



DATREND
Systems Inc.

vPad -Mini™

vPad Safety Analyzer

Operating Manual

vPad -MiniTM
vPad Safety Analyzer
Operating Manual

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B	Revisions for Recording and Automation	2020-Feb-13
C	Clarified Warranty	2023-Oct-05

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- Use a double-walled carton of sufficient strength for the weight being shipped.
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- Use at least four inches of tightly packed, industrial-approved, shock-absorbent material all around the instrument.

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* Subject to some exclusions, based on sales territory. Contact Datrend for details.

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vPad-Mini OPERATORS MANUAL

1 Overview

vPad-Mini™ is an electrical safety analyzer designed for manual safety testing in an environment with limited need for Applied Parts testing. Options are available to: a) record measurements, create test records and use Bluetooth communications to print or transfer the records; or. b) automate the safety test according to the following standards: IEC62353, IEC61010, AU/NZ 3551 or NFPA99.

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2 Manual Testing

2.1 General

The vPad-Mini app, in its most basic mode, is a manual electrical safety tester. Test results are only saved if you manually record the measurement value. There is no evaluation of passing or failing against any limit values you wish to impose. After applying power to the smart phone, the main menu of the application is shown (**Figure 1**). Note that the main menu appearance will change as the recording and the automation options are enabled: the number of buttons will change from 2 to 3 to 4 respectively.



Figure 1

The UI of the main menu includes image buttons which launch other activities of the app, including measurement activities such as voltage , equipment current , ground resistance  and leakage current , as well as application and device settings . Context-sensitive help is accessed on this and other screens by a  button.

If there is a problem during initialization of the hardware, an Alert Dialog is shown (**Figure 2**).

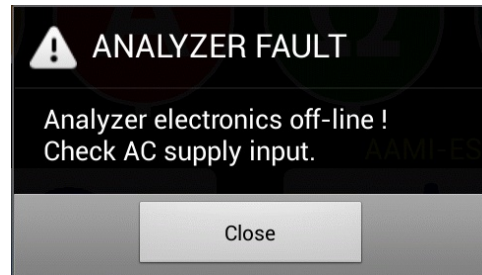



Figure 2

Fault messages which may be shown by the dialog are:

Error Message	Shown if...
Analyzer electronics off-line ! Check AC supply input.	Attempt to connect with analyzer via DACOM times out
Analyzer will not initialize ! Service is required.	No response to hardware initialization command, or No response to hardware idle command
Unable to calibrate voltmeter ! Service is required.	No response to voltmeter calibration command
Voltmeter offset is too high ! Service is required.	Response to command exceeds maximum # of counts

The **Close** button dismisses the dialog and retries making a communication connection. If the hardware fault cannot be corrected, operation loops indefinitely on the dialog until the phone is switched off.

2.2 Settings

The  button on the main menu of the app launches a Settings Menu (**Figure 3**).

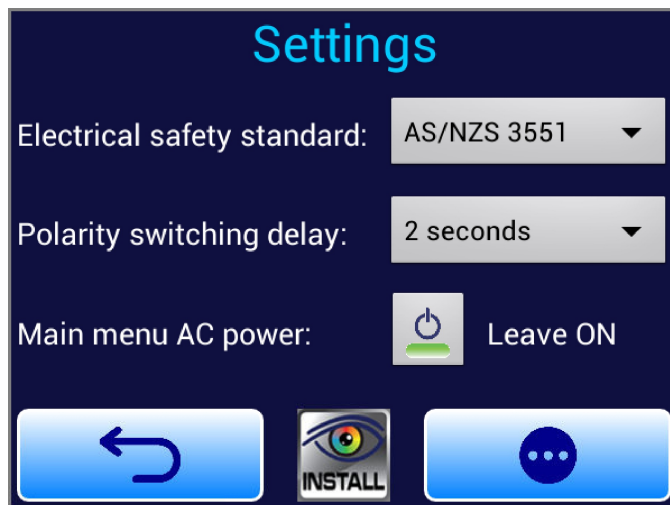


Figure 3

A spinner control sets the electrical safety standard (**Figure 4**). This setting affects the types of tests provided by measurement activities of the app, as well as nomenclature which is displayed by those activities.

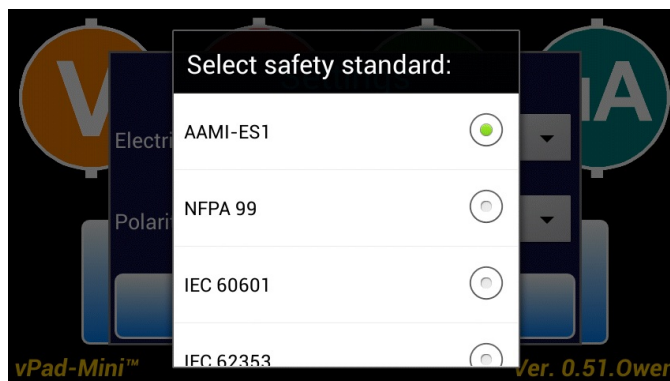



Figure 4

Standards supported by vPad-Mini are AAMI-ES1, NFPA 99, IEC 60601, IEC 62353, IEC 61010, VDE751 and AU/NZ 3551. On first run of the app, the default standard will be AAMI-ES1. The selected standard appears on most menus of the app, including the main menu where it is shown above the  button.

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A second spinner control sets the polarity switching delay (**Figure 5**). This setting applies to the leakage test activity and determines the amount of time the test receptacle is maintained in the OFF state between changes in polarity from normal to reverse or vice versa.

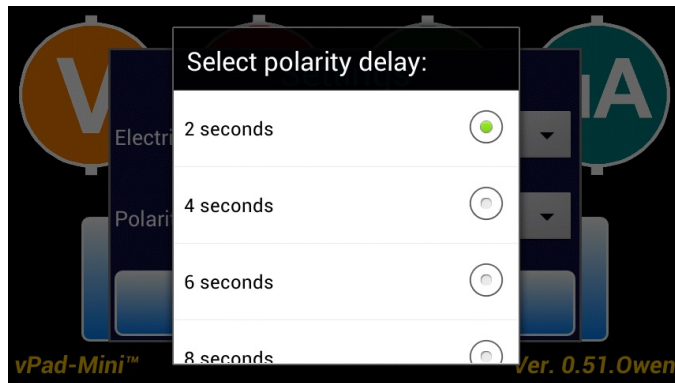




Figure 5

Available settings are 2, 4, 6 or 8 seconds. On first run of the app, the default setting is 2 seconds.

In **Figure 3**, there is a Main Menu AC Power setting. The user has the option of leaving the AC Power ON (per **Figure 3**) whenever you go back to the Main Menu from a measurement that had the receptacle **ON**, or having the AC Power turned **OFF** whenever you return to the Main Menu ( **Always OFF**).

The  button displays the Android Settings of the phone (**Figure 6**). Except for language and perhaps the sound volume, users will normally have no need to change the settings of the phone itself. However, access to the Apps submenu of the Android Settings will be necessary if the vPad-Mini app needs to be updated in the field with a new version, or you wish to use QuickSupport (from Teamviewer) for remote support. The Android Settings menu will also enable the vPad-Mini phone to be paired with the customer's phone or tablet over Bluetooth, which will be necessary if data recording, automation and reporting capabilities are activated in the future.

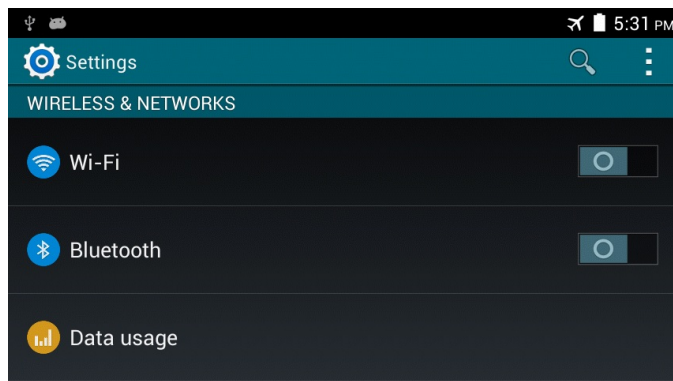





Figure 6

The phone's BACK button  is used to exit the Android Settings menu.

The  button of **Figure 3** saves changes, if any, to the safety standard, polarity delay and/or receptacle status on returning to the Main Menu, and closes the Settings Menu.

2.3 Voltage

The  button of the main menu launches a voltage measurement (**Figure 7**).

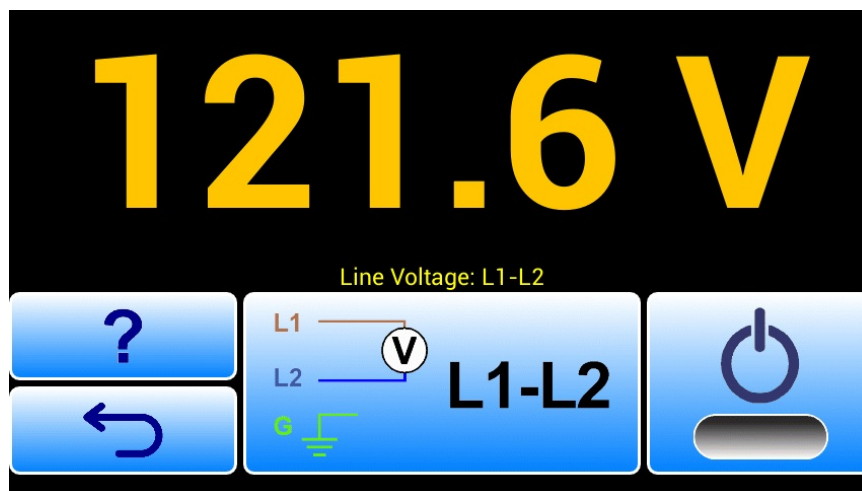





Figure 7

A numeric readout occupies the entire upper half of the screen. The measured value is updated approximately once per second.

