PiMPro Smart Series Dual Band 1821)	1710 - 1785 (RX1), 1920 - 1980 (RX2)	1805 - 1837 (TX1), 1855 - 1880 (TX2)
PCS/AWS (PiMPro Smart Series Dual Band 1921)	1710 - 1755 (RX1), 1850 - 1910 (RX2)	1965 - 1995 (TX1), 1930 - 1945 (TX2) 2110 - 2155 (TX1)
LTE 2600 (PiMPro Smart Series 2600)	2500 - 2570 (RX1)	2620 - 2644 (TX1) 2690 Fixed (TX2)
Transmitter	Frequency Accuracy: ±1 ppm @ +23°C; Stability ±1 ppm (-10°C to +55°C)	
	Frequency Aging: ±1 ppm/yr	
	Output Power Accuracy: ± 0.3 dB	
	Frequency Step Resolution: ± 10 KHz	
	Output Power Resolution: ± 0.1 dB	
Receiver	Adjustable Power Range: 20 to 46 dBm x 2 (100 mW – 40 W x 2)	
	Residual Intermod Level : < -120 dBm (< -163 dBc at 20 W); -125 dBm (-168 dBc) Typical	
	Measurement Range: -60 to -140 dBm	
	Noise Floor: -136 dBm	
Measurement Modes	Reverse Power Protection: 13 dBm (20 mW) continuous	
	Measurement Method: One Port, Reverse PIM	
	Real Time PIM: 3 rd and 5 th order IMD	
	Return Loss: Measured in dB	
	Frequency Sweep: Frequency Response	
	RSSI: Receive Only Mode – Noise Floor Measurements	
	Noise Floor Measurement: Up-Link noise level with TX off	
	PIM Location (PiMPoint): Distance to PIM Location in Feet or Meters with VP Settings	
Measurement Range	Distance to Fault/Cable Loss: One Port Open-Short Calibration	
	DAS Feature: Path Loss Characteristics (at Low Power overtime)	
	Return Loss: Directivity >25 dB; Resolution: >0.1 dB	
	VSWR: Measurement Range 17:1 to 1.12:1; Resolution: >0.01 dB	
System	Cable Loss: Measurement Range 0 to 30 dB; Resolution: >0.01 dB	
	Distance to Fault: VSWR Range 17:1 to 1.02:1; RL Range: 0 to 40 dB	
	Battery: >3 hours (Full Charge)	
	Power: AC (90 - 256 VAC, 50 - 60 Hz)	
	Alarms: Audio & Visual Display	
	Display Size & Type: 10" SMART TABLET	
	Data Ports: 3 – USB 2.0, 1 x Ethernet LAN Port	
	Remote Control: WiFi Enabled (802.11n)	
	Control: TABLET or TABLET Display	
	Battery Power: 28 VDC	
Electrical	Battery Capacity: 3.5 AH (99.4 WH)	
	Battery Type: Li-Polymer Removable Battery Pack	
Mechanical	Max Power Consumption: <340 W	
	Weight: < 18 to 27 lbs. (8.5 to 12.5 kg) (Model Dependent)	
	RF Output Connector: 1 x 7/16 DIN Female	
	Dimensions (W x H x D): 16.5" x 15" x 8" (419 x 381 x 203 mm)	
	Operating Temperature: -10°C to +45°C (14°F to 113°F), 95% RH	
Storage Temperature: -30°C to +60°C (-22°F to 140°F), 85% RH		

1 Introduction

1.1 Purpose

Passive Intermodulation (PIM) has become one of the greatest challenges of frequency planners in today's mobile communication systems. System planners, equipment and component vendors alike are faced with the ever-changing dynamics of higher transmit signals and base station sensitivity. With the uncertainty of the root cause of PIM in any given system, the need to deploy specific testing solutions in a professional, reliable instrument has become paramount in maintaining network quality. CCI's next generation PiMPro Smart Series has been designed to meet these challenges. Its compact, portable yet rugged features provide maximum power in a reliable, field proven design without compromising measurement accuracy.

1.1.1 PIM Specifications

PIM is normally specified in terms of dBm or dBc. dBm is a measure of power relative to 1 milliwatt. Zero dBm is 1 milliwatt into a 50 ohm load. dBc is a measure of dB below a specified carrier level. For example, 20 watts, or +43 dBm is a typical input power level specified for testing passive devices. A normal test requirement for allowable PIM might be -110 dBm. This would make the specification -110-43, or -153 dBc. The typical range seen today is -100 dBm to -120 dBm with two +43 dBm carriers. The PiMPro Smart Series can output two +46 dBm carriers with better than -130 dBm receiver sensitivity. Hence, the PiMPro Smart Series exhibits an exceptional -176 dBc PIM measurement sensitivity.

1.1.2 Technical Assistance

For Technical Assistance in the use of the PiMPro Smart Series PIM Analyzer please contact CCI (Communication Components, Inc.) at the following address and phone numbers:

CCI

89 Leuning Street

South Hackensack, NJ 07606

Phone Number: 201-342-3338 (9:00 A.M. to 5:00 P.M. - Eastern Standard Time)

1.2 Smart Series System Overview

The Smart Series System consists of the Smart Series PiMPro, Tablet(s), WiFi communications and a Report Generator.

1.2.1 Smart Series PiMPro

The main unit is the Smart Series PiMPro PIM Analyzer which has all the functionality of the previous PiMPro PIM Analyzers and now operates directly from tablet(s). There are only status LED's and a status LCD on the Smart Series PiMPro in addition to the connections and RF Output described in paragraph 1.4 and its subparagraphs.

1.2.2 Tablets

Note that the Smart Series PiMPro can be operated from single or multiple tablets.

1.2.3 WiFi Communication

At this time the WiFi connection is controlled by the Tablet(s) rather than the Smart Series PiMPro. If the Smart Series PiMPro is turned on and the Tablet is turned on the user should see that a connection has been established on the Tablet LCD screen. The WiFi connection icon  in the toolbar will appear "Green" if a good connection is present, or "Red" if there is no connection.

1.2.4 Report Generator

The Smart Series PiMPro utilizes a powerful report generator that can be worked on away from the site in an office environment.

1.3 Important Information

PiMPro PIM Analyzers transmit high power RF energy and must therefore be used with caution and care. Although PiMPro PIM analyzers have built-in protection for its internal key RF components, it is imperative that users use extreme caution when the system is in transmit “TX ON” mode. Mainly that the measurement path is properly terminated before turning “TX” on. Caution should also be used when handling the battery pack. Specifically, users should ensure that the AC power to the analyzer is not on when replacing the rechargeable battery. Further, all RF components in the accessory kit should be handled and torqued with the supplied torque wrench. Particularly low PIM loads and PIM Standards. Make sure to keep all the connectors covered at all times when in not use, to keep it dust free and clean before making any measurements.

1.4 Product Overview

Specifications for the PiMPro Smart Series PIM Analyzer can be found in **Table 1** of this manual. The section below provides a brief product overview and block diagram of the PiMPro Smart Series PIM Analyzer.

1.4.1 Analyzer Frequencies Available

CCI's PiMPro Smart Series Analyzer is presently available for the following frequency bands:

Model	Frequency Band	TX1 (MHz)	TX2 (MHz)	RX1 (MHz)	RX2 (MHz)
PiMPro Smart Series 700 (Dual Band)	LTE 700	745.6 - 769.4	732.6 - 734.4	698 - 722	780 - 798
PiMPro Smart Series 700A (Dual Band)	APT 700	758 - 776	788 - 807	703 - 748	825 - 845
PiMPro Smart Series 7080 (Dual Band)	Global 700A & EURO 800	783 - 810	758 (Fixed), 821 (Fixed)	728 - 733	832 - 851
PiMPro Smart Series 800	LTE 800	811 - 821	791 - 795	832 - 862	
PiMPro Smart Series 850	Cellular 850	864 - 871	881.6 - 894	824 - 849	
PiMPro Smart Series 900	GSM 900	925 - 935.4	951.6 - 980	880 - 915	
PiMPro Smart Series 1821 (Dual Band)	DCS & UMTS 1800	1805 - 1837	1855 - 1880	1710 - 1785	1920 - 1980
PiMPro Smart Series 1921 (Dual Band)	PCS & AWS	1965 - 1995	1930 - 1945	1710 - 1755	1850 - 1910
		2110 - 2155			
PiMPro Smart Series 2600	LTE 2600	2620 - 2644	2690 Fixed	2500 - 2570	

1.4.2 Construction and Layout

Note that the remote tablet(s) control the functioning of the PiMPro Smart Series PIM Analyzer. Therefore, the items covered in this paragraph are only those items located on the PiMPro Smart Series PIM Analyzer.

Figure 1 shows an overall view of the PiMPro Smart Series PIM Analyzer with locations of the Status LED's (PWR, ALARM, TX, RX, WiFi), the WiFi Antenna and the small LCD for unit status (Date, Time, Battery Charge, PA (Power Amplifier) Temperature, plus any alarm messages will be displayed here). **Figure 2** shows the Location of the RF Output port. **Figure 3** shows the DC Input port, On/Off Switch, USB Connector location, Ethernet (RJ45) port, External Clock Input port, and the battery compartment.

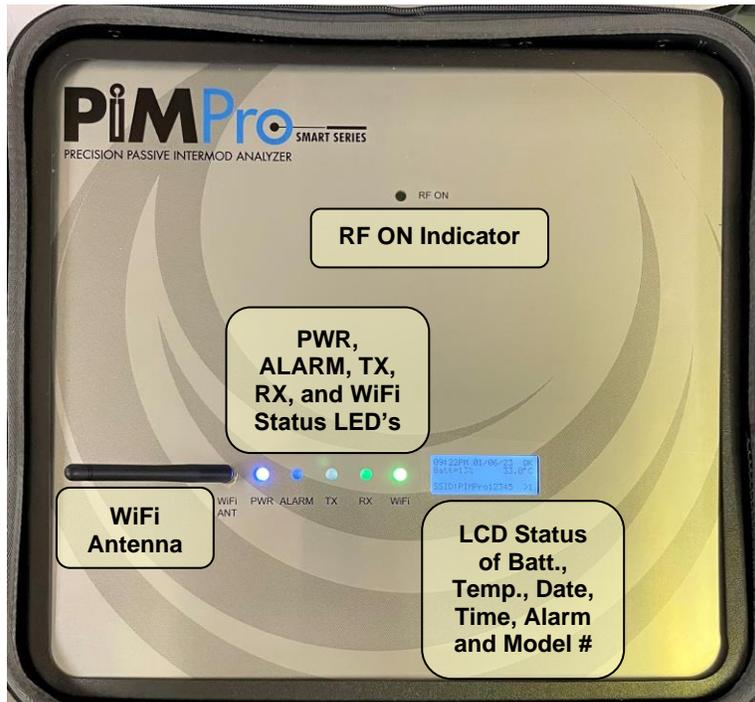


Figure 1 - View of the CCI PiMPro Smart Series PIM Analyzer Main Panel

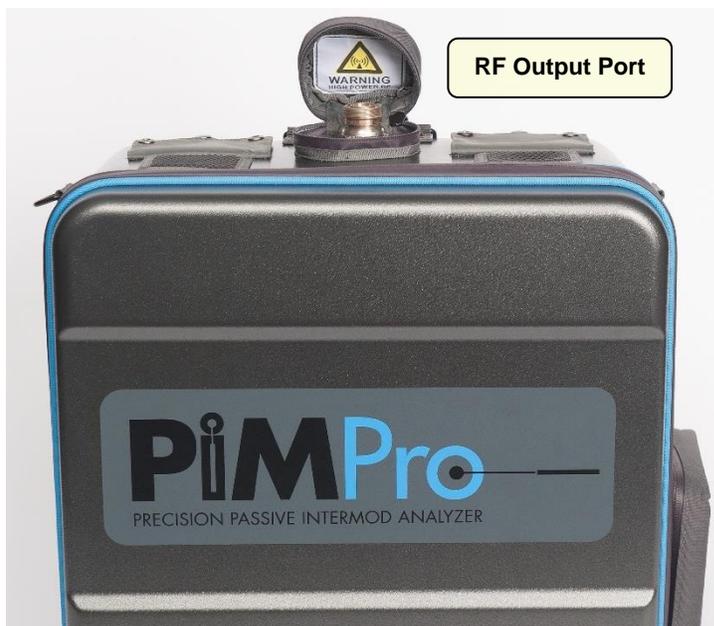


Figure 2 – PiMPro Smart Series RF Output Port

1.4.2 Construction and Layout (Cont.)

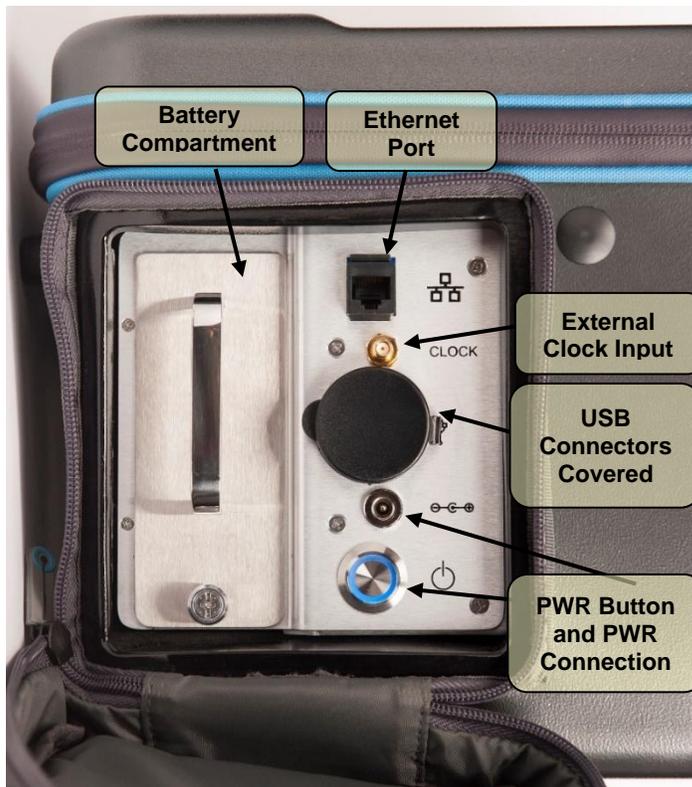


Figure 3 – Power, Ethernet, Battery, USB and Other Connections Access

1.4.2.1 “RF ON” Indicator

An “RF ON” (Red LED) indicator is located near the top of the PiMPro Smart Series PIM Analyzer as shown in **Figure 1** above.

1.4.2.2 Status LED’s

There are five (5) Status LEDs located on the main panel of the PiMPro Smart Series PIM Analyzer as shown in **Figure 1**. They include the following:

- 1) PWR – Illuminated when power is applied.
- 2) ALARM – Illuminates when a fault is present.
- 3) TX – Illuminates while the PiMPro is transmitting DATA to the Tablet(s).
- 4) RX – illuminates while the PiMPro is receiving DATA from the Tablet(s).
- 5) WiFi – illuminates when the WiFi module in the unit is ON.

1.4.2.3 WiFi Antenna

There is one removable WiFi antenna located on the main panel of the PiMPro Smart Series PIM Analyzer as shown in **Figure 1**. As this is integrated within the PiMPro Smart Series no external router is required.

1.4.2.4 Status LCD Display

The status LCD Display on the Smart Series Main Panel shows the basic status of the PiMPro Smart Series PIM Analyzer as shown in **Figure 1**. It displays the current date, time, battery charge status and temperature plus any alarm conditions of the unit.

1.4.2.5 RF Output Port

The RF Output port or Test port shown in **Figure 2** is a DIN 7/16-Female connector located at the top of the instrument. An option for a 4.3-10 connector will be offered as well. *Please note that a “Connector Saver” is placed on the RF Output port to protect the output connector.*

1.4.2.6 ON/OFF Switch

The ON/OFF switch is located on the right-hand side of the PiMPro Smart Series PIM Analyzer. See **Figure 3** for a view of the ON/OFF switch.

1.4.2.7 DC Input from AC Adapter

The 28VDC Input from the AC Adapter is located on the right-hand side of the PiMPro Smart Series PIM Analyzer between the ON/OFF Power Switch and the External Clock Input when facing the PiMPro Smart Series PIM Analyzer. See **Figure 3** for location of the DC Input from the AC Adapter.

1.4.2.8 External Clock Input

An external clock Input (10 MHz) can be found between the DC Input and the Ethernet (RJ-45) connector on the right-hand side of the PiMPro Smart Series PIM Analyzer as can be seen in **Figure 3**. This is utilized to synchronize the PiMPro time-base to the same as a spectrum analyzer or a signal generator and is only utilized during the factory Calibration process.

1.4.2.9 RJ-45 Ethernet Port

An Ethernet (RJ-45) port connection is utilized for computer control of the PiMPro Smart Series and factory calibration. See **figure 3** for location of the RJ-45 Ethernet port.

1.4.2.10 Lithium Polymer Rechargeable Battery

A Lithium Polymer rechargeable Battery is included for portable operation of the PiMPro Smart Series PIM Analyzer.

1.4.2.11 Rechargeable Lithium Polymer Battery Access

There is access to the rechargeable Lithium Polymer battery which can be seen on the left-hand side of the connections noted in **paragraphs 1.4.2.6 through 1.4.2.9**. The battery can be replaced or charged externally by removing the battery tray/bracket from the PiMPro unit.

1.4.2.12 USB Ports

The USB ports (uncovered) are located as shown in **figure 4** below. The storage of files and uploading or downloading of files is performed utilizing the USB port(s). GPS location capability is an available option and when this option is ordered a GPS antenna is included to connect to the USB port. GPS location capability is an available option and when this option is ordered a GPS antenna is included to connect to the USB port.



Figure 4 – USB Connectors (Uncovered)

1.4.2.13 PiMPro Smart Series PIM Analyzer in Backpack

CCI's PiMPro Smart Series PIM Analyzer is protected by a reinforced backpack case, which can easily strap to a climber's back for top-of-the-tower performance testing. Additionally, the unit can be safely secured to most any tower structure with its integrated industrial grade clips.

1.4.2.14 "WARNING HIGH POWER RF" Label

The "WARNING HIGH POWER RF"  Label is placed inside the "pocket" (see in **figure 2**) that is unzipped for access of the output port on the PiMPro Smart Series PIM Analyzer backpack. This label is utilized to warn the user that RF Output Power at this port (if unterminated) is at a "High" Level (up to +46dBm (40 Watts)) when the "TX ON" RED LED is ON.

1.4.3 Functional and Physical Specifications

Electrical and mechanical specifications for the CCI PiMPro Smart Series product line can be found in **Table 1**.

1.4.4 Equipment Changes

CCI reserves the right to make changes to the equipment, including but not necessarily limited to component substitution and circuitry changes. Changes that impact this manual may subsequently be incorporated in a later revision of this manual.

2 PiMPro Smart Series Operation

This section instructs the user on operation of the PiMPro Smart Series PIM Analyzer.

2.1 Turn-On PiMPro Smart Series PIM Analyzer

The analyzer can be operated either by connecting the unit to the AC adaptor and AC power or just by a fully charged battery. Turn on the unit with the power switch on the side, the blue light of the switch will be illuminated, the fans will turn on for a few seconds as a test run, the LEDs will flash on momentarily and after a few seconds the unit will be ready for operation.

2.2 Turn on the Tablet

Turn on the tablet, and once it is initialized check to see if the WiFi connection with the PiMPro is available as seen in **figure 5** below.