Image buttons occupying the bottom half of the screen enable the user to control the safety analyzer.

The  button finishes the measurement and returns the UI to the main menu. The phone's BACK button  is disabled.

The  button displays help information relevant to this menu.

The large central button selects the type of measurement to be performed.

- 2.3.1 The button displays a schematic image which represents the measurement being displayed on the upper half of the screen.
- 2.3.2 Initially the button image is set to L1-L2 voltage.
- 2.3.3 When the central button is pressed, a pop-up pick list is then shown which allows the user to change the type of measurement, **Figure 8**.

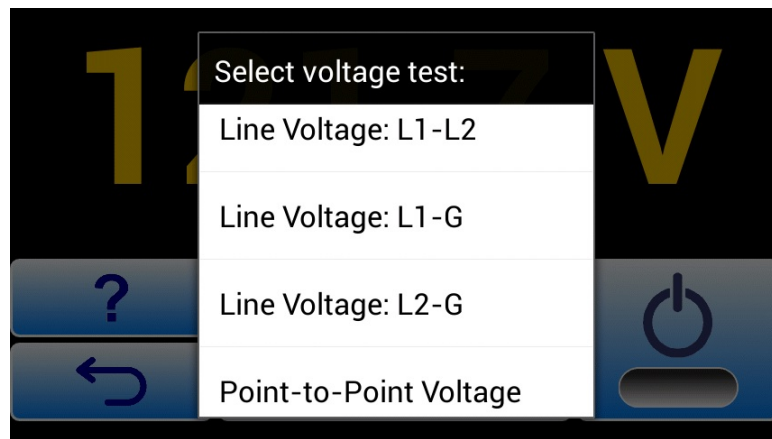


Figure 8

As shown in **Figure 8**, this list provides four measurements: L1-L2; L1-GND; L2-GND and point-to-point voltage. The nomenclature of the pick list depends on the standard which has been selected via the Settings Menu of Section 2 (AAMI and NFPA standards measure "line" voltages; IEC standards measure "mains" voltages).

- 2.3.4 When an item on the pick list is chosen, the list is dismissed and the schematic on the central button is updated to reflect the new test, and the selection label is copied to the text field above the schematic.

The toggle button at bottom right  controls the test receptacle.

The button icon includes a representation of a LED indicator, which appears bright green when the receptacle is ON or grey when the receptacle is OFF.

2.4 Load Current Activity

The **A** button on the main menu measures and displays load current. This measurement is somewhat simpler than others on the app since it provides only one type of measurement.

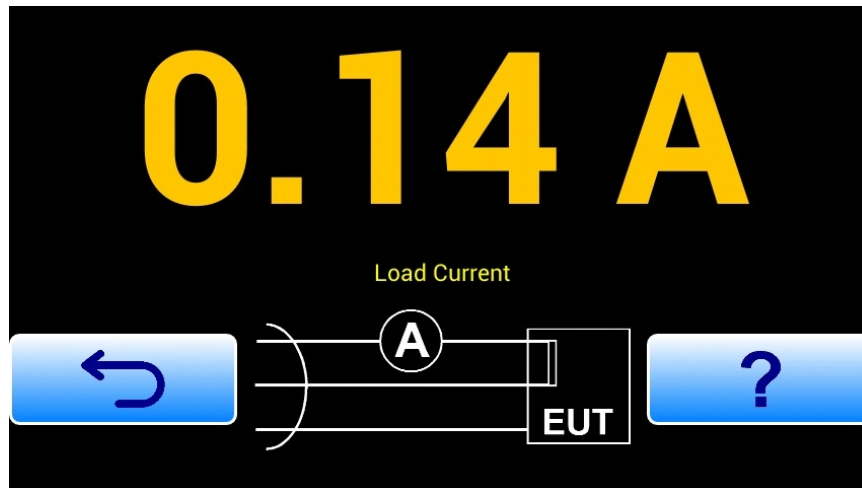








Figure 9

A numeric readout occupies the entire upper half of the screen. The measurement value is updated approximately once per second.


The  button finishes the measurement and returns to the main menu. The phone's BACK button  is disabled.

The  button displays help information relevant to this menu.

A schematic diagram is shown between  and  buttons which represents the test configuration. This is an image only, not a button. A description of the test is placed in a text field above the schematic.

On entering the menu, the test receptacle is automatically switched ON if it is not already ON. Exiting this activity with the  button does not change the state of the test receptacle, so it will remain ON while the main menu is being viewed.

2.5 Resistance

The  button on the main menu starts a resistance measurement (**Figure 10**). The UI of this activity is similar in design to the UI for the voltage measurement (see Section 3).

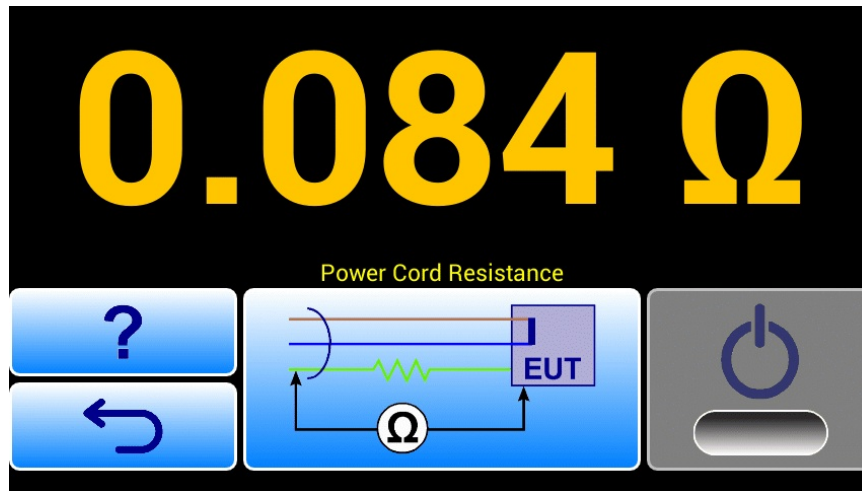





Figure 10

A numeric readout occupies the entire upper half of the screen. The measurement value is updated approximately once per second.

All measurement results are obtained with a dedicated ohmmeter circuit which measures over a single range up to ~2 ohms.

Image buttons occupying the bottom half of the screen enable the user to control the safety analyzer.

The  button finishes the measurement and returns the UI to the main menu. The phone's BACK button  is disabled.

The  button displays help information relevant to this menu..

The large central button selects the type of measurement to be performed.

- 2.5.1 The button displays a schematic image which represents the measurement being displayed on the upper half of the screen.
- 2.5.2 On initial entry to the resistance measurement, the button image is set to power cord or protective earth resistance. This means that, in addition to enabling the ohmmeter circuitry, the test receptacle will be switched OFF if it is currently ON.

- 2.5.3 When the central button is pressed a pop-up pick list is then shown which allows the user to change the type of measurement.

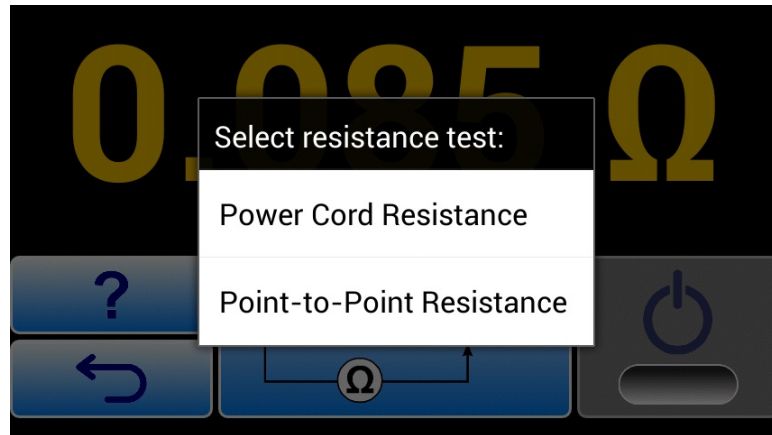


Figure 11


As shown in **Figure 11**, this activity provides two measurements: power cord or PE resistance and point-to-point resistance. The nomenclature of the pick list depends on the standard which has been selected via the Settings Menu described in Section 2.2 (AAMI and NFPA standards measure "power cord" resistance; IEC standards measure "protective earth" resistance).

- 2.5.4 When a item on the pick list is chosen, the list is dismissed and the schematic on the central button is updated to reflect the new test, and the label for the selection is copied to the text field above the schematic.

The toggle button at bottom right controls the test receptacle. Note that it will be OFF when testing the power cord, and may be OFF or ON when testing point-to-point resistance.

The button icon includes a representation of a LED indicator, which appears bright green when the receptacle is ON or grey when the receptacle is OFF.

2.6 Leakage Currents

The  button on the main menu initiates leakage current measurements (**Figure 12**). The UI of this activity is highly dependant on the setting of the standard, and in this way the leakage measurements differs somewhat from other parameters.

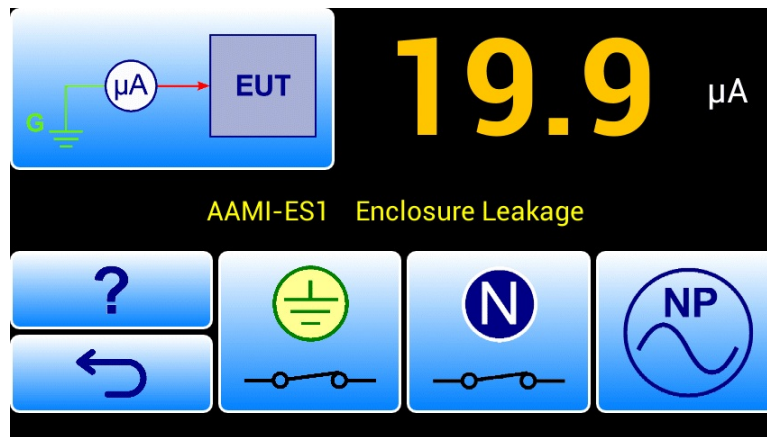


Figure 12


A numeric readout occupies the upper right corner of the screen. The measurement value is updated approximately once per second.

The metering circuitry provides two filter settings. The AAMI filter is selected when the standard is set to AAMI only. For all other standards, the IEC filter is used.

When the standard is set to IEC61010 and the selected test is "Accessible Voltage", an alternative measurement process is used which is analogous to the point-to-point measurement of the voltage activity.

Image buttons on the bottom half of the screen enable the user to control the leakage test.

On initial entry to leakage current testing the button icons default to show normal polarity and (depending on the standard) normal neutral and ground.

The  button displays help information relevant to this menu.


The "ground button"



controls the ground or earth connection at the test receptacle.


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The "ground button" may be disabled or hidden depending on the selected leakage test. For AAMI and IEC60601 earth leakage, the button is disabled, its image is set to the open-circuit icon, and the ground at the test receptacle is maintained in the open state. For IEC62353 equipment leakage, and for AAMI isolation or IEC MAP tests, the "ground button" is hidden and the receptacle's ground is maintained in a state appropriate for the test (open for equipment leakage; or closed for isolation/MAP test).

The "neutral button"  controls the neutral or line 2 connection at the test receptacle.

For AAMI enclosure leakage, IEC60601 and 61010 touch current, or for IEC60601 patient leakage, if the receptacle ground has previously been set to open, and the neutral is then opened, the ground is closed automatically by the app to avoid a double-fault test condition.

The "neutral button" may be disabled or hidden depending on the selected leakage test. For any NFPA leakage test, the "neutral button" is disabled, its image is set to the closed or default icon, and receptacle line 2 is maintained in the closed state. For IEC62353 equipment leakage, and for AAMI isolation or IEC MAP tests, the neutral button is hidden and receptacle line 2 is maintained in a state appropriate for the test (closed in all cases).

The "polarity button"  controls polarity of the test receptacle.

When the "polarity button" is pressed, a process is launched to ensure the polarity is changed in a safe manner.

During the polarity change, the readout is blanked and all buttons on the UI are disabled (see **Figure 13**).

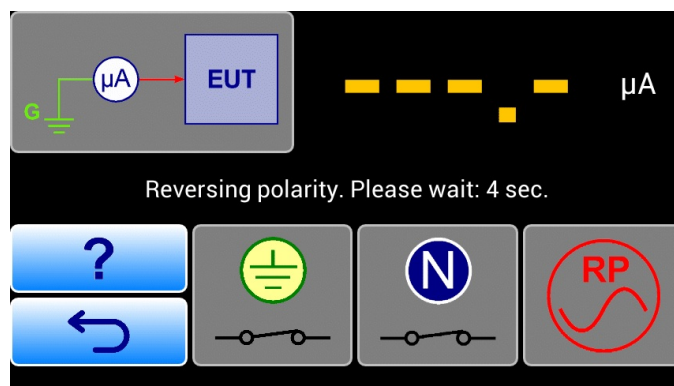


Figure 13

Per **Figure 13**, the text field in the middle of the screen is used to display a timer which counts down from the polarity switching delay time. When the timer reaches zero, the UI buttons are re-enabled and the receptacle is switched ON with the polarity indicated on the UI. The text field above the buttons is restored to the name of the leakage test, prefixed by the standard.

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The "polarity button" is enabled for all leakage tests unless the standard is set to NFPA, in which case the button is disabled and all measurements are performed with receptacle polarity set to normal.

When the selected leakage test is the AAMI (lead) isolation test, the IEC60601 MAP test, or the IEC62353 applied part leakage test, the ground and neutral buttons on the UI are hidden and a button which controls the MAP test voltage is then shown (see **Figure 14**).

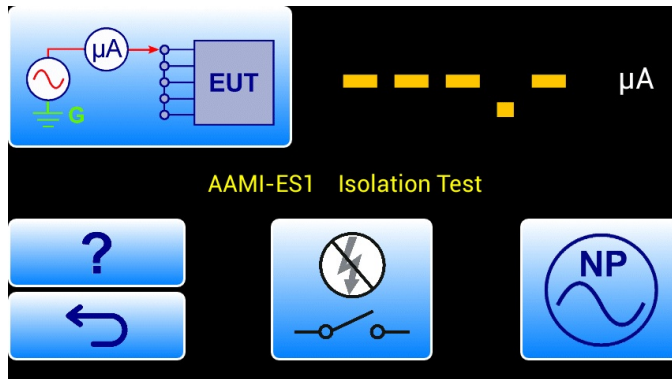


Figure 14

On initial selection of the test, the "MAP button" defaults to OFF and the leakage readout is blanked, as shown.

When the "MAP button" is pressed, the analyzer activates the test voltage (**Figure 15**).

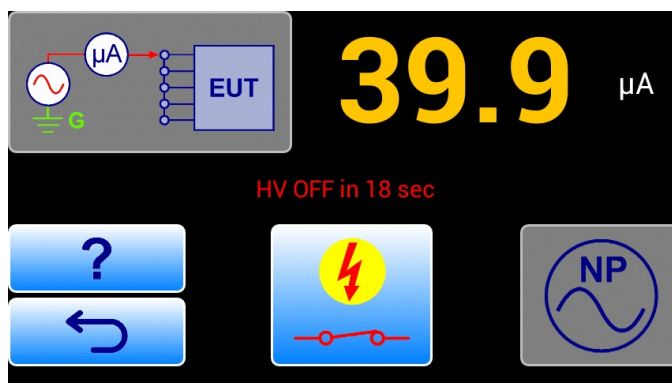


Figure 15

Per **Figure 15**, the text field in the middle of the screen is used to display a timer which counts down from 20 seconds. If the timer reaches zero, or if the "MAP Button" is pressed before the timer reaches zero, the MAP voltage is switched OFF and the UI is restored to the state shown in **Figure 14**.

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An image button located at the top left corner of the UI enables the user to select the leakage test type.

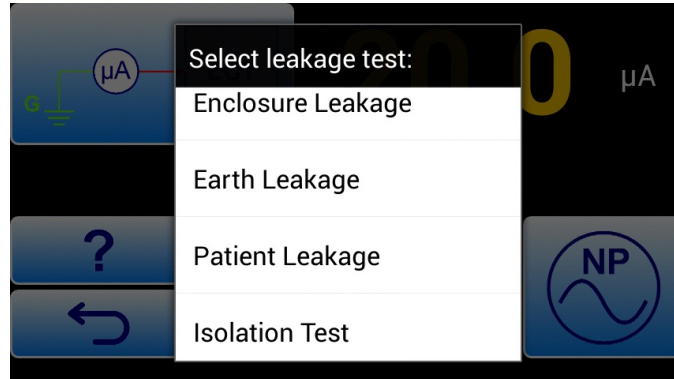



Figure 16

The content of the pick list depends on the standard which has been selected via the Settings Menu of Section 2.2, as follows:

Standard	Available Tests
AAMI-ES1	Enclosure leakage; earth leakage; patient leakage; isolation test; point-to-point leakage
NFPA 99	Chassis leakage; lead-to-ground leakage; point-to-point leakage
IEC 60601 AU/NZ 3551	Touch current; earth leakage; patient leakage; MAP test; point-to-point leakage
IEC 62353	Equipment leakage; applied part leakage; point-to-point leakage
IEC 61010	Touch current; point-to-point leakage; accessible voltage test
VDE701-702	Touch current, earth Leakage

When a item on the pick list is chosen, the list is dismissed. Receptacle polarity is not modified when a new test is selected from the list, however, neutral/line 2 is restored to normal and ground will also be restored to normal for tests other than earth leakage or equipment leakage. The schematic on the button at top left is updated to reflect the new test, and the item label is copied to the text field above the control buttons, prefixed by the name of the standard.

2.7 Help Activity

Test-related menus of the app provide a  button which displays reference information and instructions which pertain to the menu in use.

The help information is contained in HTML files and related figures which are included in the app. A help system based on HTML enables the help to include hyperlink references (**Figure 17**), photographs (**Figure 18**) and reference tables (**Figure 19**). The app design supports internationalization through sets of HTML help files which are selected by the app according to the language which has been chosen via the phone's Settings menu.

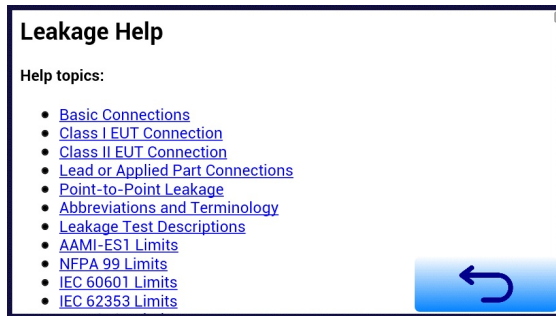


Figure 17

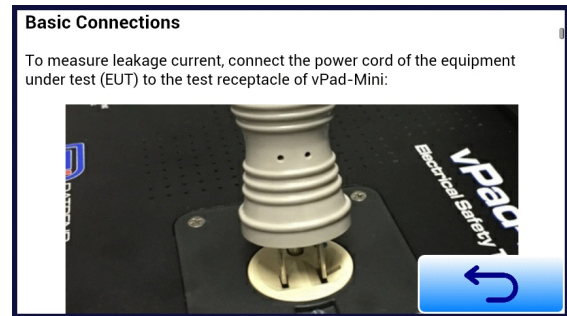


Figure 18

(table to be added)

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NFPA 99 Limits


Test	NC	SFC
Chassis Leakage	100 μ A	500 μ A
Lead-to-Ground Leakage	100 μ A	500 μ A

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IEC 60601 Limits

Figure 19

The WebView control supports pinch and zoom gestures.

The  button closes the help activity and returns the UI to the menu from which the help was opened.

If the WebView control is scrolled from the top, the scroll position is saved when the help activity is exited. If the same help information is viewed again, the WebView control is restored to the scroll position that was previously saved.