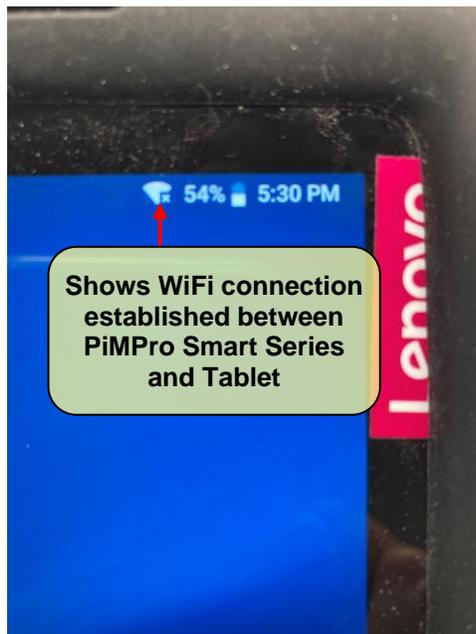


Figure 5 – Tablet Wi-Fi Connections Available

2.3 Open the PiMPro Smart Series

Once the user has verified that the WiFi connection to the PiMPro Smart Series has been established, find the PiMPro icon shown in **figure 6** (the icon will list PiMPro and a version number (in this case 1.06.30 is shown)) on the tablet screen and click on it to get to the PiMPro Smart Series Main screen.

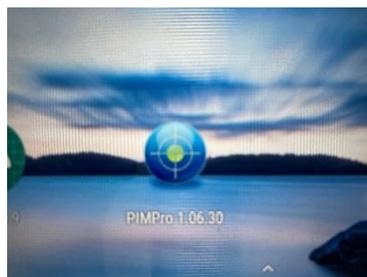


Figure 6 – PiMPro Icon on Tablet

2.4 PiMPro Smart Series Main Menu

The PiMPro Smart Series Main Menu will appear as shown in **figure 7** below. It will contain the icons noted below.

- 1) A toolbar is found at the top of the PiMPro Smart Series Main Menu window, and it contains the following items (from left to right):
 - a. PA (Power Amplifier) Temperature Icon -  shows the temperature of the PA.
 - b. Camera Icon -  allows user to take a Screenshot (.JPG image) of the Tablet LCD Screen for later use.
Note: screenshot images are saved by going to tablet's Setting → Storage → Files → PiMPro → Screen Shots.
 - c. USB Flash Drive Icon -  If there is a USB flash drive inserted, then an icon will appear
 - d. GPS Antenna Icon – Green GPS  icon – GPS Antenna connected and data available. Yellow GPS  icon - GPS Antenna not presently connected, data from previous connection available. Red GPS  icon - GPS Antenna not connected and data not available.
 - e. Speaker ON/OFF Icon
 - f. WiFi connection and information icon - a Red connection  icon means no connection, a Green connection  icon means strong good connection.
 - g. AC Power Icon –  shows when AC Power is connected to the Smart Series PiMPro
 - h. Battery Power Icon –  shows when the battery is connected to the Smart Series PiMPro
- 2) PIM & R.Loss - for setting up “Real Time measurements” of PIM and Return Loss
- 3) RX Interference – An “Amplifiers OFF” check of the appropriate RX Band.
- 4) Frequency Sweep - Holds the 1st TX tone (f1) steady and changes frequency of the 2nd test tone (f2).
- 5) PIMPoint – A Distance to PIM/Distance to Fault test.
- 6) DAS Test – A low power single tone output test used to provide a companion diagnostic tool for DAS Installation and Primary Propagation Loss Testing. Includes Tx Generator and Rx Capture functions.
- 7) Cable Loss – Adds ability to measure the Insertion Loss of a cable of any length by specifying the cable type.
- 8) Reports - Access to *Local Drive, Tablet Memory or USB Memory, Saved Files, Open Report, Copy Report, Rename Report, Delete Report and Exit.*
- 9) Configure System - Access to System Level Settings for *Set Clock, Set Defaults, Manage Labels, Manage Cables, Update Software, Manage Resources, Manage PiMPro WiFi, Manage Ethernet and Done, which returns it to Main Menu Screen*
- 10) Quick Start Guide - A Quick Start Guide (QSG) is loaded on the PiMPro Smart Series PIM Analyzer.

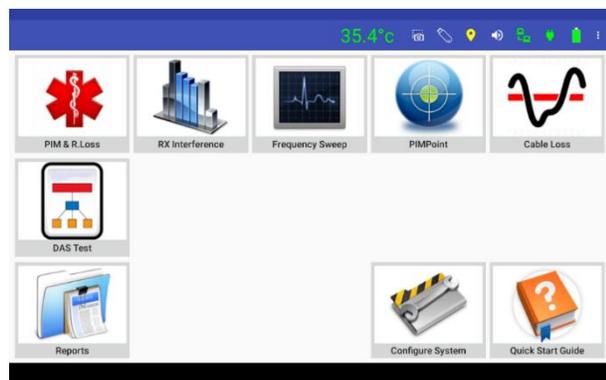


Figure 7 – Main Menu Screen

2.4.1 Select **Quick Start Guide** Icon

If you are unfamiliar with the PiMPro Smart Series and have not been through PiMPro Smart Series training, a shortened version of this guide can be viewed as a PDF file directly from the touchscreen of the tablet by depressing the **Quick Start Guide** icon on the Main Menu.



2.4.2 Select **PIM and R.Loss** Icon

Press the **PIM and R.Loss** icon found in the **Main Menu** screen on the tablet shown in **Figure 7**. This will open the **PIM and R.Loss** screen on the tablet as shown in **Figure 8** below. A listing of the available or viewable items on this screen and a brief description follow:

- 1) **IM Bar Chart** - indicates upper, pass, fail and lower IM limits in dBm.
- 2) **IM Value** - indicates the IM value reading (for IM Order # selected) in dBm while the TX is ON and IM is being measured.
- 3) **TX OFF/ON Slider** - the TX icon (shows the text “OFF” just to the left of the slider), and the slider next to it is gray. This icon becomes red when depressed (turns on the RF Output Power at the appropriate TX frequencies and the associated text changes to “ON”).
- 4) **Return Loss Value** – is not visible until TX Power is turned on (see **Figure 9**). In the “Default” setting It indicates the Return Loss value in dB while being measured and continues to show the last value after a measurement has been performed.
- 5) **F1/F2 Power Level** - indicates the power level set for the F1 & F2 RF Signal.
- 6) **F1 & F2 Frequencies** - indicates the F1 & F2 TX frequencies to be used to generate proper IM.
- 7) **Record Reading** - Temporarily saves the recorded data or chart into a report.
- 8) **Manage Reports** – Makes it possible to view the report in its present state and offers menu icons for other report related information.
- 9) **Show Graph** – shows the PIM reading in graphical format when depressed.
- 10) **Load/Save Setup** - indicates the “setups” available in either the “Local Drive” or the “USB memory,” and offers other load/save menu options.
- 11) **Time** – allows the user to set the test time.
- 12) **Exit** - allows for return to the Main Screen menu.

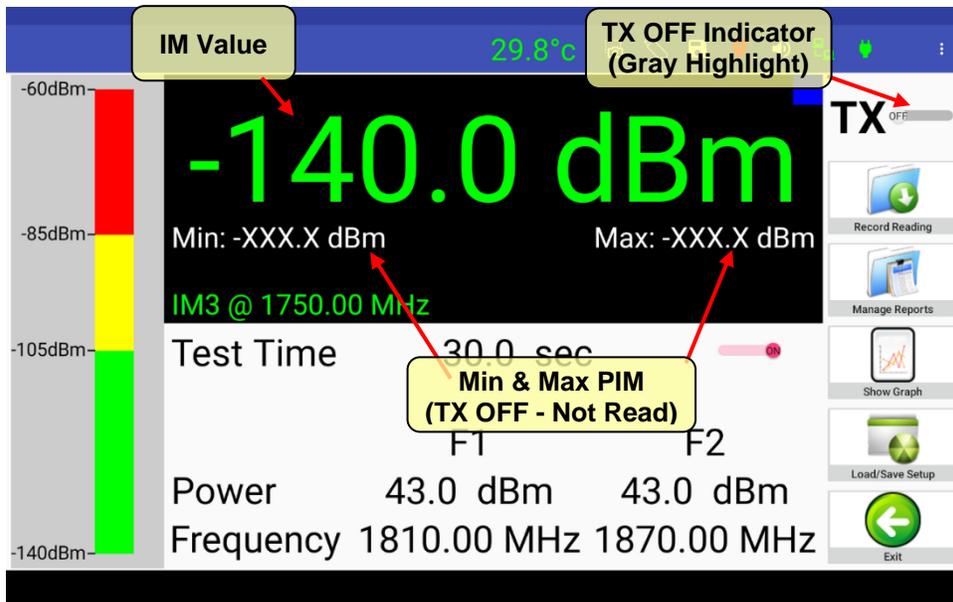


Figure 8 - PIM and Return Loss Window with “TX OFF”

2.4.2.1 Connect the PiMPro Smart Series to a LOW PIM High-Power Termination

The PiMPro Smart Series Accessory Kit provides a Low-PIM High-Power Termination and a calibrated Torque Wrench for PIM measurement and calibration purposes. Connect the Low-PIM High-Power Termination to the RF Output of the CCI PiMPro Smart Series PIM Analyzer. Ensure that the connectors are all “clean” prior to making the connections. Hand-tighten all connectors while ensuring that the connectors are not misaligned. Once the connectors are hand-tightened, use the Torque Wrench to tighten the connectors.

2.4.2.2 Turn On RF Output

Prior to turning on the RF Power the user should check all of the variables including Power Levels, Frequency, Test Time, dBm or dBc, etc. Press the **TX** slider as shown in **Figure 9** to turn on the RF Output Power. The RF Indicator (slider next to TX) text will change to a **red highlight** and the text will show “ON” at the right side of the slider. You will now see Min. and Max. PIM readings appear as well as a value for **RLoss** in dB. See **paragraph 2.4.2.4** below to record the measurement of the High-Power Low PIM Load (if required). Verify that the readings are at an “Acceptable” level while the Low PIM Load is connected.

Warning: Do NOT swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on. Do NOT disconnect the PIM LOAD while the RF is ON.

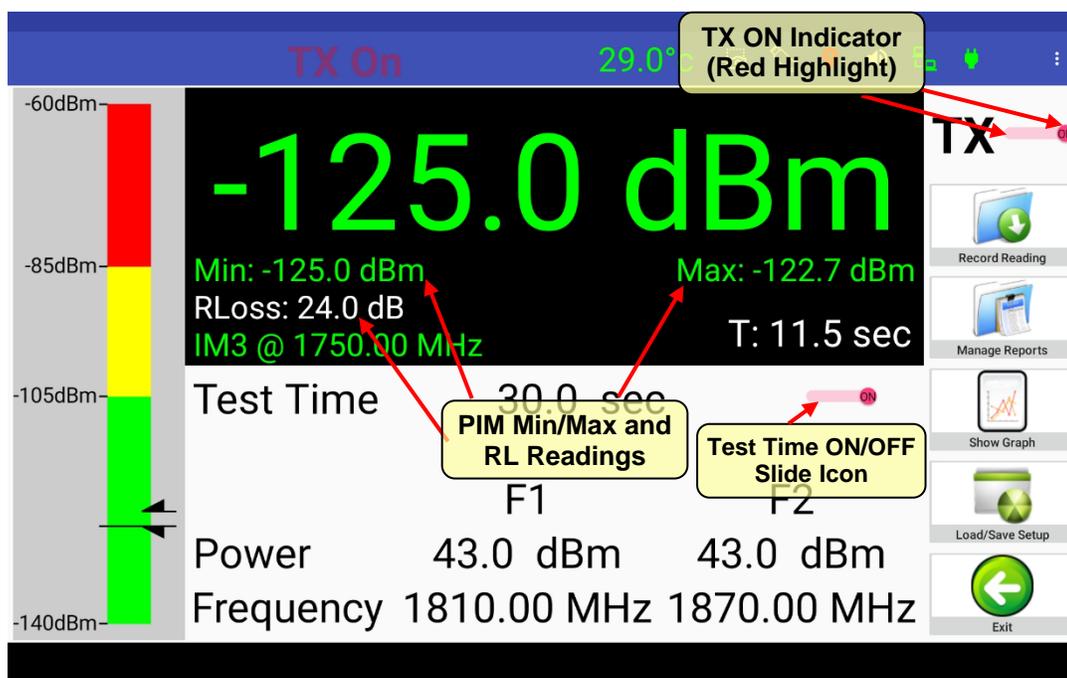


Figure 9 - **PIM and Return Loss** Window with “TX ON”

2.4.2.3 Connect PiMPro Smart Series to Feeder Line to be Tested

Prior to changing from the Low PIM Load to the Feeder Line to be tested, turn the TX power to the “OFF” setting. Now the user can loosen and disconnect the Low PIM High Power Termination. Connect the RF Cable (System, Feeder or other) to be tested to the RF Output of the CCI PiMPro Smart Series Analyzer, be sure to terminate the cable with the high power PIM Load. Ensure that the connectors are all “clean” prior to making the connections. Hand-tighten all connectors while ensuring the connectors are not misaligned. Once the connectors are hand-tightened, use the CCI-supplied Torque Wrench to tighten the connectors. See **paragraph 2.4.2.4** below to record the measurement of the Feeder Line.

2.4.2.3.1 PIM Verification (if required)

If the PIM measurement is ever in question the “Unit Under Test” (UUT) can be disconnected, after ensuring that the TX power is turned “OFF.” At this time, the connections to the UUT can be disconnected. Ensure that the connectors from the removed UUT and any cables are “clean.” The PIM Standard can now be placed on the RF output connector of the PiMPro Smart Series PIM Analyzer after also ensuring that it is “clean” and free of any debris. Place the High-Power Low PIM Load on the PIM Standard and hand tighten the Load. Once the PIM Standard and Low PIM Load are hand tightened and torqued to the proper value with the supplied torque wrench the PiMPro Smart Series can be turned “ON” and the PIM reading can be taken. The PIM value read on the touch screen display should be reasonably close to the PIM value that the known PIM Standard is supposed to produce.

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.

2.4.2.3.2 Return Loss (RL) Verification (if required)

If the RL measurement is ever in question the “Unit Under Test” (UUT) can be disconnected, after ensuring that the TX power is turned “OFF.” At this time, the connections to the UUT can be disconnected. Ensure that the connectors from the removed UUT and any cables are “clean.” A high-power attenuator (with DIN 7/16 connectors) can now be placed on the RF output connector of the PiMPro Smart Series PIM Analyzer after also ensuring that it is “clean” and free of any debris.

Once the high-power attenuator is hand tightened and torque to the proper value with the supplied torque wrench the PiMPro Smart Series can be turned “ON” and the RL reading can be taken. The RL value read on the touch screen display should be double the attenuation value of the high-power attenuator, as the RL is affected by the attenuation in both the forward and reverse (reflected) directions.

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.

2.4.2.4



Record Reading

Record Measurement

The PiMPro Smart Series PIM Analyzer will display the current PIM readings of the feeder or device it is connected to. When you are ready to record the reading being displayed (Note: the PIM readings should be stable before recording the measurement – consult the PiMPro Smart Series User Manual for more detailed information) press the *Record Reading* icon on the *PIM and Return Loss* screen. **Data can (should) only be recorded when the Transmit RF Power is “ON.” Note: Pressing the Record Reading does not save the report.**

2.4.2.5 Enter Site Information

“When the *Record Reading* icon is depressed, the *Site Information* Screen opens as depicted in **Figure 10**. Enter information on the Operator (i.e., AT&T, Verizon, T-Mobile, Sprint, etc.) and the Site Number. Also, enter your initials into the Technician field. Pressing the bar on the right side of each field will bring up a *Keyboard Entry* Screen which will allow you to enter the desired information. When you have finished entering the required site information, press the **OK** Icon.

2.4.2.5 Enter Site Information (Cont.)

Figure 10 - *Site Information* Window

2.4.2.6 Enter Sector Information

After completing the Site Information above, the *Sector Information* Screen is displayed as depicted in **Figure 11** below. Press the bar to the right-hand side of each field to enter the Sector and the Feeder information. Once the information has been entered, press the *OK* icon at the bottom of the screen. Note that the Site and Sector Information are required only on the first PIM measurement. Subsequent PIM measurements do not require re-entry of this information.

Figure 11 - *Sector Information* Screen

2.4.2.7 Select Label Menu Sector

Once the *Site Information* and *Sector Information* data entry has been completed, the *Label and Comment* pop-up window is displayed as shown in **Figure 12**. The PiMPro Smart Series PIM Analyzer does provide a list of default labels as shown in **Figure 12**. Additionally, the user can click on “Add Label” to open a keyboard entry screen which the user can then use to type the desired label. The “Menu” icons available in the Select Label function are described in the paragraphs below, and include the following:

- 1) Comment
- 2) New Sector
- 3) Cancel
- 4) Add Label
- 5) OK

2.4.2.7 **Select Label Menu Sector (Cont.)**

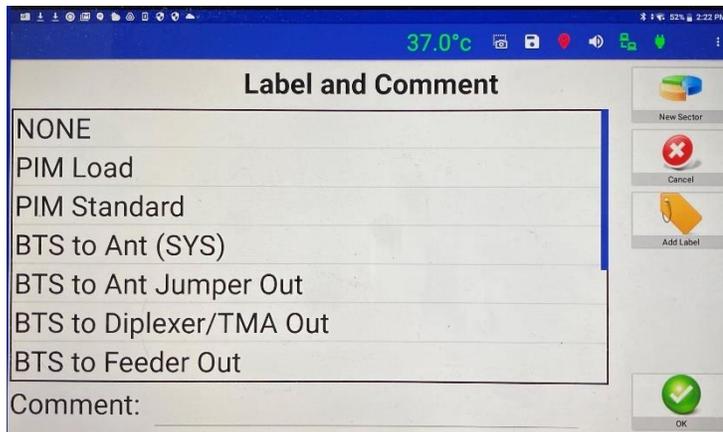


Figure 12 - Select Label Window

2.4.2.7.1 **Comment**

The **Comment** bar allows for extra information to be added to further update whatever information the “User” feels is necessary. Pressing the comment bar will open the *Keyboard Entry* Screen. For instance, the comment can indicate that this is a “return to the site...” for retest after cable or component replacement has been performed.

2.4.2.7.2 **New Sector**

Press the **New Sector** icon if it is desired to perform PIM testing on a new sector, or a new feeder within the same sector. This opens the *Sector Information* Screen. See **paragraph 2.4.2.6** above for details.

2.4.2.7.3 **Cancel**

Press the **Cancel** icon if the user has inadvertently pressed the **Record Reading** icon (i.e., the user was not prepared to take a reading at that time) in the *PIM & RL* window.

2.4.2.7.4 **Add Label**

Press the **Add Label** icon if a brand-new label is required. The *Keyboard Entry* Screen will appear on the touch screen and the new label name that is desired can be entered.

2.4.2.7.5 **OK**

When the select label process is complete, depress the **OK** icon to return to the *PIM and Return Loss* (real time measurement) screen.

2.4.2.7.6 GPS Status

GPS Status can be determined by depressing the GPS Status Icon. This opens the GPS Status pop-up window (see **figure 13**). If no data is available, the screen will appear as shown in **figure 14**. This will give the following information:

- 1) GPS Status (Locked, not Locked, Unavailable)
- 2) Latitude (Detailed)
- 3) Longitude (Detailed)
- 4) Data Taken (Date and Time Info.)