3 Recording Results


This chapter covers recording measurements and transferring or printing test results by Bluetooth.

The recording option provides the user with the ability to record individual measurements into a clip board type memory and save a series of measurements into a test record. Once completed, the test can be saved to a test record file which is identified by a file name which includes a device identifier, the date and the time. The recording option is integral to the vPad-Mini firmware and is activated by an activation file installed on the phone. The activation file is provided through the Datrend dealer on purchase of the option, and is tabletID (phone) specific.

Once activated, the main menu of the app changes from a two icon to a three icon display, as shown below.



Figure 20

The  button takes the user to the 'Recording' screen shown in **Figure 21**.

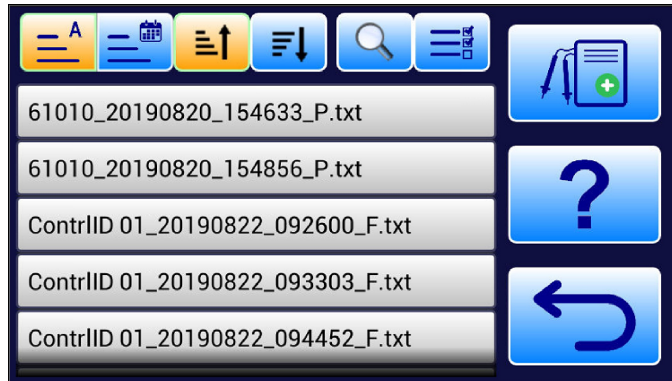






Figure 21

This screen will display a listing of the test records currently in memory, provide some options on the way in which the list will be ordered (by name, by date, ascending or descending), provide the ability to search for a particular record, and select multiple records to send or print.

To have a list of test records we must first do some tests. To start a test, press the  start test button. (This can also be accomplished using a press and hold action on the  button.) Once a test is started, the icon for this button will change to , the test - in - progress icon. If you return to the main screen, the 'records' button will also indicate a test - in - progress icon .


If we press the above icon/button, the test - in - progress screen, **Figure 22**, will be displayed. This screen will show all of the measurements that are currently in the measurement clipboard, (ie. the measurement status).



Figure 22

If there are no measurements displayed, touching the  button will allow cancellation of the current test.

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If there are measurements, the screen will show the measurement and the above button will change to  . Touching this button will delete the measurement at the bottom of the list.

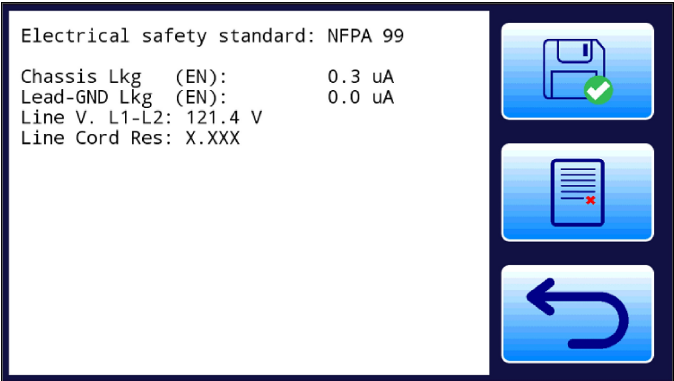



Figure 23

Note that when there are measurements on the screen, the file save button icon  will be enabled. Touching this button will display a dialog box for the device ID input which becomes part of the filename for the test report.

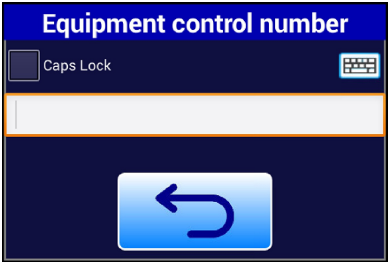


Figure 24

To make a test measurement, go to the Main Screen and select one of the measurement icons:



On the screen for the test parameter (eg. **Figure 25**), a test measurement will be displayed. To save the measurement to the test measurement clipboard, touch on the numerical measurement. An animation of the save process will be displayed, with the measurement appearing in an amber coloured ‘toast’ message which moves into the clipboard for storage.

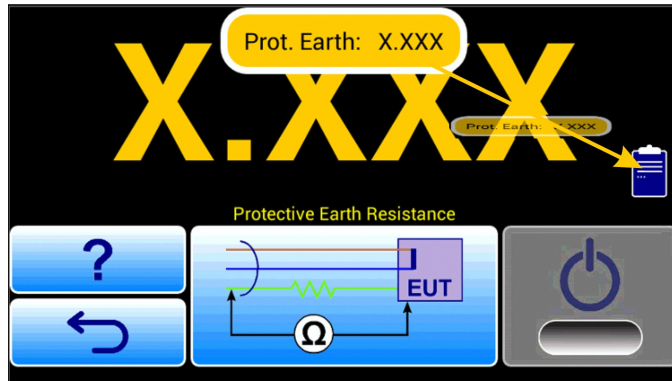


Figure 25

Once a measurement is stored to the clipboard, return to the Main screen to select another parameter, or to finalize the saving of the complete record.

Going back to the Recording screen (**Figure 21**), note the listing of the test records currently in memory. Touching on one of the records will display the contents of the test record and provide further options, **Figure 26**.

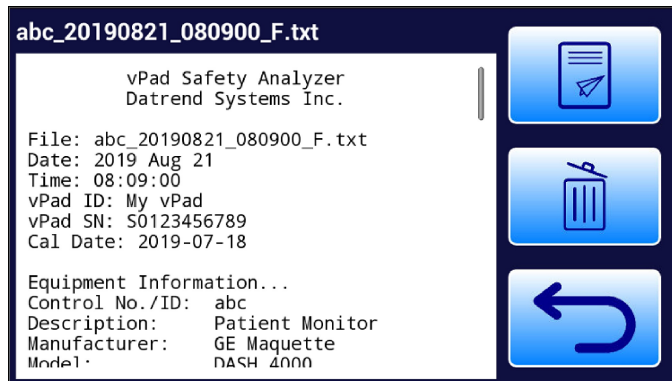




Figure 26

In addition to being able to review the contents of the test record, the test record can be deleted, , or it can be sent to a Bluetooth printer or d .

If you chose to 'send' the file, the Bluetooth connections will be presented for selection:

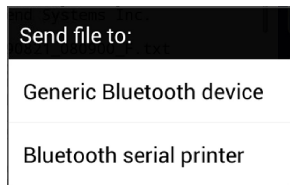


Figure 27

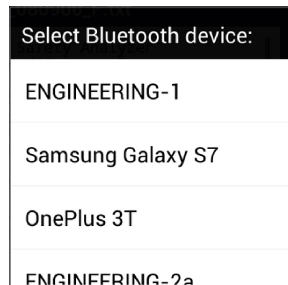


Figure 28

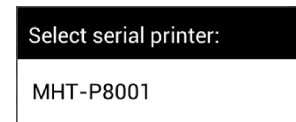



Figure 29

The lists will be separated as best as possible by the Mini, based on the type of communication protocol identified by Android.

It is possible to process multiple files at once using the ‘multiple files’ button, , on the Recording screen, **Figure 21**. Touch the button to display a list of files with a checkbox associated with each file. Check the box for the files of interest, **Figure 30**. If you wish to select (or de-select) all of the files, press and hold on the button (now amber in colour) again.

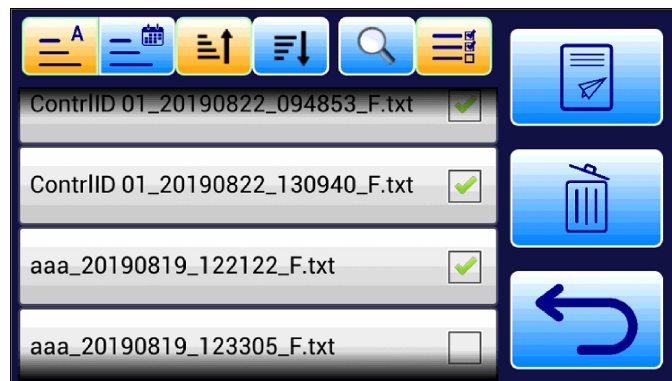


Figure 30

Four buttons are available to control the sorting of the file list (by name, by date, ascending or descending).

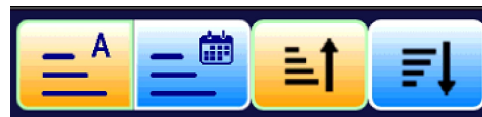



Figure 31

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In addition, it is possible to search for a particular record by entering a keyword or several characters, and searching based on 'starts with' or 'contains'. Press the magnifying glass icon button  to begin the search.

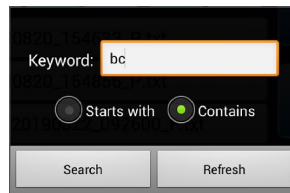


Figure 32

Enter 2 or more characters of a filename that begins with the characters and press 'Starts with' to see if a filename (one or more) meeting the search criteria can be found and displayed. You can (recursively) search on the short list of files returned above.

Enter 2 or more characters of a filename that contains the characters and press 'Contains' to see if a filename (one or more) meeting the search criteria can be found and displayed. You can (recursively) search on the short list of files returned above.

To restore the full list of filenames, press the 'Refresh' button.

Once a test has been saved, it is necessary to initiate a new test from the main screen.

4 Automated Testing

The automation option in the vPad-Mini allows automated testing for the NFPA99, IEC62353, IEC61010 and AU/NZ 3551 standards, following a preset protocol per the Standard. Once completed, the test can be saved to a test record file which is compatible with all of the features of the Recording option. The automation option is integral to the vPad-Mini firmware and is activated by an activation file installed on the phone. The activation file is provided through the Datrend dealer on purchase of the option, and is tabletID (phone) specific. The Recording option is a prerequisite for the Automation option.