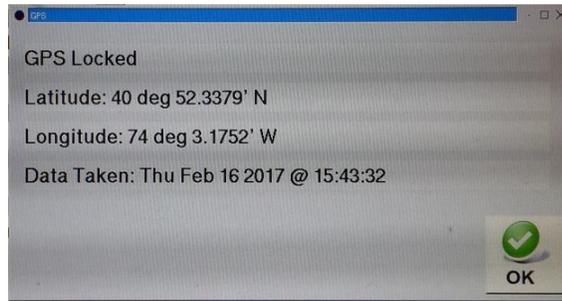


Figure 13 – GPS Status Details Screen

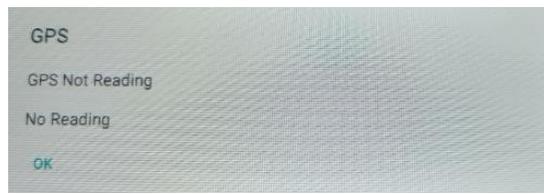


Figure 14 – GPS Status Details Screen when No Data is Available

2.4.2.8 Manage Reports

The PIM measurements taken thus far can be viewed at any time and a report can be created by pressing the *Manage Reports* icon on the *PIM and Return Loss* screen (see **figure 9**). See **paragraph 2.4.9 and its subparagraphs** for details of the Manage Reports functions available. Manage Report allows for menu-type functions to be performed. These functions include the following:

- 1) Save Report
- 2) Start New Report
- 3) Open Report to Continue
- 4) New Sector
- 5) View Current Report
- 6) Manage Reports
- 7) Done/Exit

2.4.2.9



Show Graph

The Show Graph function (see **figure 15** below) allows the user to view the Instantaneous PIM & Return Loss vs. Time in a graph format as an alternative to viewing the instantaneous data, along with the Maximum and Minimum data points. This may be helpful to the user, as it captures “jumps” in the PIM & RL for the specified time period which might be missed when viewing the “Display” mode while in the PIM & RL test mode. Note that from the “**Show Graph**” window the user can “**Record Reading**” go to “**Manage Reports**,” or “**Exit**.”

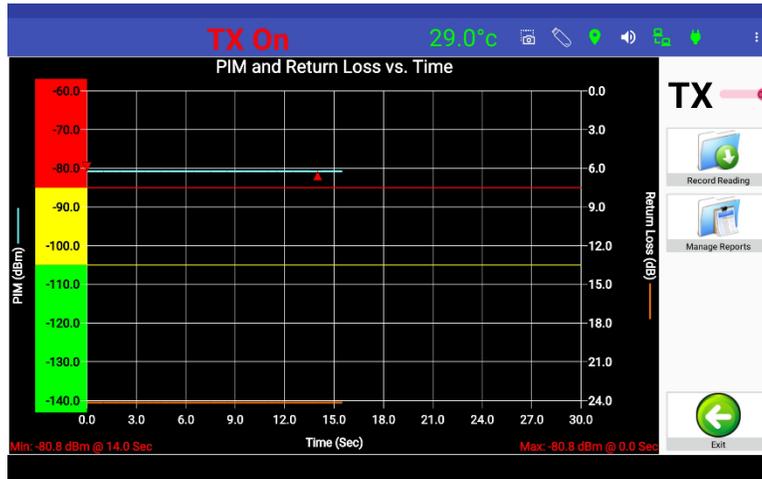


Figure 15 – Show Graph Screen

2.4.2.10 Load/Save Setup

Load/Save Setup

Pressing the *Load/Save Setup* icon from any measurement screen allows the user to load a previously saved setup, save a modified setup. *Setups are a “description” of the measurement function, power levels and frequency settings*, and can be saved in the PIM Analyzer **Disk** or to the **USB**. The options available on the *Load/Save Setup* Window Menu (see **figure 16** below) are as follows:

- 1) Select Drive – Disk or USB
- 2) Previously stored setups
- 3) Save Setup
- 4) Load Setup
- 5) Copy Setup
- 6) Delete Setup
- 7) OK – Returns user to previous window

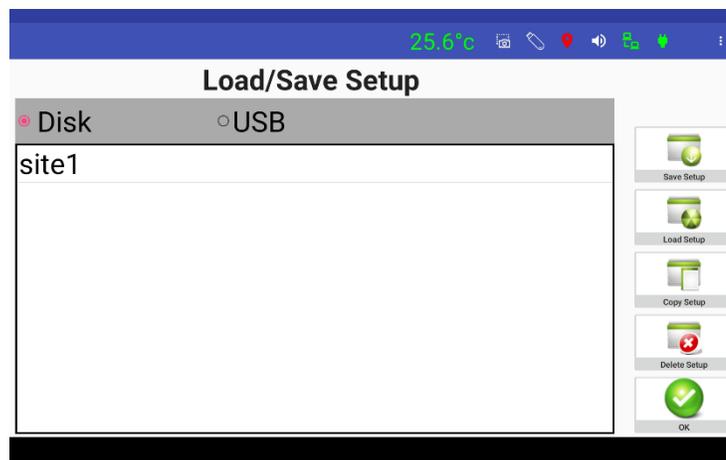


Figure 16 - *Load/Save Setup* Screen

2.4.2.10.1 Select Drive

Allows the user to choose whether the setup to be saved, opened, copied, or deleted is located on the **Disk** drive or the **USB** drive.

2.4.2.10.2 Existing Setup(s)

Existing Setups are the setups that are listed with a “filename” in the large portion of the *Load/Save Setup Menu* screen.

2.4.2.10.3 Save Setup

Save Setup

Allows the user to save a setup as modified by the user on either the **Disk** drive or the **USB** drive. Pressing the “File Name:” bar in the “Save Setup” pop-up window will open the keyboard entry screen and allow the user to type in a file name.

2.4.2.10.4 Load Setup

Load Setup

Allows the user to select the setup that is desired for use in *PIM* (real time measurement) testing by highlighting the applicable setup name screen display.

2.4.2.10.5 Copy Setup

Allows the user to copy the desired setup to/from the Local Drive/USB Drive as desired.

2.4.2.10.6 Delete Setup

Allows the user to delete an unwanted setup.

2.4.2.11 Configure PIM Limit Levels

Pressing the PIM Scale on the touch screen display opens the *Configure PIM Scale* pop-up window (see **figure 17**). This function can be used to modify the PIM Pass/Fail limits if required. The following items are accessible to the user from this menu:

- 1) Pass/Fail Limits
- 2) Units (dBm or dBc)
- 3) Battery Life (Low Noise, Normal & Extended)
- 4) Cancel
- 5) Default
- 6) OK



Figure 17 - *Configure PIM Scale* Window

2.4.2.11.1 Pass/Fail Value, Marginal Value PIM Level Setting

Pressing either the “Pass/Fail” (-85.0 dBm) or “Marginal” (-105.0 dBm) PIM level values on the color bar to the left of the screen opens a pop-up and data entry window where the user can adjust the levels as required. Each of the pop-up windows has a keypad that appears as shown in **figure 18** below and allows for entry of the appropriate limit in dBm. *Note that the pop-up window includes an indication of the applicable PIM limits that can be set in dBm (-140.0 dBm to -60.0 dBm) or dBc (-185 dBc to -105 dBc) that can be specified.*

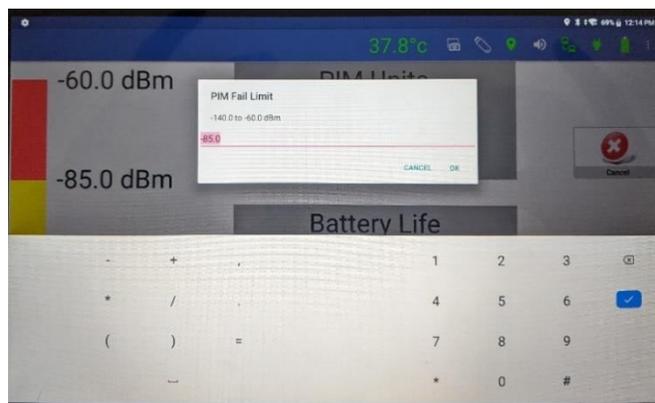


Figure 18 - “PIM Fail Limit” Value Window

2.4.2.11.2 Units

Pressing the dBc unit's portion of the popup window shown in **figure 17** changes the PiMPro Smart Series PIM Analyzer scale unit's to dBc. Pressing the dBm unit's portion of the popup window changes the PiMPro Smart Series PIM Analyzer scale units back to dBm.

2.4.2.11.3 Battery Life

The instrument is capable of making PIM measurements in 3 different modes. In all 3 modes the PIM measurement is very accurate, the only difference is by reducing the sampling time of the transmitter the unit extends the operating time when using the battery. The amount of battery operation time in each mode varies with the Model/Band of the unit and on the environmental conditions and test settings. To choose the maximum amount of operation time on a single battery, pick the “Extended” Mode per instruction below. Selection of one of the Battery Life radio buttons as shown in **figure 17** allows selection as follows:

- 1) Low Noise – allows for “Low Noise” operation of the PiMPro Smart Series PIM Analyzer (Transmitter sampling time 64 msec).
- 2) Normal - allows “Normal” operation of the PiMPro Smart Series PIM Analyzer (Transmitter sampling time 16 msec).
- 3) Extended - allows for an “Extended” battery life (Transmitter sampling time 4 msec).

2.4.2.11.4 Cancel

Pressing the *Cancel* icon shown in **figure 17** will return the user to the *PIM and Return Loss* measurement window.

2.4.2.11.5 Default

Pressing the *Default* icon shown in **figure 17** will reset the IM Limits to the following values:

- 1) Min IM Value → -140 dBm
- 2) Min IM Pass Value → -105 dBm
- 3) Max IM Fail Value → -85 dBm
- 4) Max IM Value → -60 dBm

2.4.2.11.6 OK

Pressing the OK icon on the touch screen display accepts any changes that have been made to any of the selections available on the “Configure PIM Scale” pop-up window.

2.4.2.12 IM Reading

The **IM Reading** is the largest font size numeric value on the *PIM and Return Loss* (real time measurement) window as shown in **figure 19** with TX OFF. The **IM Reading** can be changed from dBm to dBc (see **figure 17**) when the user configures the PIM Levels as noted in **paragraph 2.4.2.11** OR by tapping the dBm/dBc in the large display window. *Note that IM readings are performed in the Rx Band only. Also note that when the IM reading is converted from dBm to dBc or vice versa, the IM Bar Chart changes from dBm to dBc respectively.*

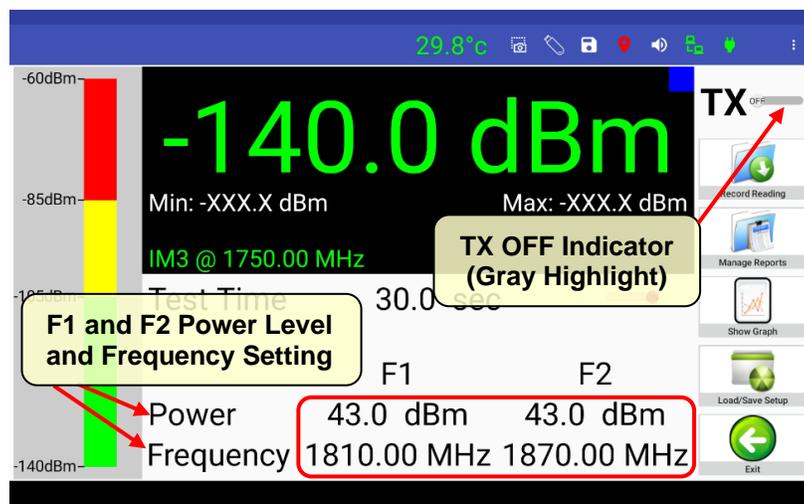


Figure 19 - *PIM and Return Loss* Window during “TX OFF”

2.4.2.13 Return Loss (R_L) Reading

The **Return Loss (R_L)** value is shown in white text in the location indicated in **figure 8**. The R_L is only available when the RF output is “ON”. *Note that Return Loss readings are performed in the Tx Band only.*

2.4.2.14 F1/F2 Power Level Set Windows

Pressing the F1 or F2 Power displays where shown in **figure 19** (black text near the bottom of the screen) opens the “*Tx Power Level*” pop-up window. The “*Set Tx Power Per Channel*” pop-up window also opens a keypad and allows for entry of the appropriate limit in dBm as shown in **figure 20**. *Note that the “Tx Power Level” display screen includes an indication of applicable limits (+20.0 dBm to +46.0 dBm) for the Smart Series PiMPro. Finally, note that setting either the F1 or F2 Power sets the power for both F1 and F2 outputs.*

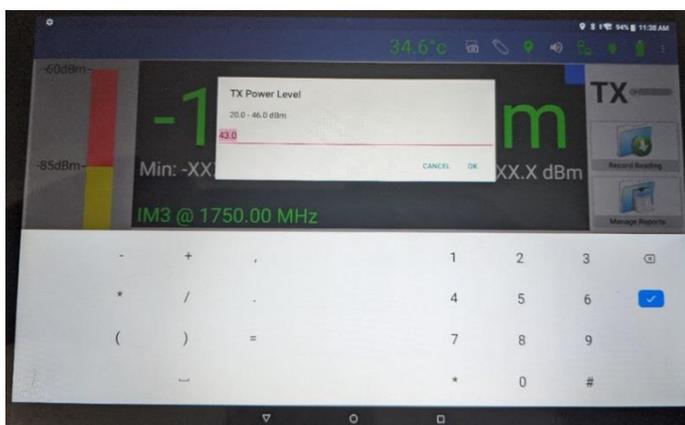


Figure 20 - **Set Tx Power Per Channel** Window

2.4.2.15 F1/F2 Frequency Set Windows

Pressing the F1 or F2 Frequency displays where shown in **figure 19** (black text near the bottom of the screen) opens the **Set Tone 1 Frequency** or **Set Tone 2 Frequency** windows as applicable. *Note that the display screen includes an indication of applicable frequency limits (1805.0 MHz to 1833.0 MHz for Tone 1, and 1855.0 MHz to 1870.0 MHz for Tone 2).* The **Set Tone 1 Frequency** and **Set Tone 2 Frequency** windows have a keypad and allows for entry of the appropriate frequency in MHz as shown in **figure 21**. Note that this example lists the values for the PiMPro Smart Series PIM Analyzer 1821.

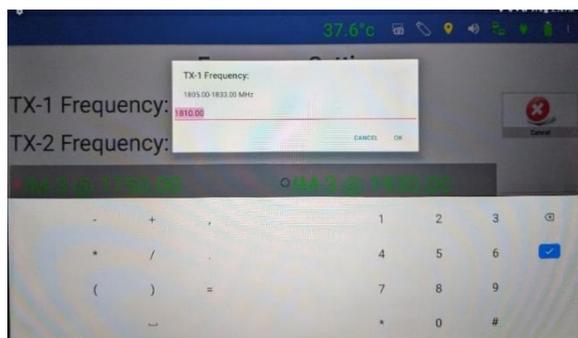


Figure 21 - **Set Tone 1 Frequency** Window

2.4.2.16 IM Product @ $f_{(IM \text{ Product})}$

The **IM Product** to be measured at the calculated **IM Product Frequency** appears in green text and is in the location indicated in **figure 20**. The **IM Product** and **IM Product Frequency** will be discussed in the following paragraphs. Pressing the **IM Product@ $f_{(IM \text{ Product})}$** portion of the touch screen display will open up the **IM Select** pop-up window as seen in **figure 22** below.

2.4.2.16.1 IM Select Window

When the **Set Tone 1 Frequency** or **Set Tone 2 Frequency** data is entered and either enter or cancel icons are depressed an **IM Select** pop-up window appears. This window indicates the IM3, IM5, IM7 and IM9 product frequencies. *Note that the PiMPro Smart Series automatically calculates the IM3 through IM9 frequencies, and highlights with a "green" any frequencies that fall within the Rx Band. Similarly, the PiMPro Smart Series highlights any frequencies that fall outside of the RX band with a "red" background.* The user can then decide which IM product frequency to perform the test on. This decision is required no matter whether there are only one or more IM product frequencies that appear in the Rx Band. The user must depress the desired IM Product frequency to perform the PIM test at. See **figure 22** for the standard IM3 frequency display when the 1810.0 and 1870.0 MHz Tx (Tone 1 and Tone 2) frequencies are used for PIM

testing.

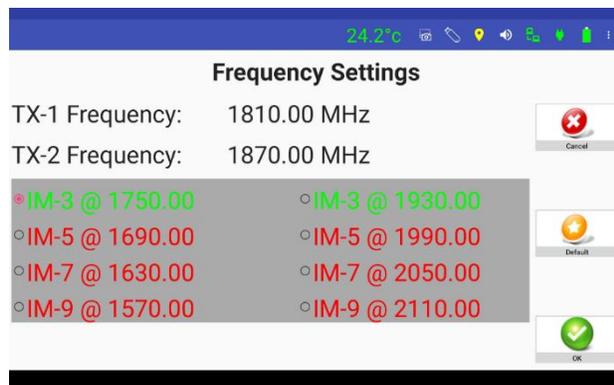


Figure 22 - **IM Select** Window, (IM3) @ F1 = 1810.0 MHz and F2 = 1870.0 MHz

2.4.2.17 RF OFF/ON

When the RF is “OFF” the RF Indicator (slider next to TX) text will appear with a **gray highlight** and the text will show “OFF” at the left side of the slider as shown in **figure 19**.

Press the **TX** slider as shown in **Figure 23** to turn on the RF Output Power. The RF Indicator (slider next to TX) text will change to a **red highlight** and the text will show “ON” at the right side of the slider and show TX ON in Blinking Red above the PIM Reading display and the RF ON Red LED on the PiMPro Unit will turn on. You will now see Min. and Max. PIM readings appear as well as a value for **RLoss** in dB.

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on. Be sure that the test port is terminated with a high power PIM Load.

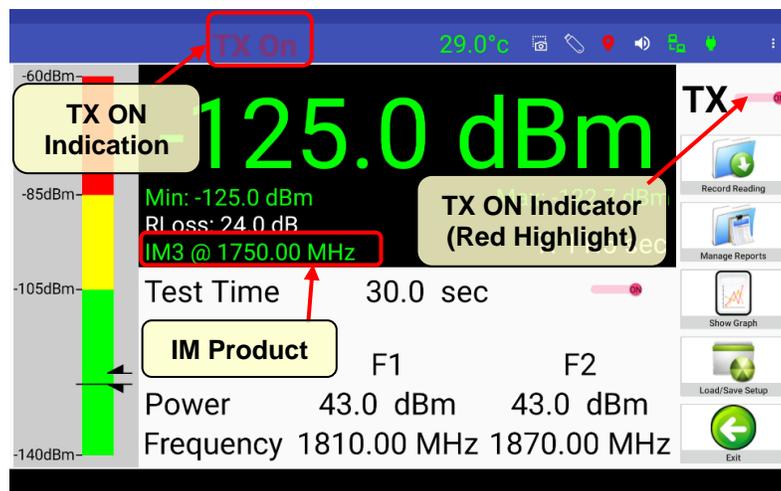


Figure 23 - **PIM and Return Loss** Window during “TX ON”

2.4.3 RX Interference

Pressing the *RX Interference* icon will open the “*RSSI vs Frequency*” window. This is a new test function that looks for external interference in the Rx band. The test works by keeping the transmitter(s) (amplifier(s)) off and sweeping the receiver across the entire Rx band. Note that the “Marginal” and “Failing” PIM values are indicated by yellow and red solid lines across the RSSI vs Frequency graph. These solid lines appear in both the initial and completed graphs (prior to and after readings are measured). Please see **figure 26** for a view of the completed sweep. This is activated by pressing the “Start Sweep” icon in the RSSI vs Frequency window. *Please note that as before if Record Plot is selected the RSSI vs Frequency Plot will be appended below the last measurement taken prior to this measurement.*

2.4.3.1 Configure Frequency Parameters

The “Start” and “End” RX frequencies and frequency “Step Size” can be adjusted from the *Configure Frequency Parameters* pop-up window (see **figure 24**), which can be accessed by pressing the X-axis on the graph shown in **figure 25**. In this example (for the PiMPro Smart Series PIM Analyzer 1821) this can be set for the 1800 MHz Band Only, the 2100 MHz Band Only, or for specific Start and End Frequencies between 1710 MHz and 1980 MHz. When specifying the Start and End Frequency, click on the “Specify Frequency” button and then on the Start or End Frequency listing, as well as the Frequency Step to change the number.

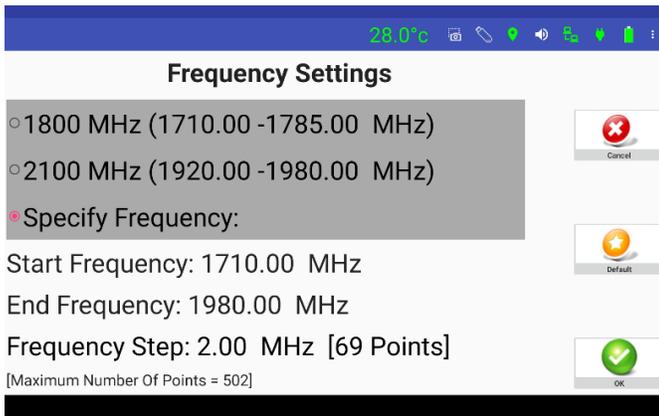


Figure 24 - *Configure Frequency Parameters* Pop-up Window

2.4.3.2 Configure PIM Scale

Pressing the Y-Axis opens the *Configure PIM Scale* pop-up window. All the functions are the same as described in **paragraphs 2.4.2.11 through 2.4.2.11.6**. *Note: Graphical testing may be performed in dBm or dBc units.*

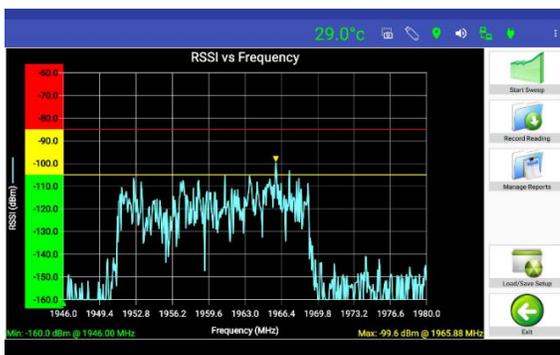


Figure 25 - Completed *RX Interference* Sweep Window

2.4.4 Frequency Sweep

Pressing the *Frequency Sweep* icon will open the “*Frequency Sweep*” function window. This is a test function that takes PIM measurements through one sweep across the band. The test works by keeping the first transmit tone fixed while moving the other. Please see **figure 26** for a view of the completed sweep. *Please note that if Record Plot is selected the RSSI vs Frequency Plot will be appended below the last measurement taken prior to this measurement.*

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.

2.4.4.1 Configure Frequency Parameters

The “*Start*” and “*End*” RX frequencies and frequency step size can be adjusted from the “*Configure Frequency Parameters*” pop-up window (see **figure 24**), which can be accessed by pressing the X-axis on the graph shown in **figure 26**. In this example (for the PiMPro Smart Series PIM Analyzer 1821) this can be set for the 1800 MHz Band Only, the 2100 MHz Band Only, or for specific Start and End Frequencies between 1710 MHz and 1980 MHz. When specifying the Start and End Frequency, click on the “Specify Frequency” button and then on the Start or End Frequency listing, as well as the Frequency Step to change the number.

2.4.4.2 IM Select

The *IM Order* to be measured can also be selected by tapping on the IM3 Icon at the bottom of the graph.

2.4.4.3 Configure PIM Scale

Pressing the Y-Axis opens the *Configure PIM Scale* pop-up window. All the functions are the same as described in paragraphs 2.4.2.11 through 2.4.2.11.1. *Note: Graphical testing may be performed in dBm or dBc units.*

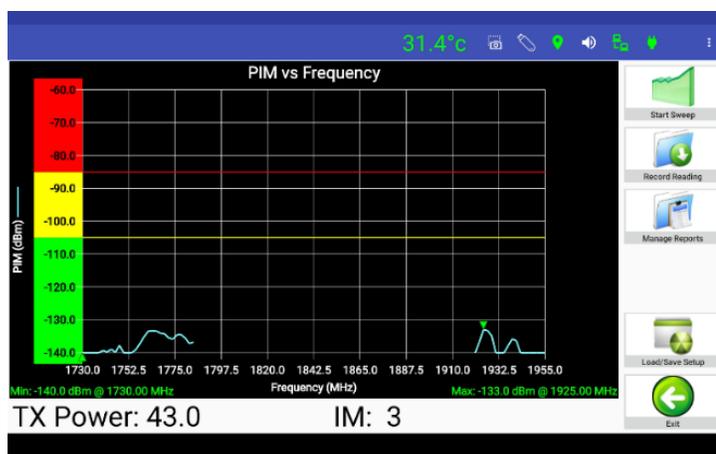


Figure 26 - Completed *Frequency Sweep* Display

2.4.4.4 TX Power

TX Power can be specified by tapping on the TX Power icon at the bottom left corner of the graph.

2.4.4.5 Graph Markers and Delta Measurements

All graphical measurements (RSSI, Frequency Sweep, and PiMPoint) can now be further processed to set two markers. The analyzer will automatically calculate and display the difference (delta) between the two markers. Marker placement is simplified with a variety of “marker helpers” including:

- Move Right 
- Move Left 
- Select Left Peak 
- Select Right Peak 
- Select Left Valley 
- Select Right Valley 

2.4.4.5.1 Set Marker 1

Note that you must select the “1” button to create the 1st marker of your choosing. Press the “trace” near the first point you want to highlight. The display shown in **Figure 27** will appear. You can then drag the marker to a point close to where you want to measure. Use the appropriate marker arrow (move right, move left, left peak, right peak, left valley, and right valley) listed above to move to the point to be measured. For example, press the “move right” arrow to nudge the marker to the right, then press the “Right Valley” arrow to move to the lowest point to the right of the last point the marker was moved to.

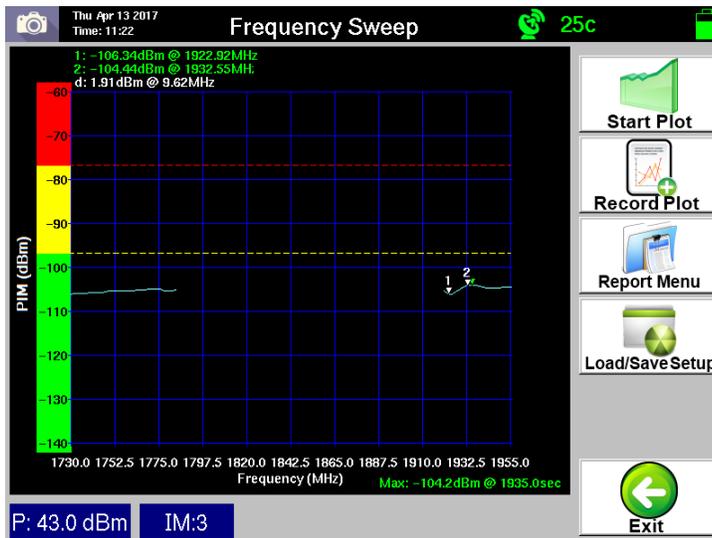


Figure 27 – Graph Marker Window

2.4.4.5.2 Set Marker 2

Note that you must select the “2” button to create the 2nd marker of your choosing. Press the “trace” near the second point you want to highlight. The display shown in **Figure 27** will appear. You can then drag the marker to a point close to where you want to measure. Use the appropriate marker arrow (move right, move left, left peak, right peak, left valley and right valley) listed above to move to the point to be measured. For example, press the “move left” arrow to nudge the marker to the left, then press the “Left Valley” arrow to move to the lowest point to the left of the last point the marker was moved to.

2.4.4.5.3 Display and Delta Calculation

The top of the display will show the “1” and “2” marker levels and frequencies in “Green” text. The calculated “Delta” will appear below the “1” and “2” as “d” and will list the delta in level (dBm or dBc), and the delta in frequency in “White” text.

2.4.4.5.4 Saving Marker and Delta Screens

The display showing the “markers” and “delta” can only be saved as a “Snapshot.”

2.4.4.5.5 Extra paragraph in case needed

2.4.5 DAS Test

Pressing the DAS Test icon in the Main Menu will open the “DAS Test” function window (see **figure 28**). Two methods of DAS Testing are available on the PiMPro Smart Series units. The DAS TX test is used to inject a single tone signal into a DAS System at low power for extended periods of time. The DAS RX testing can be used to determine if a signal is present at a specific frequency in the RX Band.

2.4.5.1 DAS TX

This function is used to perform a Special DAS Test that is performed with a single Transmit tone at a lower output level (i.e., between +20 dBm (100 mW) and +30 dBm (1,000 mW)) for extended periods of time (i.e., 10 to 120 minutes). The purpose of this test is to provide a companion diagnostic tool for DAS Installation and Primary Propagation Loss Testing. Note that the extended duration of the test allows for testing to be performed in large buildings including arenas and stadiums with multiple sectors. The “Walk-by” (or walk-through) testing would involve injection of the lower-level single tone output into the DAS Network on site. It requires the use of a portable Spectrum Analyzer connected to an Omni-Antenna to measure Primary Propagation Loss. This testing allows the user to search for problems with the connections to the In-Building Antennas, cabling, and other components. Note that the TX Generator testing does not generate a report, as with the other PIM Testing performed with the PiMPro Smart Series PIM Analyzer. Pressing the DAS TX Icon will open the **DAS TX Generator** window shown in **figure 29** below.



Figure 28 – DAS Menu Window

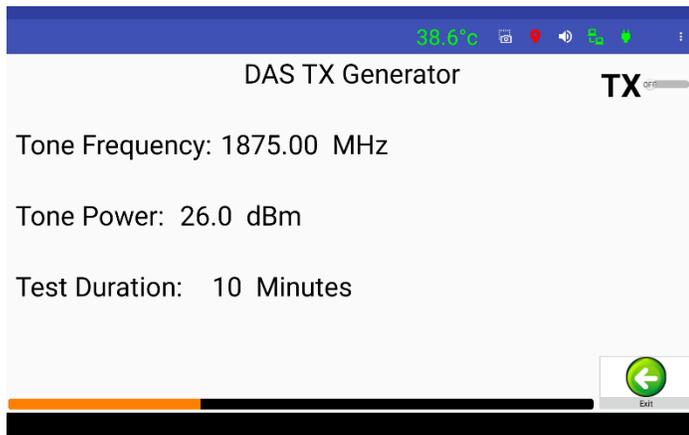


Figure 29 – DAS TX Generator Test Window

2.4.5.1.1 Tone Frequency

Pressing the Tone Frequency bar will open the Set tone Frequency pop-up window. This allows the user to set the TX frequency within the frequency range shown in the pop-up window. This will be similar to the F1/F2 Frequency Set Window shown in **figure 22** and described in **paragraph 2.4.2.14**.

2.4.5.1.2 Tone Power

Pressing the Tone Power bar will open the Set Tone Power pop-up window. This allows the user to set the TX Power shown in the pop-up window. This will be similar to the F1/F2 Power Level Window shown in **figure 21** and described in **paragraph 2.4.2.15**.

2.4.5.1.3 Test Duration

Pressing the Test Duration time (shown in **figure 29** above) opens a keypad that allows the user to set the duration of the test at 1 minute minimum, and up to 240 minutes maximum.

2.4.5.1.4 Start TX Generator Test

Pressing the TX slider **TX**  (slider changes from Gray to Red) initiates the single tone test at the low power. The Tx ON Red Icon on the screen blinks and the "RF ON" RED LED on the front panel of the unit turns on for the duration of the test.

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.

2.4.5.1.5 Stop TX Generator Test

Pressing the TX slider **TX**  (changes from Red to Gray) allows to user to stop the TX Generator test before the test duration completion if it is needed.

2.4.5.1.6



Exit

Pressing the "Exit" icon returns the user to the DAS window.

2.4.5.2 DAS RX

The DAS RX function is used to perform Special DAS Testing where the user needs to optimize the location for a DAS antenna within a certain enclosed area or room. That is, the user is attempting to determine the location where the ambient noise is the lowest. Note that the time scale is fixed at 300 seconds (5 minutes). Note that the test starts as soon the user selects the DAS RX test, and it runs from the present time no matter which mode the user is viewing. The test can be viewed in “Display View” which gives the instantaneous signal level in large font, while also listing the Minimum and Maximum levels read by the Smart Series PiMPro. Additionally, there is a “Show Graph” function available which shows the present reading in the Graphical mode after depressing  the **Show Graph** icon. In the graph mode the Minimum and Maximum levels are still shown at the bottom of the Graphical display. If the user wishes to clear the graph data shown, they only need to  press the **Clear Graph** icon. Note that the DAS RX testing does not generate a report, as with the other PIM Testing performed with the PiMPro. Pressing the **DAS RX** Icon will open the window shown in **figure 30** below. Note that the PIM Scale bar on the left-hand side of the window is an additional indicator of the PIM being read during this RX testing.

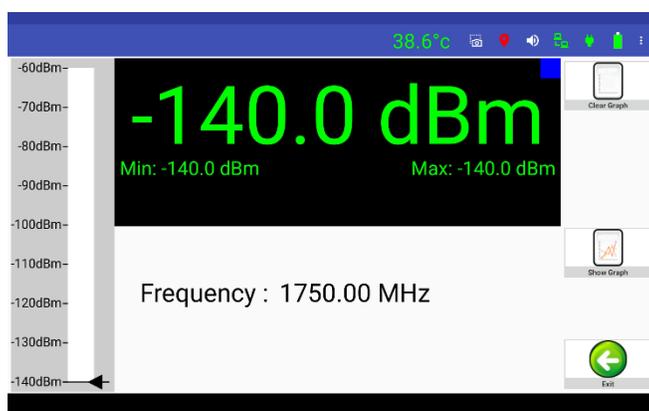


Figure 30 - RX Capture Window in “Display View”

2.4.5.2.1 Setting RX “Capture” Frequency

The RX Frequency is visible once the DAS RX window is opened as shown in **figure 30**. The RX Frequency is visible in either the Display View or the Graph View modes of testing. Pressing the RX Frequency allows the user to set the RX Frequency over the specified limits (1710.0 - 1785.0 MHz & 1920 – 1980 MHz for the PiMPro Smart Series 1821) to be sampled during the RX “Capture” test. The frequency setting is similar to the Tone 1 and Tone 2 frequency setting previously shown in this manual.

2.4.5.2.2  **Show Graph**

Note that “Show Graph” in the RX “Capture” test is basically the same as the “Display View,” except that the representation is Graphical, rather than a listing of values on the screen. See **figure 31** below for an example of this Show Graph test.

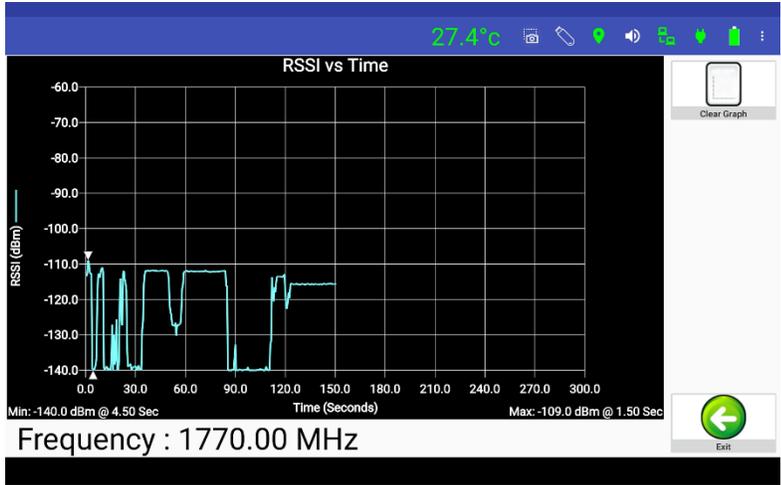


Figure 31 – RX “Capture” Window in “Show Graph”

2.4.5.2.3  **Clear Graph**

Pressing the Clear Graph icon as shown in **figure 30** does exactly what it states. That is, it clears the graph data from the DAS RX screen and allows the user to start the test again.

2.4.5.2.4  **Exit**

Pressing the “Exit” icon returns the user to the DAS test window.

2.4.5.3  **Exit**

Pressing the “Exit” icon in the DAS test window returns the user to the Main Menu.



2.4.6 PIMPoint

PIMPoint walks the user through a calibration sequence to establish a measurement reference plane. The reference plane can be set at the PIM Analyzer's output connector or offset to the end of a jumper cable. This reference plane will thus become the "zero" distance reference from which all PIMPoint measurements will be taken. A PIM Standard of -80 dBm is used as a PIM level reference.

Using the accessory kit's -80 dBm PIM Standard at the chosen reference plane and terminating the PIM Standard with the CCI Low PIM Load allows for the analyzer to store calibration parameters which become the reference PIM magnitude and phase from which all further measurements are calculated. During this calibration process, it is imperative to have clean connectors as well as applying proper torque to all connections before pressing the "CAL" icon. A poor calibration will yield poor results.

The user can manually enter the approximate distance to the antenna which is highlighted on the screen as a marker reference and used by PIMPoint to set the crossover point at which a different velocity of propagation factor (air VP = 100%) is applied. This is to accurately discern the distance to external (outside the antenna) potential interfering energy sources. The biggest problem of which is in the form of broadband noise from metal objects near the antenna, which when detected in the network's uplink, can be construed as PIM, with similar effect.

PIMPoint is available as a Distance to PIM (DTP), Distance to Fault (DTF) or both can be measured at the same time. **Paragraph 2.4.6.3** and its sub-paragraphs will cover the DTP measurement requirements and setup. **Paragraph 2.4.6.4** and its sub-paragraphs will cover the DTF measurement requirements and setup. A sample of the screen (prior to measurement) will be shown in **Figure 32** below with the DTP & DTF setting selected. The user only needs to click on the desired function to select it or click a second time to deselect it. To perform continuous testing the user must click on the check box at the bottom of the window to the right side of the DTF selection. This will then show a check mark and turn red. To return to a one-time test click again and the check mark will disappear, and the check box will be "white."