The test protocol for an automated test can follow one of two methods: 1) a protocol which is based on the deviceID and stored in a file which is named <deviceID>.ats, where ats stands for automated test sequence; or 2) a protocol which is applicable to numerous devices, such as defibrillators or pulse oximeters, and is stored in a file which has been named <deviceTYPE>.seq, referred to as a 'named' sequence.

If a device is being tested for the first time, the user will be taken to the 'test by Standard' screen initially. If you 'run' a protocol directly from the 'Standards' screen (pages 1 - 4), a <deviceID>.ats file will be created and referred to in the <deviceID>.eqr file when you save the test record. If you go to the 'Sequences' screen a 'named' sequence file can be selected, such as 'Zoll Defib, 5 leads'. This 'named' sequence will be referred to in the <deviceID>.eqr file when you save the test record. The advantage of using a 'named' sequence is that the test protocol is predefined for that type of device, ensuring consistency for that device type and also between technicians. Making a change to a 'named' sequence will affect all devices using that 'named' sequence.

Once activated, the main menu of the app changes from a three icon to a four icon display, as shown in Fig. 4-1.

An automated test can be initiated by pressing the AUTO button () on the main screen.



Figure 33

Pressing the **AUTO** button will provide a dialog box, **Figure 34**, to allow entry of an identification code for the device. This code can be alpha, numeric or alphanumeric, but must uniquely identify the device as it will be used in the test record filename. The input dialog screen is shown below, note that the code used to identify the device is labelled Equipment ID Number, but may be referred to by other labels such as Control ID, Device ID, Asset ID, etc.:

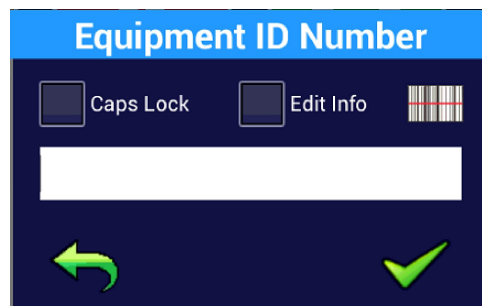




Figure 34

On this Equipment ID input screen there are two check boxes. If input is required in all uppercase, check Caps Lock. If you wish to enter the Equipment Information screen, check the Edit Info box. If you are using a barcode scanner and it has gone to sleep and needs to be re-connected, activate the scanner again and click on the bar code icon to enable the virtual keyboard with the scanner.

The back arrow icon  will go back one screen, in this case, to abort the test. The check  will proceed with the test.

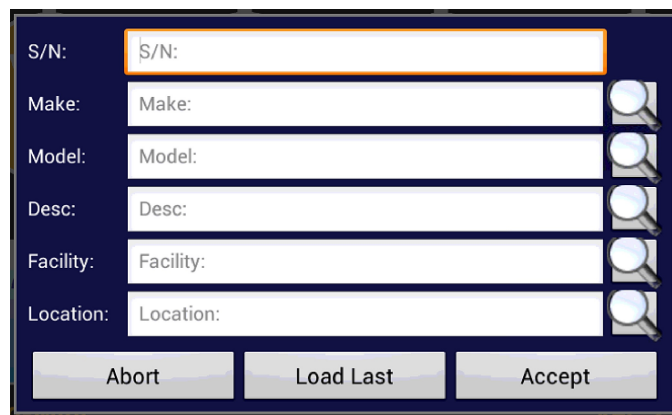
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The selection of a Standard will identify what particular tests are to be performed to meet the requirements of the electrical safety standard, as identified in the Default<std> file resident on the vPad-Mini. On initial delivery, this file will define a test protocol which meets the basics of an accepted Standard, subject to any limitations imposed by vPad-Mini. A user may wish to modify this Default<std> file (one per standard). Consult your local dealer or customer service at Datrend Systems Inc. for advice on what changes can be made.

vPad-Mini provides the ability to retain Equipment Information and Test Protocol Information based on the Equipment ID. When starting a test, the user can enter a device ID that has not been tested before, or a device ID that has been tested before.

When a test record is created/saved at the end of a test sequence, this information will be saved to a file associated with the Equipment ID (<device_ID.eqr). This Equipment Information may then be optionally recalled in the future if a previously tested Equipment ID is entered to begin a test.

Basic Equipment Information is as indicated below in **Figure 35**:








S/N:	<input type="text"/>	
Make:	<input type="text"/>	
Model:	<input type="text"/>	
Desc:	<input type="text"/>	
Facility:	<input type="text"/>	
Location:	<input type="text"/>	
<div>Abort Load Last Accept</div>		

Figure 35

Additionally, when a test protocol has been identified/defined, and a test record is created/saved at the end of a test, the test protocol information will also be saved to a file associated with the Equipment ID (<device_ID.ats). This test protocol may also be optionally recalled in the future if a previously tested Equipment ID is entered to begin a test.

Assuming we are starting with an Equipment ID that has **not** been tested previously *and* the Edit Info box is checked, an empty Equipment Information dialog will be presented, as indicated in Fig. 4-3. If the Edit Info box has not been checked, operation will jump forward to the first page of the test protocol definition as shown in **Figure 43**, or to the 'Sequence' screen if the <deviceID>.epr file contains a 'named' sequence (see est Protocols Based on a Sequence).

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The Serial number is (should be) unique to the device and must be entered by the keyboard. Touch in the Serial Number input text box to activate the keyboard. Enter the serial number and press **Next** when done.

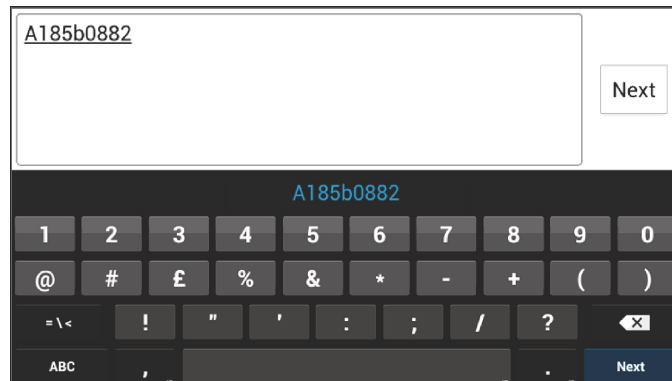


Figure 36

This will automatically take you to the next Input box, which is for the device Make. A 'hint' is provided as to what the Input box is for, in this case Make: .

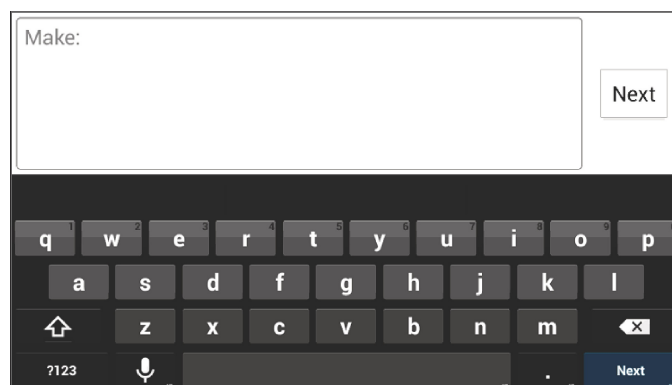


Figure 37

It is not necessary to delete the 'hint', simply begin typing with the Make of the device. **Next** will take you to the next input box. Once again, the 'hint' will indicate the type of input expected, or, if there was text already in the input box, it will be displayed.

If you wish to exit the **Next** cycle of input, use the **Back** button on the tablet to go back to the Equipment Information screen, **Figure 35**.

A partially completed Equipment Information screen is shown in **Figure 38**.

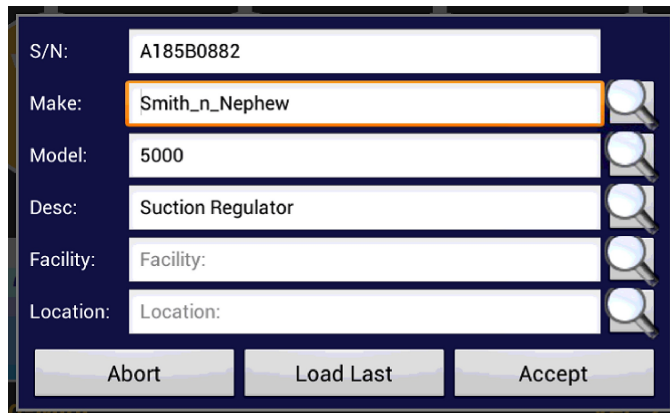



Figure 38

An alternative method of data input is via the use of the list search feature, accessed by the search icon, . Touch this icon to access the context sensitive (eg. Make, Model, Description, Facility, Location) list search feature. Touch on the search icon at the end of the Facility line in **Figure 38** to gain access to any facilities available in an existing list.

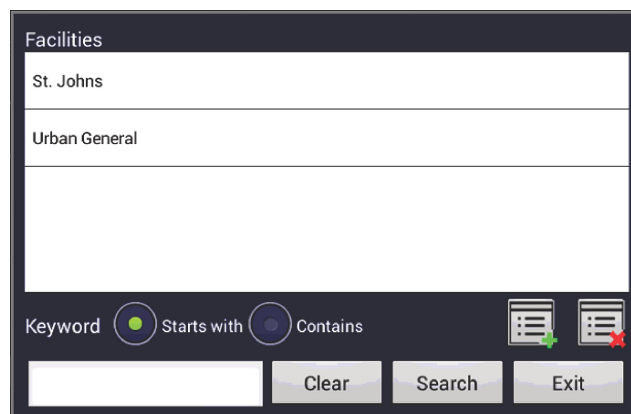

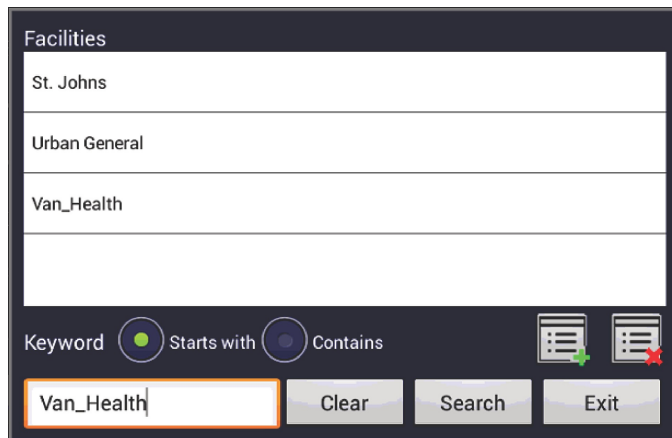


Figure 39

The list of facilities, for instance, is a text file resident on the vPad-Mini. The file can be created on a PC and transferred to the Mini tablet, or it can be created as new devices are tested. In the above screen, the Search has been entered with a blank initial value, as indicated by the blank text input box, in the lower left corner. On entry with a blank value, the list will display all available values for the parameter, in this case, Facilities.