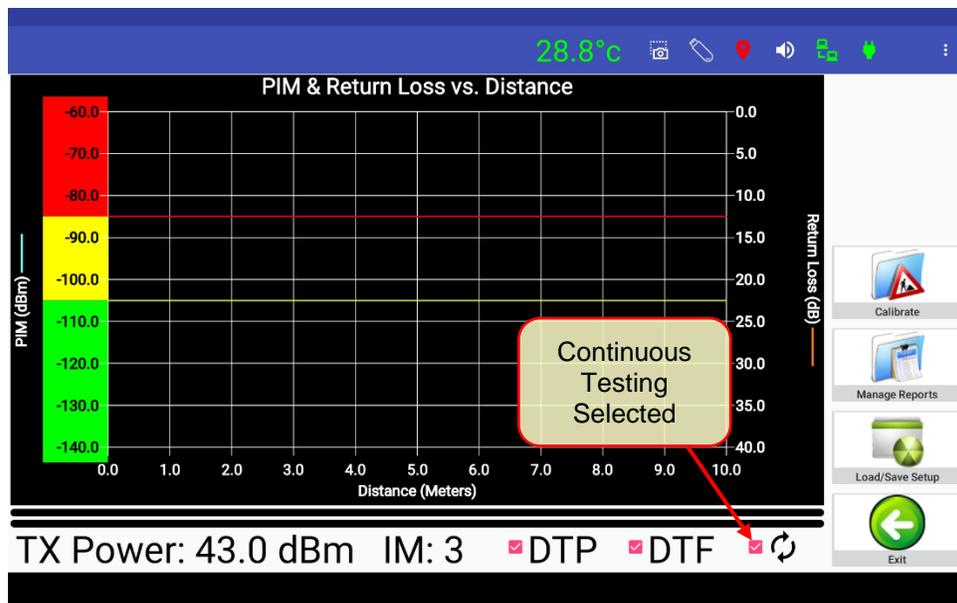


Figure 32 – Distance to PIM (DTP & DTF Selected)

1. **Calibration Parameters.** Various calibration parameters can be set by the user as seen in the **PIMPoint Details Window** shown in **figure 33** below.
 - a. **Selection of DTP or DTF.** The user can select whether to measure the Distance to PIM (DTP), Distance to Fault (DTF), or both parameters.
 - b. **DTP IM.** DTP IM is always IM3, this is only shown for User's Reference.
 - c. **DTP Tx Power Level (dBm).** The user can set the power level to a range from +20 dBm to +46 dBm for performance of the DTP testing.
 - d. **Cable Identification.** The user can select the cable type to be used by depressing the "**Cable: Default**" portion of the window shown in **figure 33** below. This will open the listing of cables from the "Manage Cables" in the "System Configuration" menu
 - e. **Velocity of Propagation compensation (VP).** This is the cable's VP ratio compared to the speed of light. Typically, 80 to 88%, can be input by depressing the "**Velocity: 88 %**" portion of the window shown in **figure 33** below. The user can set the number to that of the cable's manufacturer. It is important to get the right number as the distance precision is directly affected.
 - f. **Loss per 100 ft (dB).** The other variable parameter is the cable Insertion Loss per 100 ft. length. If other than the Default value of 3 dB, this can be set to the appropriate loss value for the cable being used by depressing the "**Loss: 3.0 dB**" portion of the window shown in **figure 33** below.

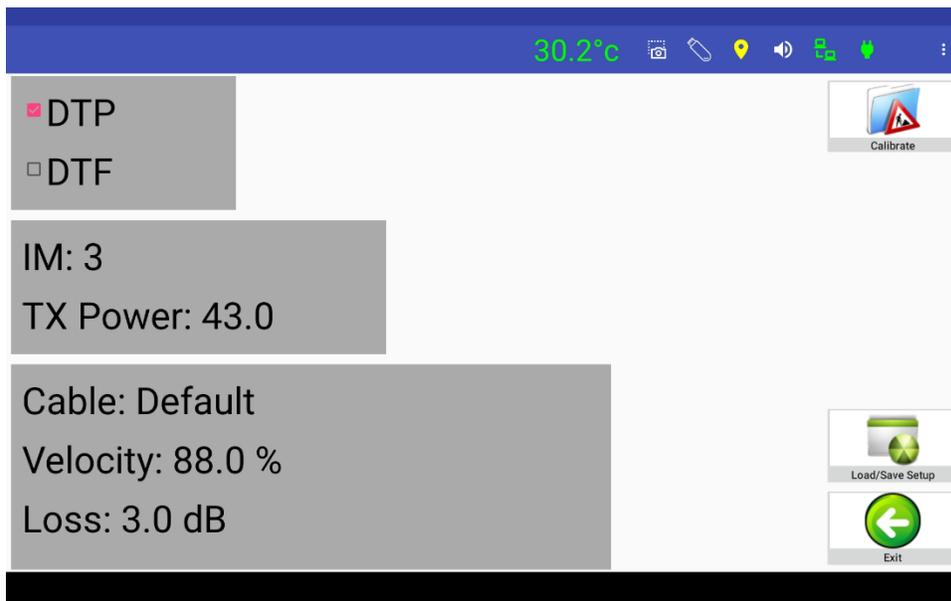


Figure 33 - PIMPoint Details Window

2.4.6.1 Initiate **PIMPoint**

Press the **PIMPoint**  icon in the Main Menu window. This will open the window shown in figure 34 below.

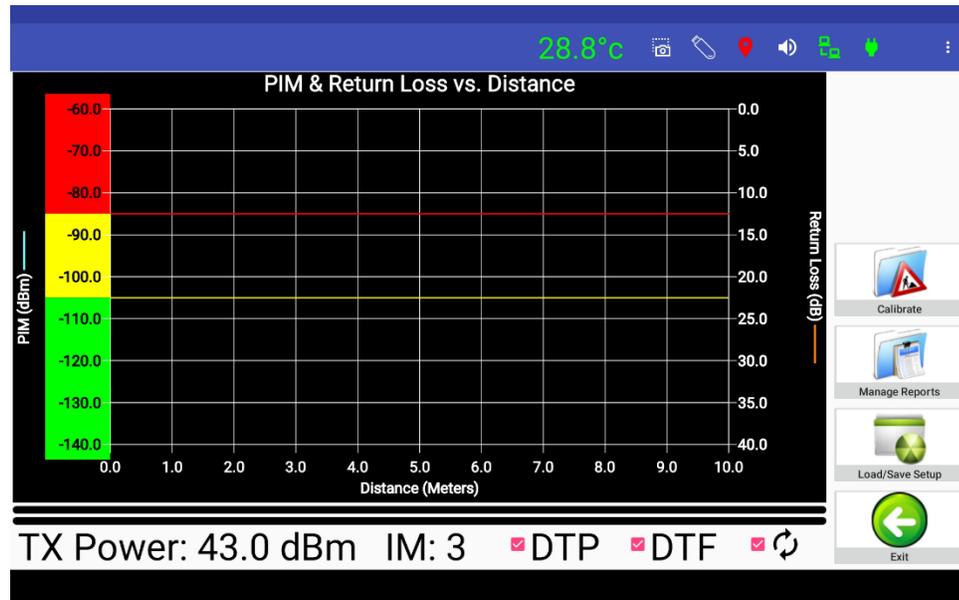


Figure 34 – PIMPoint Window

2.4.6.1.1 Select IM Order

Only the 3rd order IM is allowed to be utilized for DTP test.

2.4.6.1.2 Set DTP Tx Power Level

If an output power of other than +43 dBm (20W) is required the user can set the output power by depressing the "**TX Power: 43.0 dBm**" below the graph, or in the "Calibration" parameter setup screen. This will open an Output Power pop-up window as previously described in **paragraph 2.4.2.14** (see **figure 22**) for other testing. The available output power limits are +20 dBm to +46 dBm.

2.4.6.1.3 “Select Cable” Being Used

The user can select the “Default” RF Cable with settings of Velocity Ratio at 88%, and Loss per 100 ft. (dB) set to 3.0 dB. If other cable characteristics are desired, the user can select another cable as shown in the selection list which opens when the “bar” next to the word cable is depressed (see **figure 35**). If there are no “Preset” cables in the listing the user can “Add” a cable by pressing the **Add Cable**  icon. The figure below shows an example where “coax1” and “Coax2” have been added by a user. For details on adding or editing a cable please see **paragraphs 2.4.8.4 thru 2.4.8.4.4**.

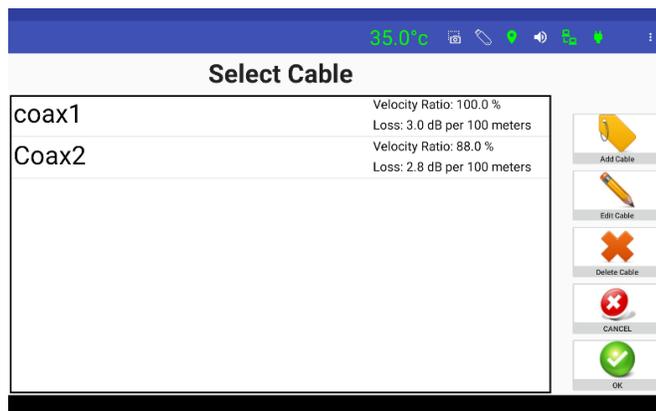


Figure 35 - “Select Cable” Screen

2.4.6.1.3.1 Deleting, Adding and Editing a Cable

Deleting, adding, and editing a cable is covered in the Manage Cable section of this users guide at **paragraph 2.4.8.4** and its subparagraphs.

2.4.6.1.3.2 Configure PIMPoint Window (Distance Details)

The Configure PIMPoint Window (Distance Details) will open (see **figure 36**) for the user to enter the appropriate information by pressing anywhere on the X axis. Pressing the End Distance or Antenna Location will open a keypad noted previously in this manual for entry of the distance. **Please note that the Start Distance is always 0 feet (or 0 meters)**. Entry of the “End” distance must be a distance greater than the actual antenna distance. “PIM Units” allows the user to select the distance to be measured in meters or feet.

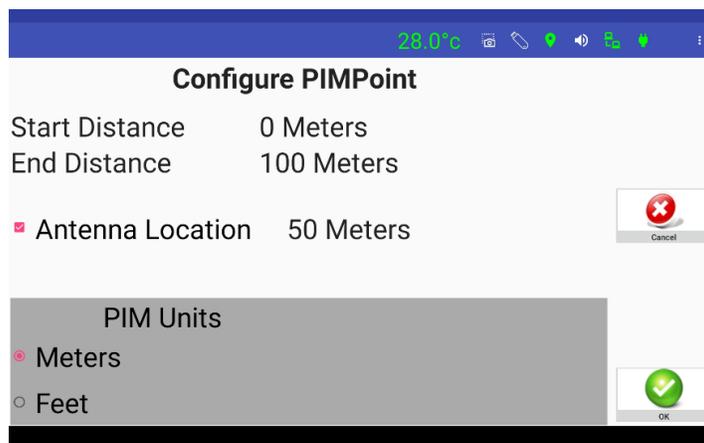


Figure 36 – Configure PIMPoint Window (Distance Details)

2.4.6.2 PIMPoint Calibration Setup

Calibration can be performed for DTF (Distance to Fault), DTP (Distance to PIM, or both). To begin the PIMPoint Calibration process place the -80 dBm PIM Standard at the RF Output of the PiMPro Smart Series PIM Analyzer. Next the user must place the Low PIM Load at the output of the -80 dBm PIM Standard. Once the PIM Standard and Low PIM Load are hand-tightened, the User must use a Torque wrench to fully tighten both.

2.4.6.2.1 Calibration Sequence

With the PIM Standard connected depress the “*Calibrate*”  icon to begin the PIMPoint Calibration process.

2.4.6.2.2 Calibration Sequence with PIM Standard

This will open a “*Please Connect PIM Standard*” pop-up window as shown in **figure 37** below. Pressing “*OK*” in the pop-up warning window will initiate the calibration process. The PiMPro Smart Series PIM Analyzer will start taking data points and will show a “progress bar” at the bottom of the screen. Depress “*Abort Calibration*” if the user determines that they are not yet ready to perform the calibration.

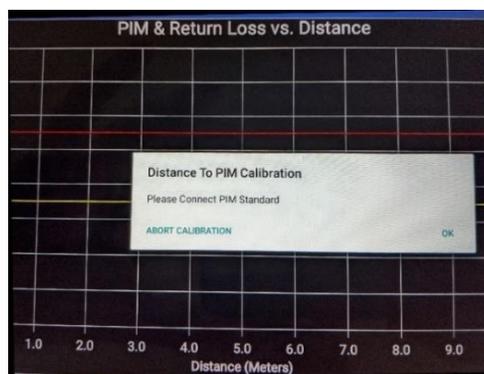


Figure 37 – “*Please Connect PIM Standard*” Warning Window

2.4.6.2.3 Calibration with PIM (50 ohm) Load

Disconnect the PIM Standard from the PiMPro Smart Series PIM Analyzer, and then connect the Low PIM (50 ohm) Load to the PiMPro output. The “*Please Connect 50 ohm Load*” pop-up window is already present as shown in **figure 38** below. Pressing “*OK*” in the pop-up warning window will initiate the calibration process. The PiMPro Smart Series PIM Analyzer will start taking data points and will show a “progress bar” at the bottom of the screen. Depress “*Abort Calibration*” if the user determines that they are not yet ready to perform the calibration.

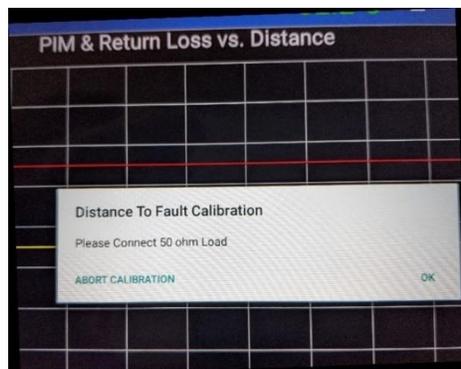


Figure 38 - “*Connect 50 ohm Load*” Pop-up Window

2.4.6.2.4 Calibration with Open

Disconnect the PIM (50 ohm) Load from the PiMPro Smart Series PIM Analyzer, and then connect the “Open” to the PiMPro output. The “*Please Connect Open*” pop-up window is already present as shown in **figure 39** below. Pressing “*OK*” in the pop-up window will initiate the calibration process. The PiMPro Smart Series PIM Analyzer will start taking data points and will show a “progress bar” at the bottom of the screen. Depress “*Abort Calibration*” if the user determines that they are not yet ready to perform the calibration.

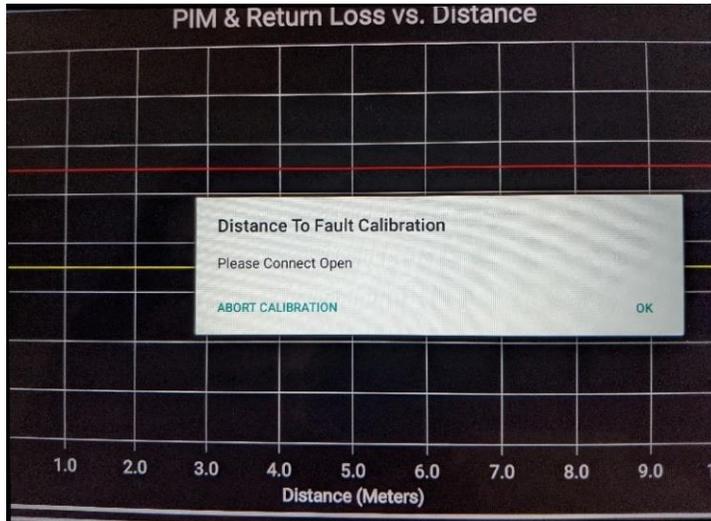


Figure 39 - “*Please Connect Open*” Pop-up Window

2.4.6.2.5 Calibration with Short

Disconnect the “Open Standard” from the PiMPro Smart Series PIM Analyzer, and then connect the “Short” to the PiMPro output. The “*Please Connect Short*” pop-up window is already present as shown in **figure 40** below. Pressing “*OK*” in the pop-up window initiate the calibration process. The PiMPro Smart Series PIM Analyzer will start taking data points and will show a “progress bar” at the bottom of the screen. Depress “*Abort Calibration*” if the user determines that they are not yet ready to perform the calibration.

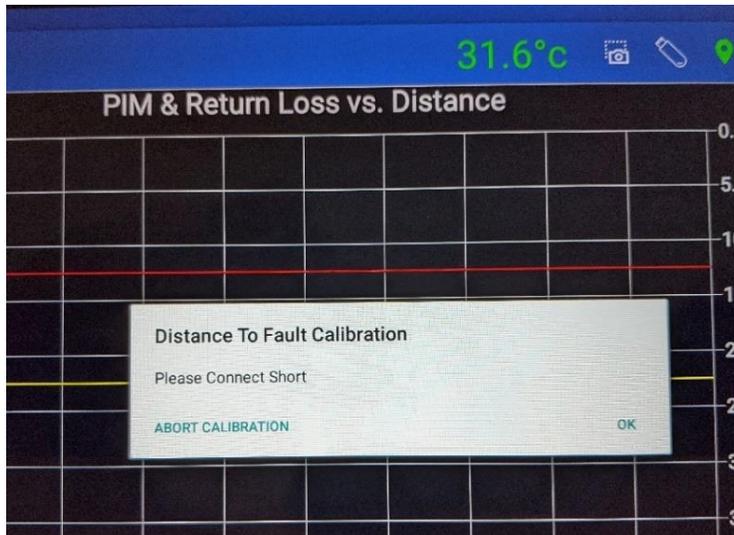


Figure 40 - “*Please Connect Short*” Pop-up Window

2.4.6.2.6 Calibration Process is Complete

Calibration process is complete. The unit is ready to make PIMPOINT measurements.

2.4.6.3 Make PIMPOINT Measurement

Perform the following steps to make PIMPOINT measurement.

2.4.6.3.1 Connect Feed-Line to be Measured

Connect the Feed-Line (which is connected to an Antenna) to be measured to the RF Output of the PiMPro Smart Series PIM Analyzer. Hand-tighten the Feed-Line and then use a torque wrench to properly torque the connector.

2.4.6.3.2 Perform PIMPoint Measurement of Feedline

Perform the PIMPoint measurement of the Feedline by depressing the **Start Sweep**  icon in the PIMPoint window. The PiMPro Smart Series PIM Analyzer will start taking data points and will show a “progress bar” at the bottom of the screen. When the test run is complete the trace will indicate where the highest PIM reading has been measured. See **figure 41** for an example where the maximum PIM measurement of -95.8 dBm has been found at a distance of 16.1 feet, clearly indicating a problem in the cable at approximately 16 feet. Measurement can be “continuous” or  “one time,” by “selecting” or “deselecting” the “Continuous” check box near the bottom of the window shown in **figure 41**.

Note that for this example a test jumper of 16.0 feet was terminated with the PIM Standard which was in turn terminated by the PIM Load.

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.

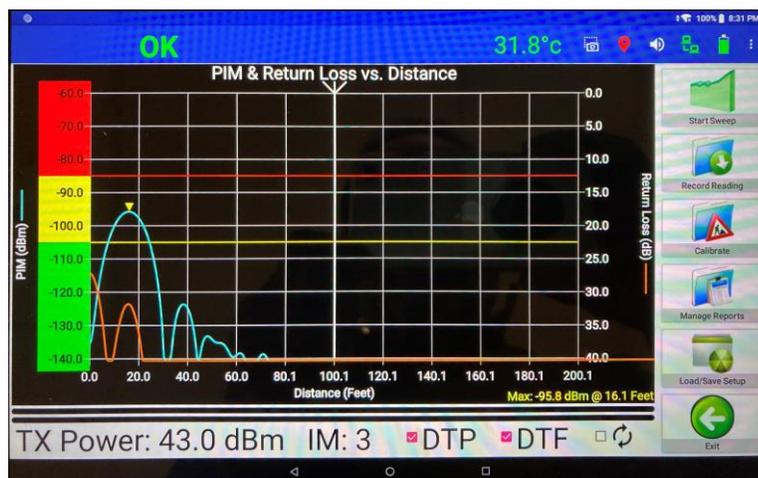


Figure 41 – PIMPoint Measurement of Feedline to Antenna

2.4.6.3.3 Comment About Distance Readings

Please note that if the Maximum PIM Reading is shown to be greater than the distance to the antenna, the user should then look for other possible sources of PIM other than the feedline or the components connected to the Feedline.

2.4.6.4 Distance to PIM (DTP) and Distance to Fault (DTF) Combined Measurements

DTP and DTF can be measured together at the same time if desired once the setup for each has been completed per 2.4.6.2.1 thru 2.4.6.2.5.

2.4.7 Cable Loss Measurement

The ability to measure Insertion Loss of a cable of any length by specifying the cable type has been added to the PiMPro Smart Series PIM Analyzer. To measure the insertion loss, cables can be left OPEN (unterminated), or can be terminated with a SHORT. *Note: The Cable Loss Option, when licensed, is provided with an OPEN/SHORT termination.* See **Figure 42** for the Initial Cable Loss screen prior to “Calibration.”



Figure 42 – Initial Cable Loss Window

2.4.7.1 Calibration with PIM Load, Open and Short

Press the “Calibrate” button to initiate the calibration process. The “*Connect Load Std.*” warning pop-up window will appear similar to what is shown in **figure 43**. Connect the Low PIM Load and press the “OK” icon in the pop-up warning window initiate the calibration process. The PiMPro Smart Series PIM Analyzer will start taking data points and the display will be similar to what is seen in the “Taking Short Data” Progress bar shown in **figure 44**. Continue in the same manner with the “Open” and then the “Short.” When complete disconnect the “Short.”

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.



Figure 43 – Connect Short Warning Pop-up

2.4.7.1 Calibration with PIM Load, Open and Short (Cont.)

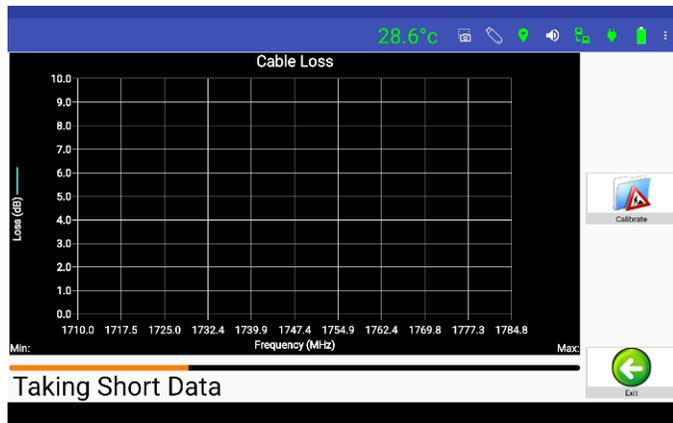


Figure 44 – Taking “Short” Data Progress pop-up

2.4.7.2 Connect Feed-Line to be Measured

Connect the Feed-Line (which is connected to an Antenna) to be measured to the RF Output of the PiMPro Smart Series PIM Analyzer. Hand-tighten the Feed-Line and then use a torque wrench to properly torque the connector.

2.4.7.3 Perform Cable Loss Measurement of Feed-Line

Perform the Cable Loss measurement of the Feed-Line by depressing the *Sweep* slider in the Cable Loss window. This will move the sweep slider *Sweep* to the right (the slider will change from gray to red) and starts the sweep process. During the test “progress bar” will be visible below the plot. Also note that the user can perform a one-time test or continuous testing of the cable loss. To perform continuous testing the user must click on the check box at the bottom of the window which will then show a check mark and turn red. To return to a one-time test click again and the check mark will disappear, and the check box will be “white.” When the test run is complete the trace will list the average Cable Loss. See **Figure 45**, where this indicates a Cable Loss of 2.2 dB.



Figure 45 – Cable Loss Measurement

2.4.8



Configure System

Pressing the *Configure System* icon on the touch screen display Main Menu opens the *System Configuration* window (see **figure 46**). The configuration items available to view or modify include the following:

- 1) Set Clock
- 2) Set Defaults
- 3) Manage Labels
- 4) Manage Cables
- 5) Update Software
- 6) Manage Resources
- 7) Manage PiMPro WiFi
- 8) Manage Ethernet
- 9) Done

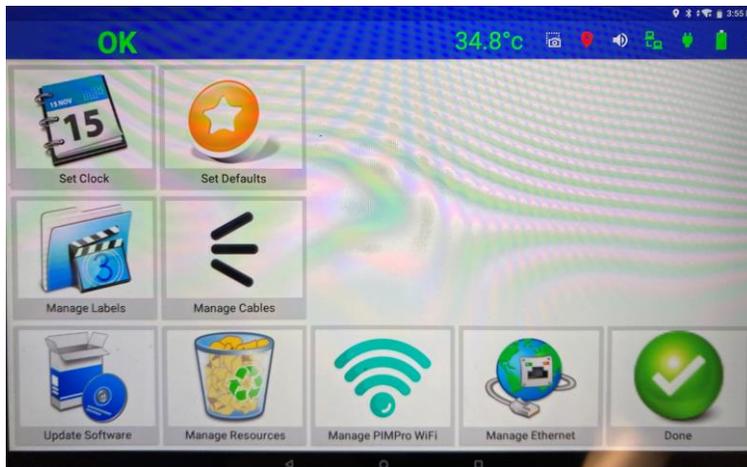


Figure 46 - *System Configuration* Window

2.4.8.1



Set Clock

Setting the date and time accomplished by using the “Set Clock” icon in the Configure System menu. Clicking on the “Set Clock” icon sets the program time to match the time on the tablet.

2.4.8.2 Set Defaults

Pressing the Set Defaults icon allows the user to set default values for the following items:

- 1) Technicians Name
- 2) Distance Units (Feet or Meters)
- 3) VSWR Unit (VSWR or Return Loss)
- 4) PIM (dBm or dBc)
- 5) Date Format (Default is DD/MM/YYYY)
- 6) AM/PM is the Default setting

2.4.8.3 Manage Labels

By depressing the *Manage Labels* icon on the *System Configuration* window, the *Manage Labels* window opens (see **figure 47**). This window (Menu) allows the user to Add, Edit or Delete labels to the window. There is a list of Preset Labels as can be seen in the figure below. Pressing the “Done” button returns the user to the System Configuration window.

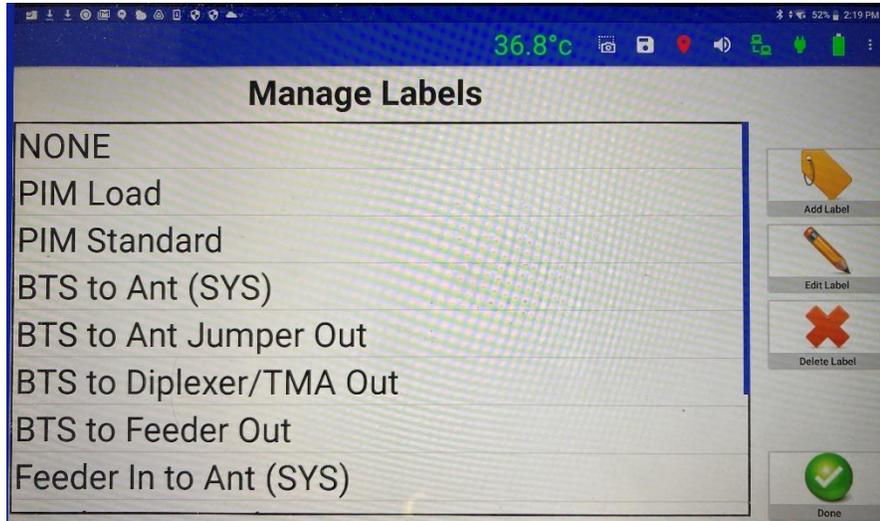


Figure 47 - *Manage Labels* Window

2.4.8.3.1 Add Label

Press the *Add Label* menu icon if a brand-new label is required. The *keyboard entry* screen will appear on the touch screen and the new label name that is desired can be entered.

2.4.8.3.2 Edit Label

If it is desired to change an existing label by adding or removing information to/from the existing label press the *Edit Label* icon after selecting the label to be edited. Next use the keyboard keys to edit the label as desired. *Remember that the full label is highlighted initially on this screen.*

2.4.8.3.3 Delete Label

If it is desired to delete an existing label, highlight the label to be deleted by locating it on the touch screen and depressing said label. Then press the *Delete Label* icon to remove the label from the Select Label menu.

2.4.8.3.4 Done

Pressing the *Done* icon returns the user to the *System Configuration* window on the touch screen.

2.4.8.4

**Manage Cables**

The user can select the “Default” RF Cable with settings of Velocity Ratio at 88%, and Loss per 100 ft. (dB) set to 3.0 dB. If other characteristics are desired, the user can select another cable as shown in the selection list which opens when the “bar” next to the word cable shown in **figure 35** is depressed.

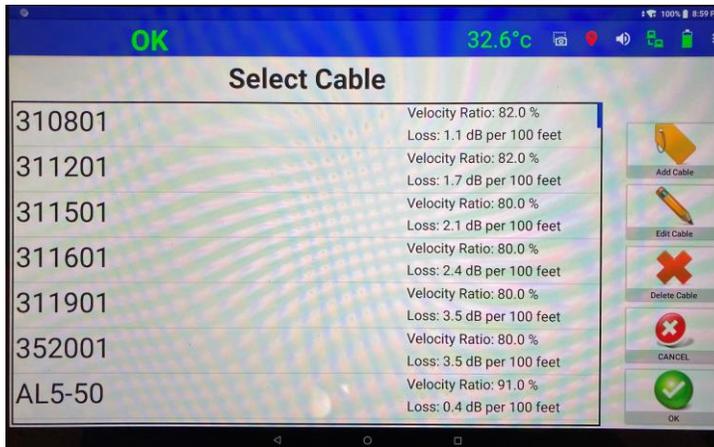


Figure 48 - “Select Cable” Screen

2.4.8.4.1

**Delete Cable**

If the user desires to delete an existing cable, highlight the cable to be deleted by locating it on the touch screen and depressing said label. Then press the *Delete Cable* icon to remove the cable from the Select Cable menu.

2.4.8.4.2

**Add Cable**

Press the *Add Cable* icon if a new cable type is required. The Cable Details window will appear on the touch screen as shown in **figure 49** below. This window requires input of three items as follows:

- 1) **Cable Name** – Identification of the Cable
- 2) **Velocity Ratio** – Velocity of Propagation of the new cable
- 3) **Loss** - Loss per 100 ft (or per 100 meters) of Cable in dB

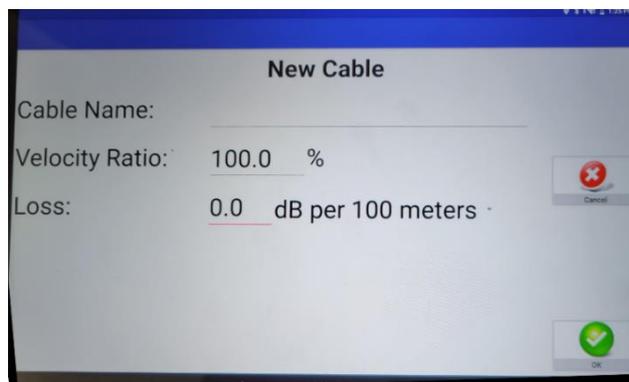


Figure 49 – Cable Details Window

After adding the cable information, the user can press the **OK** button to accept the changes or press the **Cancel** button to return to the previous screen.

2.4.8.4.3**Edit Cable Information**

If it is desired to change existing cable by adding information to or removing information from the existing cable name, or to change errors in the Relative Propagation Velocity or Loss per 100 feet of cable, press the *Edit Cable* icon after selecting the cable to be edited. Next use the keyboard keys to modify the cable identification or change the Relative Propagation Velocity per **paragraph 2.4.8.4.3.1** or change the Loss per 100 feet of cable per **paragraph 2.4.8.4.3.2**.

2.4.8.4.3.1 Set “Relative Propagation Velocity” Ratio

This is the cable's VP ratio compared to the speed of light. The values are typically 80 to 88% for most cables. When the Velocity Ratio (%) is depressed the Relative Propagation Velocity pop-up window opens. Values from **1.0% to 100.0% of “c”** (Speed of Light) can be input in the pop-up keypad similar to those shown elsewhere in this manual. It is important to get the right number as the distance precision is directly affected.

2.4.8.4.3.2 Set “Loss per 100 ft (or per 100 meters) dB”

The user can set the Insertion Loss per 100 ft (or per 100 meters) in dB of the RF Cable if the preset value is incorrect. Pressing the bar for the “Loss” will open a pop-up window. This allows entry of the Loss per 100 ft (or per 100 meters) of cable within the limits of 0 dB to 100 dB, in the pop-up keypad similar to those shown elsewhere in this manual.

2.4.8.4.3.3**Cancel**

Press the *Cancel* icon if you have accidentally gotten to the Cable Details screen and do not wish to be editing the cable information.

2.4.8.4.4**OK**

Press the *OK* icon once the required information has been entered (if necessary) to return to the Manage Cable screen.

2.4.8.5  **Update Software**

Pressing the *Update Software* icon in the *System Configuration* window opens the *Available Software Upgrade* window as shown in **figure 50**. In addition to listing Available Software Versions and Installed Licenses this window allows the user the following choices:

- 1) Install Version
- 2) Delete Version
- 3) Done

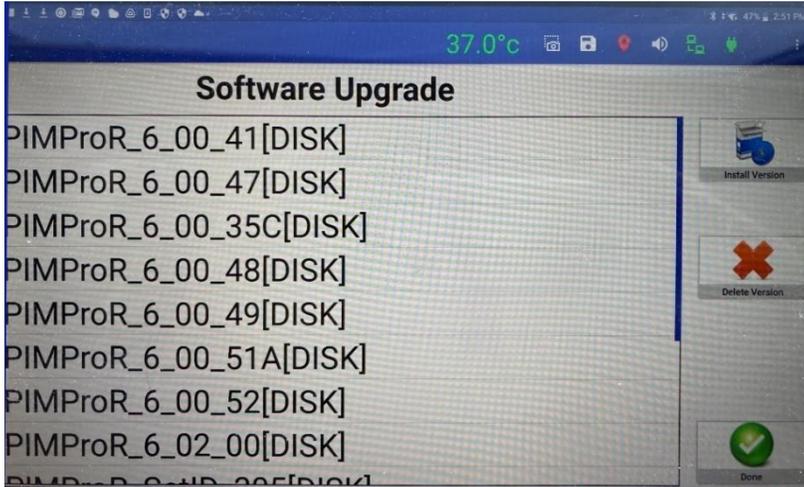


Figure 50 - *Software Upgrade* Window

2.4.8.5.1  **Install Version**

Selecting the Software Version to be installed and pressing the *Install Version* icon shown in **figure 50** installs the version of S/W which the user has selected. Once the installation of the S/W is complete a reboot of the PiMPro Smart Series will occur.

2.4.8.5.2  **Delete Version**

Selecting the Software Version to be deleted and depressing the *Delete Version* icon shown in **figure 50** will delete the highlighted Software Version.

2.4.8.5.3  **Done**

Pressing the *Done* icon returns the user to the *System Configuration* window.

2.4.8.6

**Manage Resources**

Pressing the **Manage Resources** Icon in the Main Menu opens the Manage System Resources window as seen in **figure 51** below. The following items are available from this window:

- 1) Report Files (memory used by report files)
- 2) Software Files (memory used by software files)
- 3) Free Space (available memory)
- 4) Total Capacity (total memory size)
- 5) Clear Reports
- 6) Clear Old S/W
- 7) Backup (Reports)
- 8) Exit



Figure 51 – Manage Resources Window

2.4.8.6.1 Report Files

The number of files and amount of memory used by reports is shown in the first row shown in the Manage Resources window.

2.4.8.6.2 Software Files

The number of files and amount of memory used by Software is shown in the second row shown in the Manage Resources window.

2.4.8.6.3 Free Space

The total amount of free memory is shown in the third row shown in the Manage System Resources window.

2.4.8.6.4 Total Capacity

Total Capacity informs the user of the total memory capacity of the drive in the fourth row shown in the Manage System Resources window.

2.4.8.6.5

**Clear Reports**

Clear Reports allows the user to free up additional memory by deleting “all” reports, once the user has copied the reports to the USB memory.

2.4.8.6.6  **Clear Old S/W**

Clear Old S/W allows the user to delete any old versions of S/W that are loaded in the memory of the PiMPro Smart Series. While keeping old S/W Versions allows the user to be able to revert to a former version which is known to function properly, performing “Clear Old S/W” allows additional memory to become available for use on the PiMPro Smart Series.

2.4.8.6.7  **Backup**

Backup can be used to copy all reports located on the **Local Drive** to the **USB Drive**. Utilizing this function allows the user to avoid the need to copy large numbers of reports individually.

2.4.8.6.10  **Exit**

Pressing the **Exit** icon from the Manage Resources window returns the user to the “Main Menu.”

2.4.8.7  **Manage PiMPro WiFi**

Depressing the “Manage PiMPro WiFi” icon in the Configure System window (as seen in **Figure 46**) opens the PiMPro WiFi Manager window seen in **Figure 52** below. The user can Rename the SSID, change the Password and select a WiFi channel for better connection (between 1-11). Pressing the **Exit** icon from the Manage Resources window returns the user to the “Configure System Menu.”

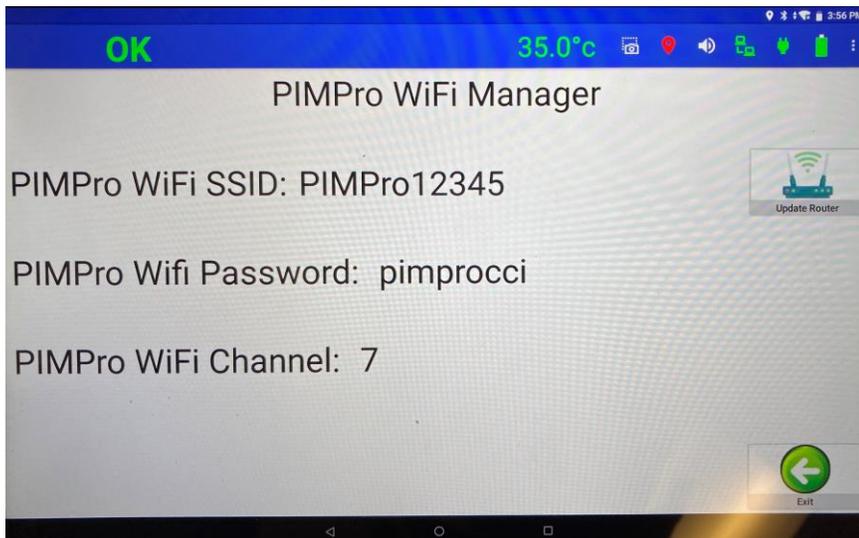


Figure 52 – PiMPro WiFi Manager Window



2.4.8.9 PiMPro Ethernet Manager

Please note that the PiMPro Ethernet Manager has been added for **future development**, and that the PiMPro cannot be controlled via the Ethernet at this time. Pressing the “PiMPro Ethernet Manager” icon in the Configure System window will take the user to the PiMPro Ethernet Manager window shown in **Figure 53** below. At present pressing the “DHCP” button will take the user to the window shown in **Figure 54** which will allow the user to change the “Ethernet” and “DNS” address to a Static address. Pressing the **Exit** icon from the Manage Resources window returns the user to the “Configure System Menu.”