To add an entry to the list, type in the new value to the text input box of **Figure 39** and touch the **Add** icon, . The value added will now appear in the list. Touch the new entry to select it and return to the Equipment Information screen. An alternative method is to enter the value on the Equipment Information screen first, then touch the Search icon. The Search screen will open with the value pre-entered in the Input text box. Simply touch the **Add** icon to put the value in the list.



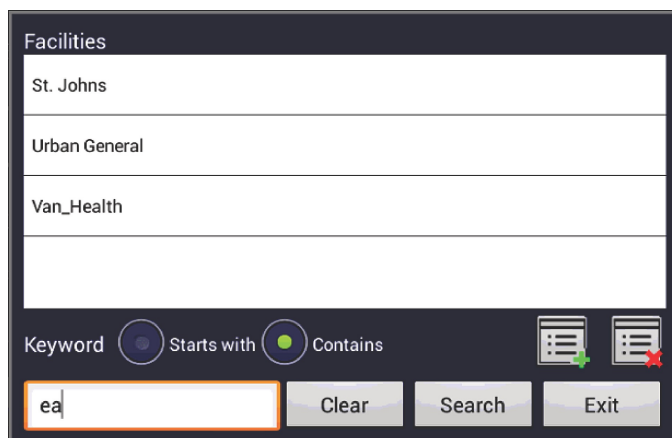
The screenshot shows a 'Facilities' screen with a list containing 'St. Johns', 'Urban General', and 'Van_Health'. Below the list, there are radio buttons for 'Starts with' (selected) and 'Contains'. To the right are icons for 'Add' (green plus) and 'Delete' (red minus). At the bottom, there is a text input box containing 'Van_Health', and buttons for 'Clear', 'Search', and 'Exit'.

Figure 40

To delete a value from the List, type or import the value into the Input box and touch the Delete icon,



In some cases, the List may be very long. To find a value in the List, type 2 or more characters that you know to be in the value into the Input box. Select the Search method, **Starts with or Contains**, and then touch **Search**. The value List will be updated with only those values that meet the **Search** criteria. This reduced list may be searched again with new criteria input.



The screenshot shows the same 'Facilities' screen. The 'Starts with' radio button is now selected. The text input box at the bottom now contains 'ea'. The 'Add' and 'Delete' icons are still present on the right.

Figure 41

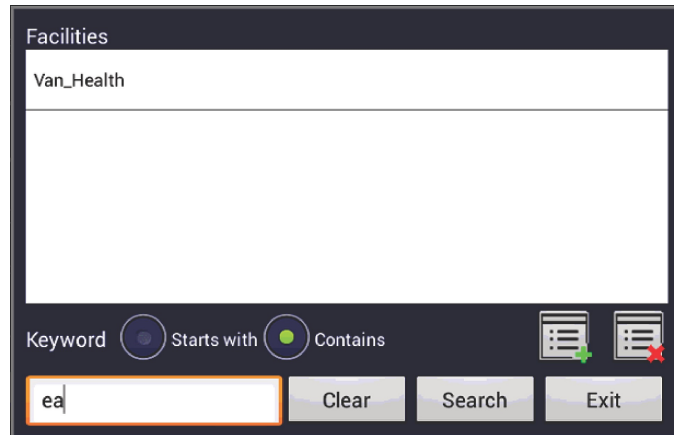


Figure 42

Note that the search is case insensitive.

Touch on the desired value in the List to accept it as the input and return to the Equipment Information screen.

When all of the parameters deemed necessary have been entered, touch the **Accept** button on the Equipment Information screen, **Figure 35**. The **Abort** button is equivalent to Cancel, and will return to the Main Screen, **Figure 34**.

The **Load Last** button allows you to copy the equipment information data (except Serial Number) from the last test that was completed and **Saved**. This is useful if you are performing incoming inspections on multiple new devices, and wish to ‘cut and paste’ the last equipment information data to the next test. Note that the test must be *save d* to store the equipment information data to memory for later recall.

Accepting the Equipment Information will move forward to the test definition screen, **Figure 45**.

If an Equipment ID Number is entered that has been tested before and the Edit Info button is checked, a dialog will be presented requesting confirmation that the historical data from the last test should be used for this test. One dialog is presented for the Equipment Information and one for the Test Protocol. These dialogs are shown below.

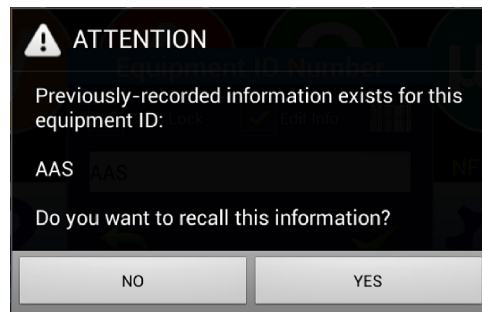


Figure 43

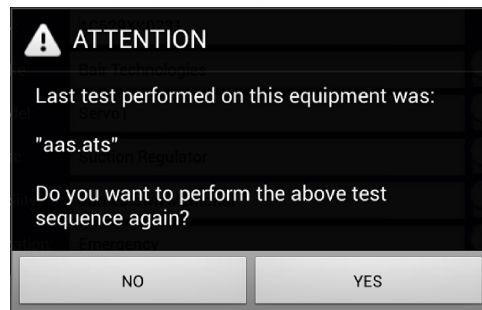


Figure 44

If the Edit Info box is *not* checked, these screens will be skipped over, but the answers will be assumed to be **Yes**, and the info from the files will be used.

Note that the name of the 'last test performed on this equipment' will be a 'seq' type filename if the protocol was based on a 'named' sequence rather than a Standard.

4.1 Test Protocols


When a test is started for the first time on a device, it may be necessary to select the desired standard from the drop-down list. On this first-time test, the protocol will start as the default protocol defined for the particular standard. The actual test steps that are enabled in the default protocol are shown in yellow on the right of the screen, with a check mark if the default protocol will perform the step. Additional, optional steps are also shown, but do not have a checkmark. The default protocol may be changed if desired. Contact your local distributor for assistance.




Figure 45

The default protocols for the four available standards are:

<div>Equip Lkg ✓ Earth Lkg EUT ON ✓ AP PWR NP/RP ✓ PE 300 Ω ✓ Semi Auto ✓ Voltage L1-L2 ✓ Current</div>	<div>Equip Lkg ✓ Earth Lkg EUT ON/OFF ✓ AP PWR NP ✓ PE 500 Ω ✓ Semi Auto ✓ Voltage L1-L2 ✓ Current</div>	<div>Equip Lkg ✓ ACCV ✓ EUT ON ✓ AP PWR NP/RP ✓ PE 200 Ω ✓ Semi Auto ✓ Voltage L1-L2 ✓ Current</div>	<div>Equip Lkg ✓ Earth Lkg EUT ON ✓ AP PWR NP ✓ PE 100 Ω ✓ Semi Auto ✓ Voltage L1-L2 ✓ Current</div>
EC 62353	NFPA99	IEC61010	AU/NZ 3551
Default Setting for Standards			

If the test protocol, as indicated by the checkmarks, is acceptable, simply touch the Run icon,  ,to start the test.

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If you wish to change the test protocol for this device, touch the Next Page icon, . The test protocol is defined over a total of 4 pages. The only change available on page 1 is selection of the Class of the device. Selection of a Class other than Class I will disable the Protective Earth test in the list of tests. The particular icons shown on the screen for the Classes are defined in the ConfigMini.txt file. The contents of the ConfigMini file are:

```
Class_TextOnly: false
Territory_NA: true
ConfirmResult: true
```

If Class_TextOnly is true, the screen will show text that indicates the power conditions. If false, the next line will define which icons will be displayed. If Territory_NA is true, an icon will appear next to the Class designation that shows a typical plug for North America, grounded for Class I and no ground for Class II. If Territory_NA is false, the electrical symbol for ground or double insulated will be used. The ConfirmResult setting will be used in the saving of test results.

Page 2, **Figure 46**, allows changes to the Leakage test to be preformed, allowing the selection of Equipment Leakage, Earth Leakage, or Applied Part Leakage testing.

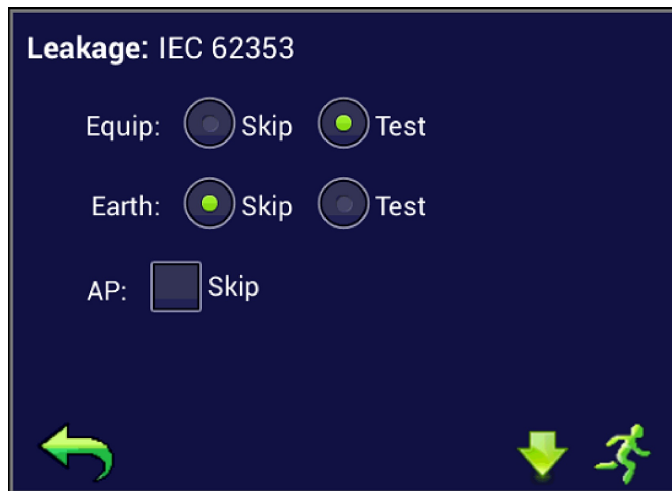


Figure 46

If the device has Applied Parts, they may be tested by un-checking the AP Skip box. When the test is run, the app will prompt for the Applied Part Type and Function as needed for the Standard. For IEC 61010, there are no AP tests available.