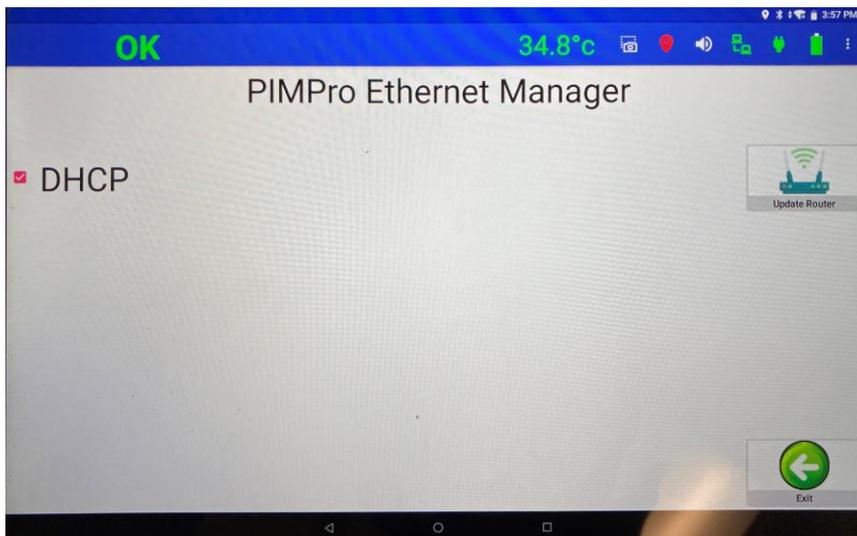


Figure 53 – PiMPro Ethernet Manger Window

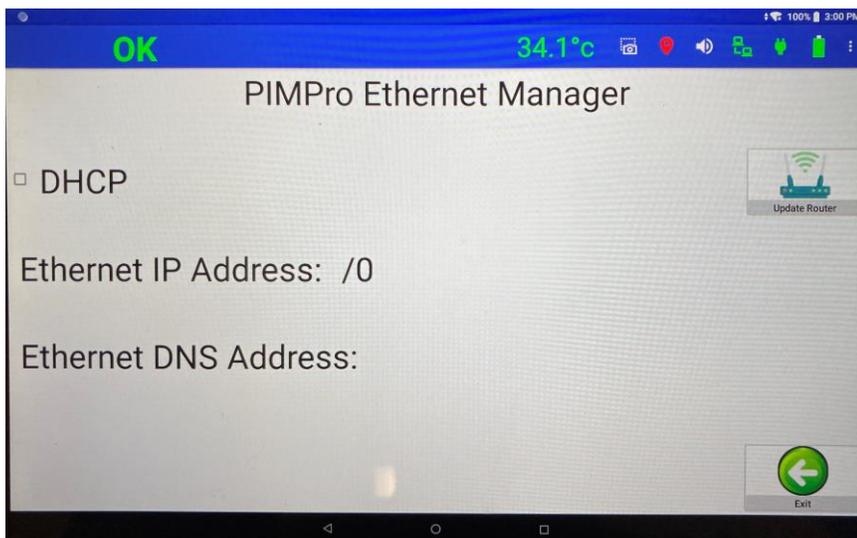


Figure 54 - PiMPro Ethernet Manger Window After Pressing DHCP

2.4.8.10 Done

Pressing the Done icon from the System Configuration window returns the user to the Main Menu.

2.4.9



Reports

Pressing the **Reports** icon on the Main Menu window opens the “**Follows the Report**” window shown in **figure 55**. Depressing the **Manage Reports** icon opens the **Manage Reports Listing and Menu** shown in **figure 56**. Existing Reports found on the **Local Drive**, the **USB Drive**, or the **Tablet** (as selected), are displayed on the left-hand side of the reports window. The functions available in the **Manage Reports Listing and Menu** include the following:

- 1) Save Report
- 2) Start New Report
- 3) Open Report to Continue
- 4) New Sector
- 5) View Current Report
- 6) Manage Reports
- 7) Done

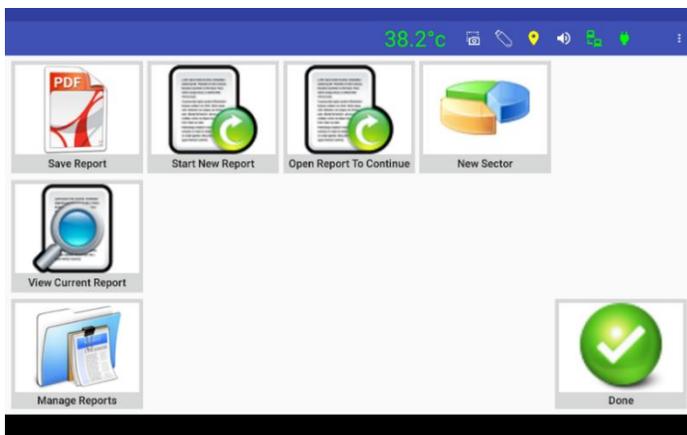


Figure 55 – Follows the Report Window

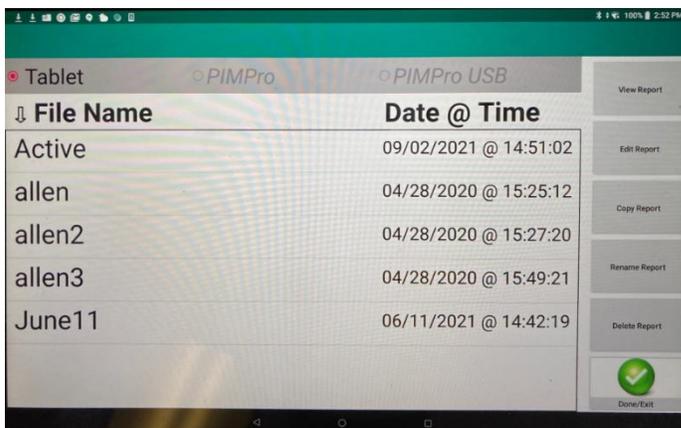


Figure 56 – Manage Reports Listing and Menu Window

2.4.9.1

 **View Report**

Pressing the *View Report* icon on the Report Listing window (after highlighting a report to be viewed) opens the Active PDF test report file, a portion of which is shown in **figure 57**. Remember that the report can be located on either the **PiMPro Local Drive**, **PiMPro USB Drive**, or the **Tablet**. The user can scroll through the report by moving the report down or up throughout the touch screen. Note that to return to the *Manage Reports* window the user must click on the “**Back**” button on the tablet screen as shown in **figure 57** or the back arrow on top left corner in **figure 58**.

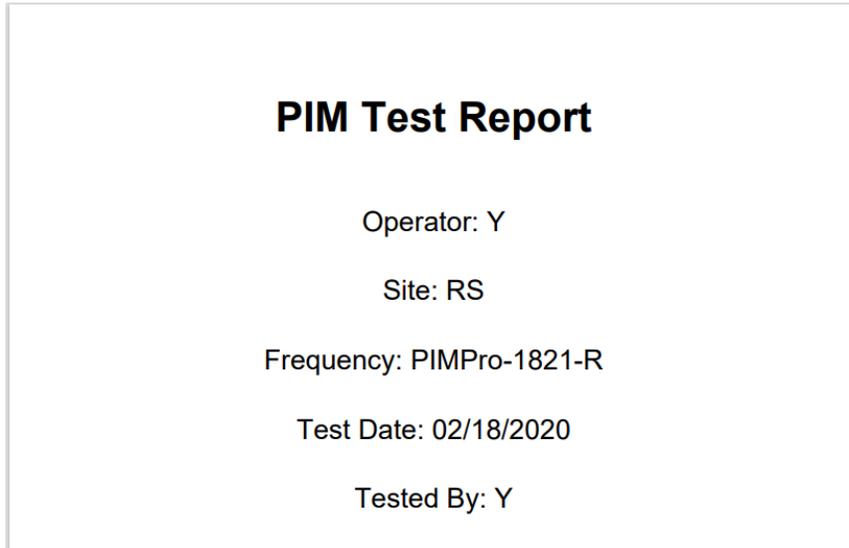


Figure 57 - *View Report* Window (Active PDF File)

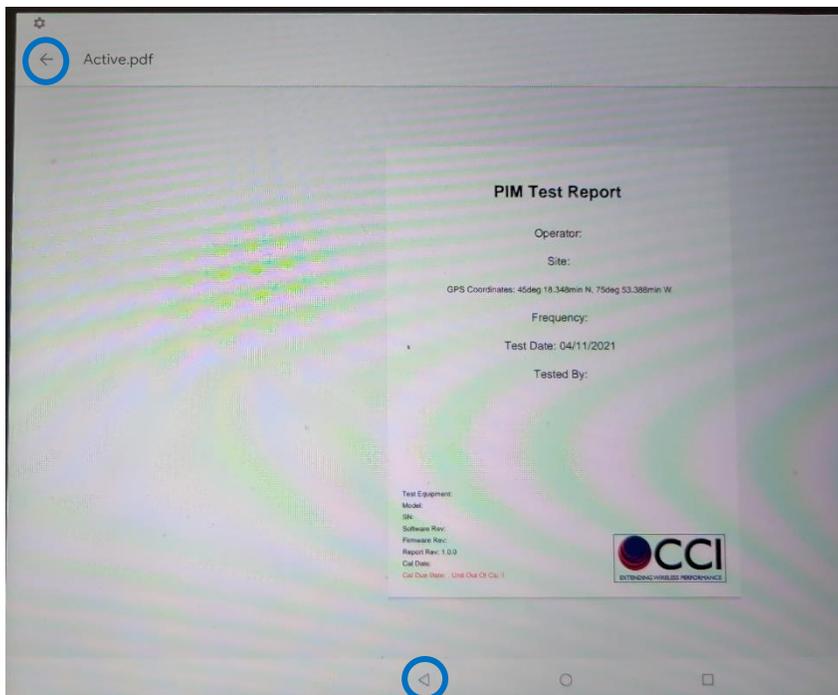


Figure 58 – Back (Left) Arrow on Tablet Screen and Upper Left Corner

2.4.9.2

Edit Report

Edit Report

Pressing the Edit Report Icon brings you to a window such as shown in **figure 59** below, and it is available in **PiMPro Smart Series**. This feature is used to allow changes to be made during and after measurements, as well as to make changes to a saved report without throwing away any of the original data taken. A Report can be Edited only in the tablet, if the reports is on the PiMPro unit itself the APP will give instruction to the user to copy the report from PiMPro to the Tablet so it can be Edited. The functions available in *Edit Report* are explained as follows.

Note: *The report edit feature is designed to remove possible unwanted measurement data from a saved report with the objective of editing a report so as to only show relevant measurements. Field measurement sessions often result in more recorded measurement data than required. This feature permits an off-site report edit before forwarding to the requesting authorities. It prevents a user from editing (falsifying) test results. Only report header information entered by the user can be edited such as, comments, technician, sector, feeder, etc.*

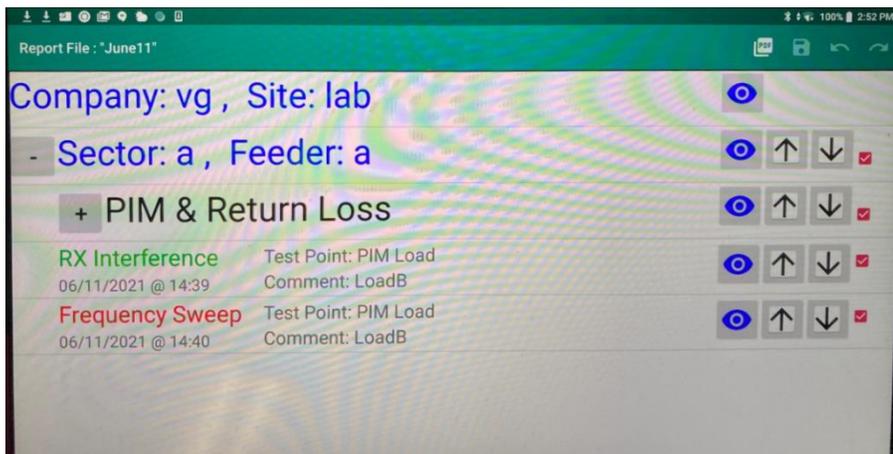


Figure 59 – Edit Report Window

2.4.9.2.1 **Edit Site Information**

The Site Information can be edited by pressing on the “Company, Site” information shown in **blue text**. Pressing this will open the screen shown in **figure 60**. The user can then modify the site information as needed. To save the changes press on the “Green Check Mark Icon” at the top right corner of the screen.

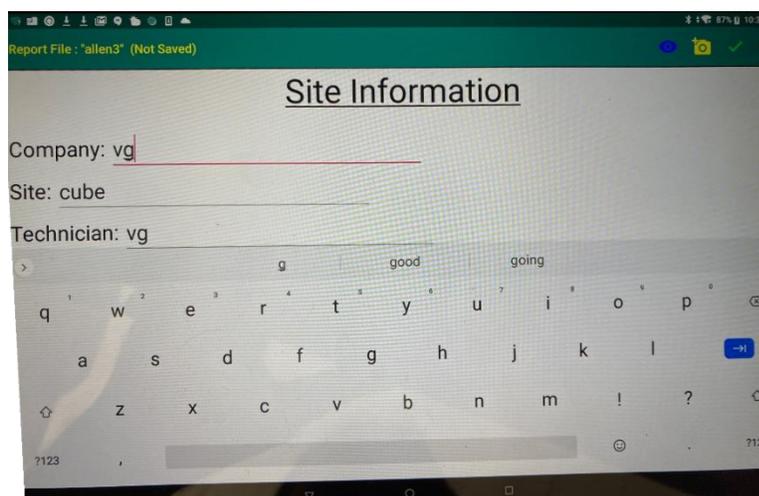


Figure 60 – Edit Site Information Window

2.4.9.2.2 Edit Sector/Feeder Information

The Site Information can be edited by pressing on the “Sector/Feeder” information shown in [blue text](#). Pressing this will open the screen shown in **figure 61**. Pressing on the sector or feeder line will open the keyboard and the user can then modify the sector or feeder information as needed. To save the changes press on the “Green Check Mark Icon” at the top right corner of the screen.

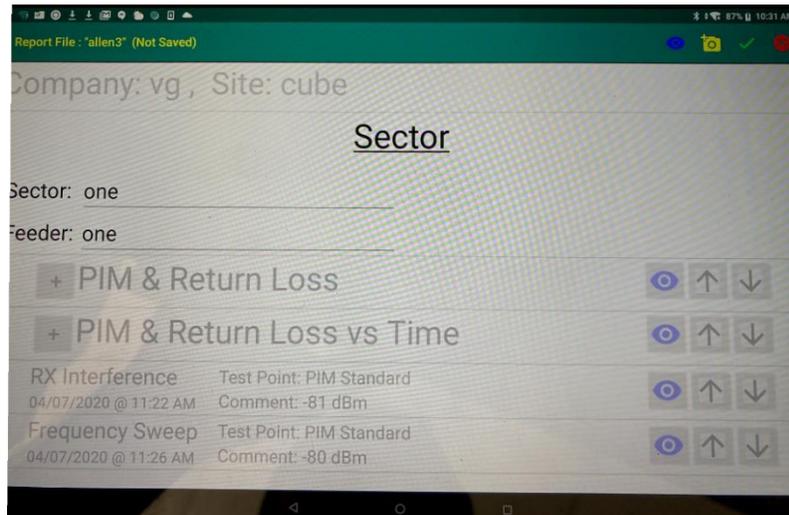


Figure 61 - Edit Sector/Feeder Information Window

2.4.9.2.3 Edit Test Point and Comment Information

The Test Point and Comment Information can be edited by pressing on the “test to be edited.” Pressing this will open the screen shown in **figure 62**. Pressing on the Test Point or Comment will open the keyboard and the user can then modify the Test Point or Comment information as needed. To save the changes press on the “Green Check Mark Icon” at the top right corner of the screen.

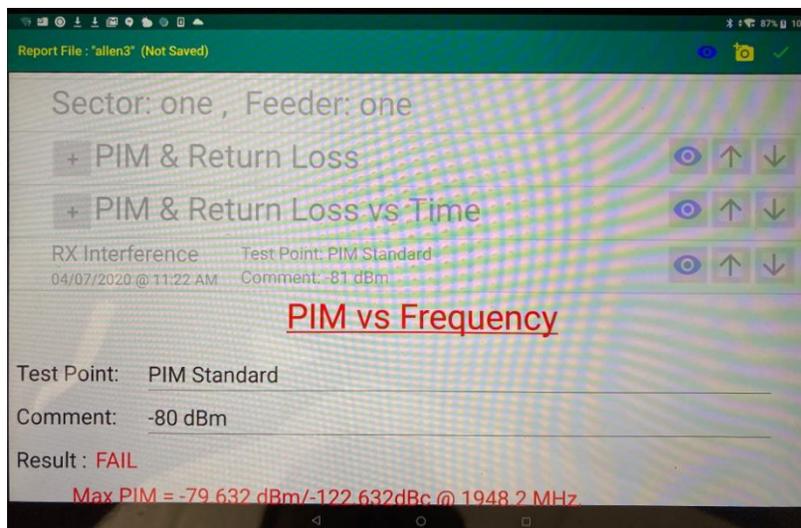


Figure 62 – Edit Test Point or Comment Information

2.4.9.2.4 Expand/Contract

Pressing the **Plus**  or **Minus**  icons on the left side of the tablet screen allows the user to **Expand** or **Contract** the information shown in the *Edit Report* window.

2.4.9.2.5 View Report

The individual test data or graph can be viewed in PDF format by pressing the “**eye**”  icon to the right of the test listing on the tablet screen.

2.4.9.2.6 Test Order

The order of the testing can be changed in the report by using the **up arrow**  to move the test further up, or the **down arrow**  to move the test further down.

2.4.9.2.7 Hide/Unhide

A test can be hidden by clicking on the RED check box to remove the **check**  **mark**. This will change the Edit Report screen to show the test which has been unchecked as “greyed out”, as seen in **figure 63** below. Clicking on the check box once again places the **check**  **mark** in the box and the test will now be unhidden (visible again).