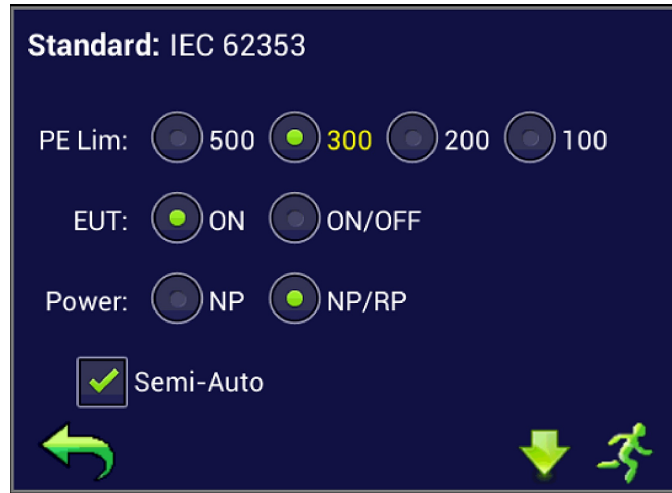







Figure 47

Page 3, **Figure 47**, allows changes to the Protective Earth limits. The normal, default limit for the Protective Earth measurement is indicated in yellow. Alternative limits that may be allowed in the standard under certain circumstances, or that may have been commonly used previously are also provided. The Mains criteria may also be changed, if desired, for this device test.

If Semi-Auto(mated) mode is enabled, the vPad-Mini will stop and wait for instructions at any point where changing the Mains test condition is about to happen, or where user input is required.

If no more changes to the protocol are required, touch the Run icon, , to start the test. Otherwise, touch the Next page icon, , to continue changes, or the back  to go back one page.

Page 4, **Figure 48**, provides the final test configuration options: Protective Earth, Mains Voltage and Device Current. When selections are complete, you can touch the Run icon, , to start the test. To save this (new) test protocol as a (named) Sequence for future use, press the Save icon, . Note that this named sequence will be recorded for the current test report. There is also an opportunity when saving the test result to save it as a named Sequence.

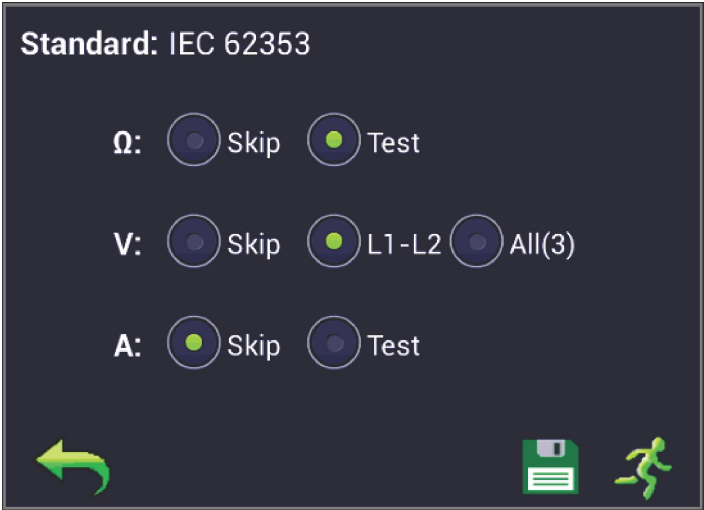



Figure 48

Once a protocol has been setup, it can be saved to a ‘named’ sequence by touching the Save icon  . When the Save icon is touched, a dialog will be presented as shown in **Figure 49**, below.

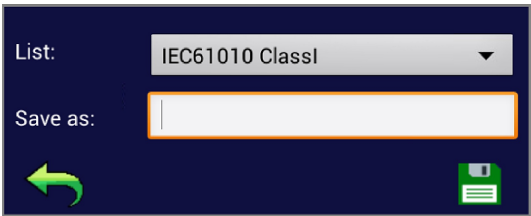


Figure 49

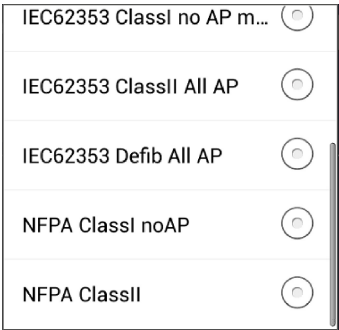



Figure 50

If you wish to use a name that is similar to an existing name, a list of the existing ‘named’ sequences is available as a dropdown list, per **Figure 50** from which a name can be selected and edited.

To use a ‘named’ Sequence to define the protocol for a test, use the Swipe icon,  , on Page 1 to change from the Standards List to the Sequence List and select the Sequence from the list.



4.2 Test Protocols Based on a Sequence

On the 'Sequence' screen a 'named' sequence can be selected from the dropdown list shown in **Figure 50** and **Figure 51**. When naming sequences, it is recommended that one of the following 'keys' be included in the name, depending on the Standard used: 62353, 61010, or NFPA. This will allow the list to be filtered in accordance with the filter checkboxes in order to make it easier to find the desired sequence name.



Figure 51

Once a sequence has been selected, the icon buttons at the bottom of the screen will be enabled. These buttons are Edit ,  ,  Run .

Once created, the content of a 'named' sequence is not intended to be easily changed. To make changes it is necessary to first select Edit , which will take you to the Standards screen, where the parameters from the Sequence will be reflected in the parameter list. If you choose to Run the test from the Standards screen, the test protocol recorded in the test report will be changed back to a <deviceID>.ats format. If changes are made to the protocol and you wish to update the original 'named' sequence, go to page 4 of the Standards screens and select Save  . When the Save icon is touched, a dialog will be presented as shown in **Figure 52**, below.

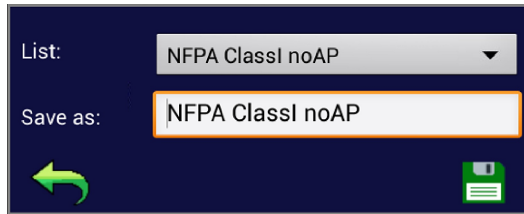




Figure 52

Note that the Save As input box is already filled in with the name of the sequence you started with, but the dropdown list and the keyboard input are still available if a different filename is desired.

Remember to Save  the file before continuing by touching the back  to return to the Standards screen. If you do not Save the file, you will be reminded, just in case.

4.3 Running a test with Semi-Auto(mated) Mode

It is a common problem during automation of a test that the automated tester will begin to do testing before the device under test (DUT) is ready. It could be that the device can not be turned on in advance of power being available at the receptacle, or there needs to be a delay due to the startup time as the device boots up, or the power needs to be turned OFF and then back ON as you reverse the polarity of the input power lines. If the Semi-Auto mode is enabled for a test protocol, the safety tester will pause at the appropriate times to allow the user to make any power adjustment or pause to allow the DUT to power ON or power OFF, as needed. The following advisory screens may be shown, as necessary:

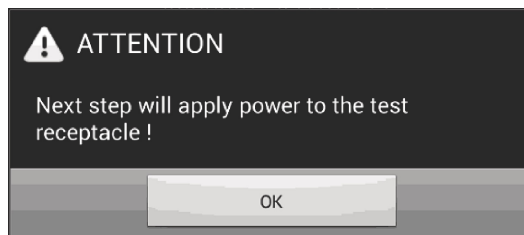


Figure 53

This advisory will typically be shown prior to applying power to the test receptacle, in order for the user to take an precautions necessary for the safety of the operator or to ensure the EUT is ready to accept the application of power.

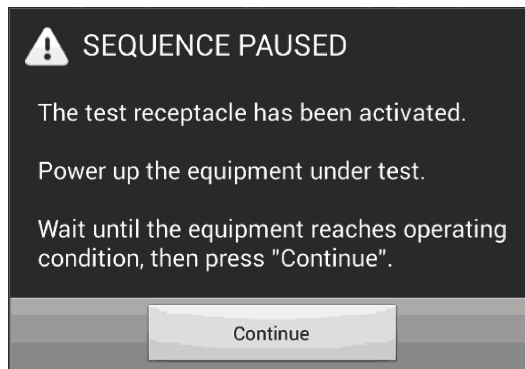


Figure 54

An advisory to turn the EUT ON and wait till it reaches operational condition before continuing.

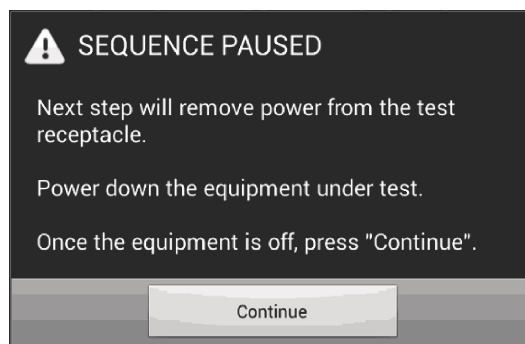


Figure 55

An advisory to turn the EUT OFF in an orderly manner prior to removing power from the receptacle. This could happen in preparation for reversing the polarity on the receptacle, or at the end of a test prior to saving results.

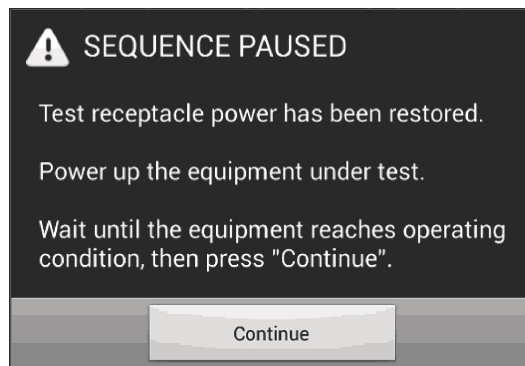


Figure 56

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An advisory to turn the EUT ON and wait until it reaches operational mode. This would typically be seen after applying Reverse Polarity.