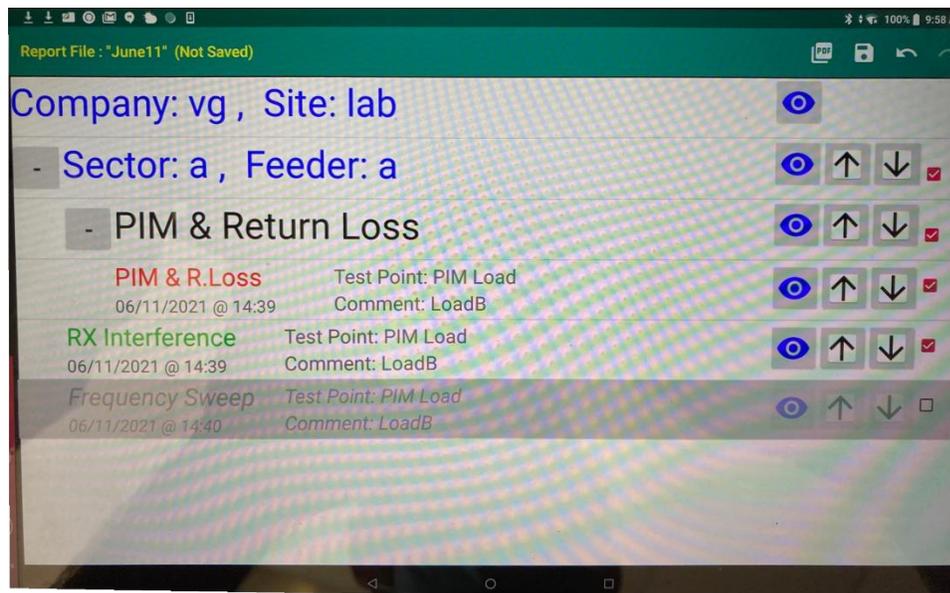


Figure 63 - Edit Report Window with Frequency Sweep Test “Hidden”

2.4.9.2.8 Return to Manage Reports Listing Window

To return to the Manage Reports window the user must press the back (left arrow) button on the tablet screen.

2.4.9.3



Copy Report

Pressing the *Copy Report* icon on the Report Listing window in **figure 56** will open “**Report Not Selected Please Select Report**” pop-up window (see **figure 64**) if the report to be copied has not been already selected. Remember that the report to be copied can be located on either the **PiMPro Local Drive, PiMPro USB Drive, or the Tablet** and will be copied to the selected location (see **figure 64**). The locations that can be copied to will appear in black text, while the locations that cannot be copied to will be “greyed out.”

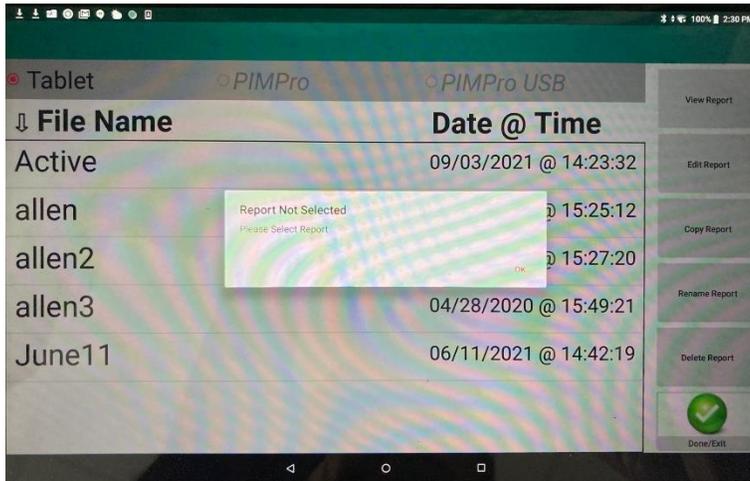


Figure 64 - *Please Select Report* Window in Copy Report

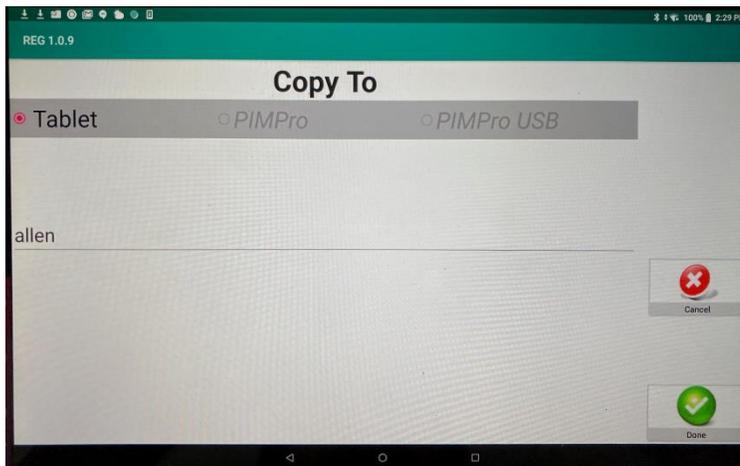


Figure 65 – “Copy To” Window in Copy Report

2.4.9.3.1



Cancel

Pressing the *Cancel* icon cancels the copy process and brings the user back to the **Manage Reports** window.

2.4.9.3.2



Done

Pressing the *Done* icon accepts the users request to perform the copy of the report that was Highlighted, and brings the user back to the **Manage Reports** window when the copy is completed.

2.4.9.4

**Rename Report**

Pressing the *Rename Report* icon on the Report Listing window in **figure 56** will open “**Report Not Selected Please Select Report**” pop-up window (see **figure 66**) if the report to be copied has not been already selected. The report to be renamed can be found in **figure 56**. To rename the file, press on the present name of the file to open the keyboard up and type in the desired filename. The user will be returned to the **Manage Reports** window the rename is complete.

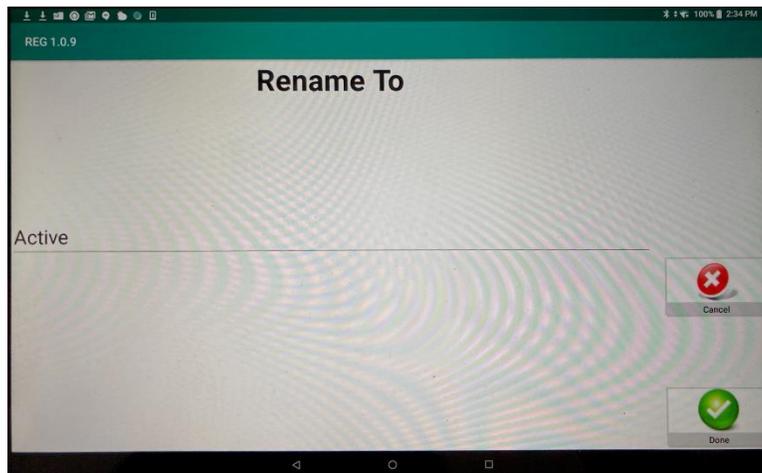


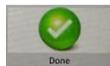
Figure 66 - *Rename To* Window

2.4.9.4.1

**Cancel**

Pressing the *Cancel* icon cancels the rename process and brings the user back to the **Manage Reports** window.

2.4.9.4.2

**Done**

Pressing the *Done* icon accepts the users request to perform the rename of the report that was Highlighted, and brings the user back to the **Manage Reports** window when the copy is completed.

2.4.9.5

**Delete Report**

Pressing the *Delete Report* icon on the Report Listing window in **figure 56** will open “**Report Not Selected Please Select Report**” pop-up window (see **figure 67**) if the report to be copied has not been already selected. Remember that the report to be deleted can be located on either the **PiMPro Local Drive, PiMPro USB Drive, or the Tablet** and will be deleted from the selected location (see **figure 56**). The locations that can be deleted from will appear in black text, while the locations that cannot be deleted from will be “greyed out.” Note that a Warning pop-up window will appear that will state → “**xxxx**” will be deleted | **Do You Want To Proceed?** The user must select either **No** or **Yes**. **No** will not delete the file, while **Yes** will delete the file. The user will be returned to the **Manage Reports** window when either selection is made.

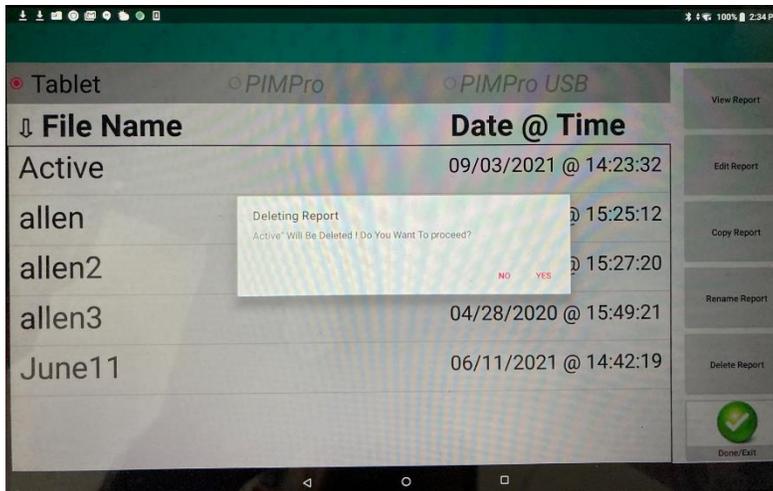


Figure 67 - Delete Report Warning Window

2.4.9.6

**Done/Exit**

Pressing the *Done/Exit* icon from the Manage Reports window returns the user to the “Main Menu.”

2.4.10 Manage Snapshots

The saved snapshots can be accessed by going to the Screen shots folder. Go to "Setting", then "Storage", then "Files" and "PiMPro" to access the folder.

2.5 Update of PiMPro Smart Series Software

Ensure that the PiMPro Smart Series PIM Analyzer Software is up to date. To ensure that the software is up to date perform the steps listed in **paragraphs 2.5.1 through 2.5.8** below.

2.5.1 Retrieve Latest PiMPro Smart Series Software

The user can log onto CCI's Website and search for PiMPro Smart Series Software updates, or if on CCI's mailing list the user will receive the latest PiMPro Smart Series Software update via email.

2.5.2 Copy PiMPro Smart Series Software to USB Drive

The user should place a USB Drive into one of your PC's USB ports. After locating the latest PiMPro Smart Series Software update, copy the file from either the CCI Website or email attachment as applicable onto the USB Drive.

2.5.3 Turn-On the CCI PiMPro Smart Series

Turn-On the CCI PiMPro Smart Series PIM Analyzer and wait for the Main Menu to appear.

2.5.4 Connect USB Drive to PiMPro Smart Series

Take the USB Drive and connect it to the CCI PiMPro Smart Series **USB port**.

2.5.5 Select the Configure System Icon

At the Main Menu select the *Configure System* icon.

2.5.6 Select the Update Software Icon

At the System *Configuration Menu* select the *Update Software* icon.

2.5.7 Find and Select the Latest Software Version

Find and select the latest software version on the tablet touch screen, and then highlight it by pressing the touch screen on the latest version software's filename.

2.5.8 Perform Install

Selecting the Software Version to be installed and pressing the *Install Version* icon shown in **figure 50** installs the version of S/W which the user has selected. Once the installation of the S/W is complete a reboot of the PiMPro Smart Series will occur.

2.6 Autosave

PiM-Pro now automatically saves unsaved data recordings from a prior measurement session in case power is lost or in case the user forgets to save measurements. This feature works very well in the event of a power outage. See **figure 68** for an example of the Autosave pop-up window after powering the PiMPro Smart Series PIM Analyzer.

Please note that the Autosave screen will be seen at PiMPro Smart Series turn-on, especially after a power failure or a session where the user did not save data.

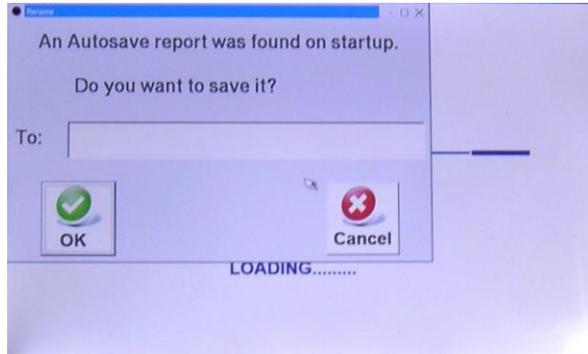


Figure 68 - Autosave Pop-up Window at PiMPro Smart Series Power-up

2.8 Save Report

2.8.1 Length of Report Filenames

The number of characters allowed for filenames has been extended. Report filenames can now include spaces. This improvement applies to the entire report subsystem which includes Save, Copy, Rename and Open Report. *Please note that special characters are not allowed.*

2.8.2 Default Report Filenames

PiMPro Smart Series generates a default filename for saved reports that the user can override and change. *The "suggested" filename no longer contains the sector information. Please note that special characters are not allowed.*

2.9 PiMPro Smart Series PIM Analyzer External Battery Charging

The battery LED charge indicators are not visible when the battery is in the Smart Series PiMPro unit. An external charger is available as an option. The battery display while performing external charging will be discussed in the following paragraphs. *Note: the battery is being charged while in the unit and connected to AC power through the AC Adaptor.*

2.9.1 Connecting the PiMPro Smart Series PIM Analyzer AC Adaptor, Battery Charger and Battery

Plug one end of the Battery Charger (with the 2.5 mm, center positive connector) into the AC Power Adaptor. Then take the loose Battery and connect the "D-Style" connector from the Battery Charger to the Battery. Finally, connect one end of the AC power cord into the AC Adaptor and then take the other end (C13 Connector) of the AC power cord and plug it into the AC power source.

2.9.2 Status Indications When Charging the PiMPro Smart Series PIM Analyzer Battery is Fully Discharged

The Battery Charger LED will blink green when charging the Battery. Note that when the Battery is fully discharged and the Battery Charge Status Button is depressed, the Battery LED will not come on until a small percentage of charge has been taken on by the battery.

2.9.3 Status Indications When Charging the PiMPro Smart Series PIM Analyzer Battery

The Battery Charger LED will blink green when charging the Battery. When the Battery is charging and the Battery Charge Status Button is depressed, the Battery LED illuminates and shows the percentage of charge (0%-25%, >25%, >50%, >75%, and Full Charge) taken on by the battery. The Battery LED will stay illuminated while the Battery is charging will blink for the XX% level that is presently being charged to. The LED will continue to give the user the status of the battery charge while the charger remains plugged in and powered.

2.9.4 Status Indications When Charging the PiMPro Smart Series PIM Analyzer Battery is Fully Charged

The Battery Charger LED will be solid green when the Battery is full charged. When the Battery is fully charged and the Battery Charge Status Button is depressed, the Battery LED will illuminate all percentages of charge and stay illuminated. When the Battery is fully charged and the Battery Charge Status Button is depressed, the Battery LED will illuminate all percentages (0%-25%, >25%, >50%, >75%, and Full Charge) of charge and stay illuminated as seen in **figure 69** below.



Figure 69 – Fully Charged Battery LED Status Indicators

2.9.5 Status Indications When an Error Occurs in Charging the PiMPro Smart Series PIM Analyzer Battery

The Battery Charger LED will blink Red when an error occurs during the charging of the PiMPro Smart Series PIM Analyzer Battery. Possible reasons for the error include:

- 1) Battery is Fully Charged.
- 2) Connection between the Battery Charger and the Battery is improper.
- 3) Battery is Faulty.

2.10 PiMPro Smart Series PIM Analyzer Battery Usage

The battery will be charged if the AC-DC Adaptor is plugged into the unit. Otherwise, the unit is being run from the battery and not being charged.

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.

2.10.1 Connecting the PiMPro Smart Series AC Adaptor, Battery Charger and Battery

Plug one end of the Battery Charger (with the 2.5 mm, center positive connector) into the AC Power Adaptor on the PiMPro Smart Series PIM Analyzer PIM Analyzer. Then connect one end of the AC power cord into the AC Adaptor and then take the other end (C13 Connector) of the AC power cord and plug it into the AC power source.

2.10.2 Status Indications on Tablet When Battery is in the PiMPro Smart Series

When the battery  icon on the upper right corner of the tablet is depressed it will indicate the exact percentage the battery is charged to.

2.10.3 Lithium Polymer Rechargeable Battery Care and Precautions

Note that there are no indications of a faulty battery (no LED's, etc.). The only way of knowing there is a problem is if the user notices a seemingly endless charging process. As an example, if the battery never progresses beyond the 1st bar (0-25% charge) on the battery LED within the expected 2.5-to-3-hour charge time for a "drained" battery. As another example, if the charge time is exceeding the 2.5-to-3-hour charge time no matter what charge status the battery reads (without ever becoming fully" charged).

- 1) Handle the Lithium Polymer Battery with extreme care: Dropping the battery can result in permanent damage
- 2) Remove the battery from the PiMPro's battery slot prior to shipping the PiMPro Smart Series PIM Analyzer PIM Analyzer.
- 3) Use only CCI specified charger or PiMPro Smart Series PIM Analyzer Internal charging feature to recharge the battery.

Warning: Do not swap battery while RF power is on. Also, never plug or unplug the AC Adaptor while the RF is on.

3 Inspection and Maintenance

3.1 Inspection and Maintenance (Unpowered)

Inspection and Maintenance of the CCI PiMPro Smart Series should be performed when the unit is not powered. The CCI PiMPro Smart Series should be inspected for the following items:

- 1) RF Output Connector Saver
 - a. The RF Connector Saver should be examined for dirt. If the RF Connector Saver is dirty, please be sure to clean the connector with Q-Tips and Alcohol pads supplied in the PiMPro Smart Series Accessory Kit.
 - b. The RF Connector Saver should be examined for damage. If the connector saver is damaged, the PiMPro Smart Series should be returned to CCI for replacement.
- 2) Fans/Fan Covers
 - c. The fans/fan covers in the PiMPro Smart Series should be kept clean to insure proper air flow through the PiMPro Smart Series. The fans/fan covers can be wiped clean, and a vacuum cleaner can also be used for cleaning.
- 3) Vents
 - d. The vents in the PiMPro Smart Series should be kept clean to insure proper air flow through the PiMPro Smart Series. The vents can be wiped clean, and a vacuum cleaner can also be used for cleaning.

3.2 Inspection and Maintenance (Powered)

A powered CCI PiMPro Smart Series can be inspected for Software and Firmware Version Installed. To view the Software and Firmware version see **paragraph -2130194304.508.-21301943042.4.8.5**. These versions should be compared with the latest version of Software available for download from the CCI Website on the PiMPro Smart Series webpage, and the Software Upgrade Instructions document also located on the PiMPro Smart Series webpage on the CCI Website.

C Appendix C –Declarations of Conformity

c.1 CE Declaration of Conformity



Hereby, **Communication Components Inc.**
89 Leuning Street
South Hackensack, NJ 07606 USA

declares that the following products are in compliance with the essential requirements of Directive 2014/30/EU (EMC Directive) and Directive 2014/35/EU (LVD Directive) if installed and operated in accordance with manufacturer’s instructions, per Certificate of Compliance No. 2G16129.CC0T74.

Model Number
PiMPro Smart Series 700
PiMPro Smart Series 700A
PiMPro Smart Series 7080
PiMPro Smart Series 800
PiMPro Smart Series 850
PiMPro Smart Series 900
PiMPro Smart Series 1821
PiMPro Smart Series 1900
PiMPro Smart Series 1921
PiMPro Smart Series 2600

These products are in conformity with the following European harmonized and published standards at the date of this declaration.

Referenced EMC Standard:	
EN 55022:2010 “Class B”	EN 61000-3-3: 2013
EN 55024: 2010	IEC 60950-1: 2005+A1: 2009+A2: 2013
EN 61000-3-2: 2014	EN 60950-1: 2006+A11: 2009+A1: 2010+A12: 2011+A2: 2013
EN 61000-3-3: 2013	

c.2 Sample Label Showing CE “Mark”



Revision History

Revision	Date Released	Author	Changes
1.0	1/6/2023	J. Baszak	Release PiMPro Smart Series User Manual