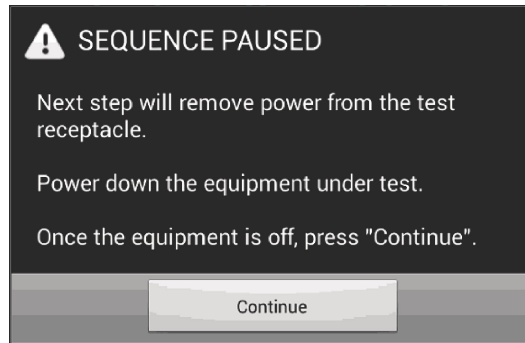


Figure 57

During testing, test measurements are taken and compared to limits set out in the protocol. A typical Leakage Current test is shown below.

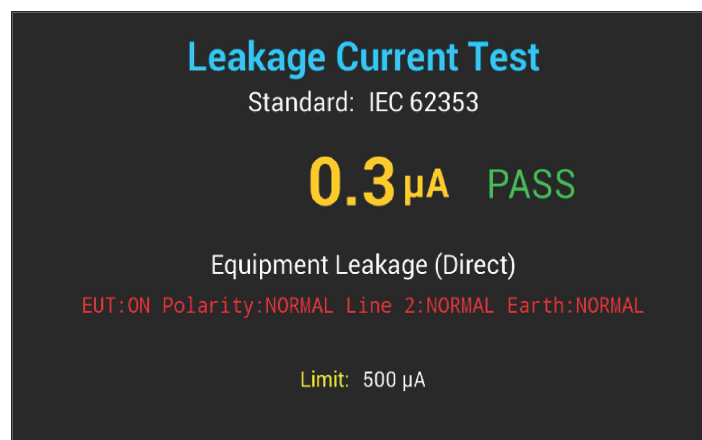


Figure 58

4.4 Testing Applied Parts

Many medical devices have applied parts consisting of one or more leads used to connect to the patient and acquire a signal for a given parameter or function such as ECG. Applied parts are designated as:

- a) Type B if they are applied to an external body part (does not break the skin or enter the body cavity) and include a ground/protective earth connection to make the measurement;
- b) Type BF if the measurement function is similar to a Type B but is powered by an isolated/floating power supply (no direct ground connection); and,
- c) Type CF if the measurement function has one or more lead that is intended to make direct contact with the heart. In many case, the manufacturer will include leads of measurement functions that require breaking the skin or entering the body cavity as a designated CF type applied part in their specification.

The IEC61010 standard is for laboratory devices which are not intended to come in contact with a patient. This type of device does not have applied parts.

The IEC 62353 standard calls for all leads of each Applied Part (by function) to be connected together and each Applied Part then subjected to a Mains on Applied Part test. This is repeated for each Applied Part function for each Applied Part Type. The test limits as identified in Table 2 of the standard are applied.

In addition to the test as described above for IEC 62353, the AU/NZ 3551 standard calls for Applied Part to Ground tests for ALL leads (of all functions) of an individual Applied Part Type (B, BF or CF). If the test of ALL leads fails, each function of that Applied Part must then be tested individually. The limits for ALL leads of all functions are identical to the limits for ALL leads of EACH function.

When an Applied Part to Ground test (AU/NZ 3551) is encountered, the user will be prompted to connect the leads according to the requirements of the standard.

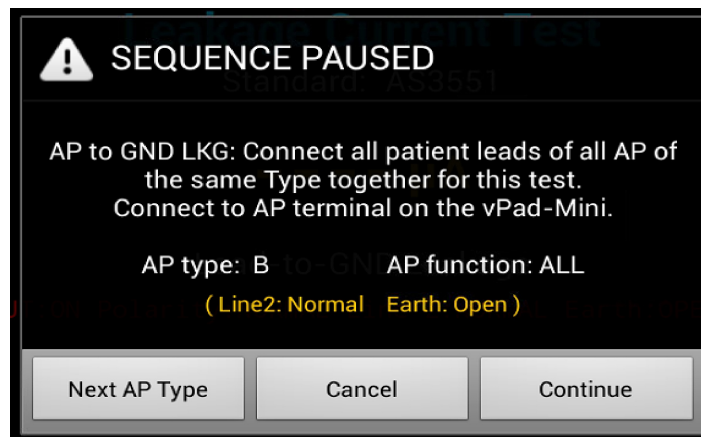
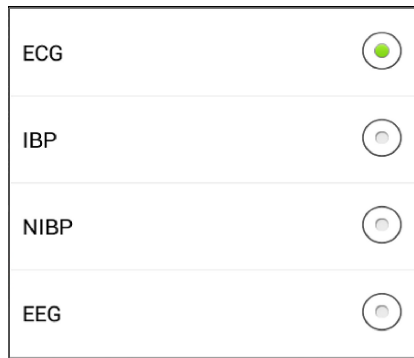


Figure 59

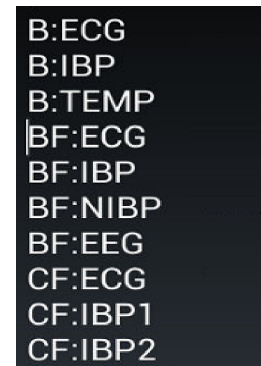
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In the event of a limits failure when testing ALL, the user will be prompted to continue testing while identifying the function of the Applied Part. The functions will be presented in a list, filtered by AP Type. The functions list is located in the /Datrend/vPad-Mini/Lists/ folder in the Functions_list file. The list contains a B, BF or CF prefix to allow the functions to be filtered. If a function can be more than one Applied Part Type, an entry must exist for each Type.



ECG	<input checked="" type="radio"/>
IBP	<input type="radio"/>
NIBP	<input type="radio"/>
EEG	<input type="radio"/>

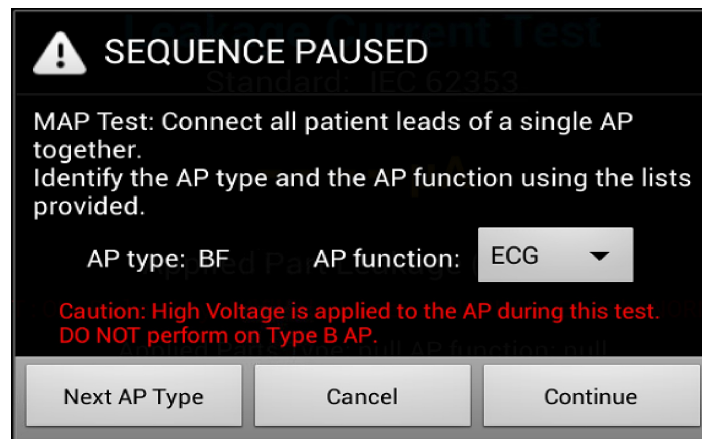
Figure 60



```
B:ECG
B:IBP
B:TEMP
BF:ECG
BF:IBP
BF:NIBP
BF:EEG
CF:ECG
CF:IBP1
CF:IBP2
```

Figure 61

When a Mains on Applied Part (MAP) test is encountered during a test (IEC 62353 and AU/NZ 3551), the user will be prompted to connect the leads according to the requirements of the standard.



! SEQUENCE PAUSED

MAP Test: Connect all patient leads of a single AP together.
Identify the AP type and the AP function using the lists provided.

AP type: BF AP function: ECG ▼

**Caution: High Voltage is applied to the AP during this test.
DO NOT perform on Type B AP.**

Next AP Type Cancel Continue

Figure 62

Note the **Caution** related to the High Voltage present on the AP during the test.

4.5 Saving Results

As measurements are made, the test and the results are stored to a file on the vPad-Mini. The test report is a text file which is stored in the Datrend/vPad-Mini/Records folder. The user can optionally assign some descriptive information to the test report, including Technician and actual Labor Time. If the parameter has a Choose button available, there is a corresponding file on the vPad-Mini which contains the list of options. These text files are located in the vPad-Mini/Lists folder, and each selection is a text line followed by a carriage return.

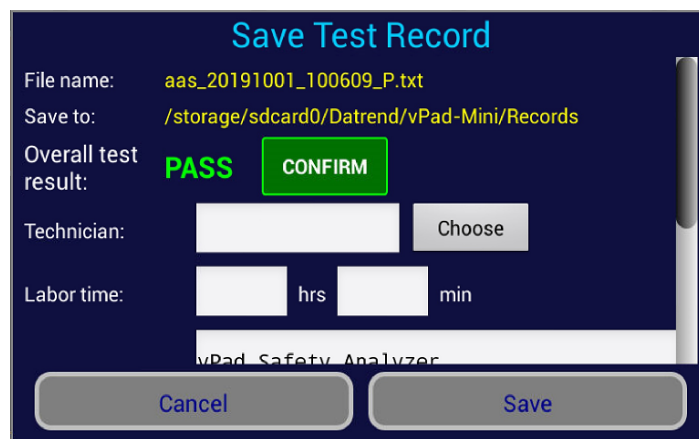


Figure 63

The Technician and Test Report Title are ‘sticky’ fields - once entered, they will re-appear in subsequent tests until changed.

The ConfigMini.txt file which was previously discussed contains the ConfirmResult setting status. If it is true, the overall Pass/Fail result will be shown on the Save Test Record screen and the user will be required to Confirm the result. The Cancel and Save buttons will be disabled until the Confirm button is pressed. If the Overall Test Result is a Pass, the indication will be in Green; if it is Fail, the indication will be in Red. This Confirmation process is solely to try and ensure the user has acknowledged the status of the overall result.

To remove the need to press the Confirm button, the ConfirmResult setting can be changed to ‘false’.


The image shows a 'Save Test Record' screen with a dark blue background. At the top, the title 'Save Test Record' is in light blue. Below it, there are input fields for 'Labor time' with 'hrs' and 'min' units. The 'Test report title' field contains the text 'vPad Safety Analyzer' and 'Datrend Systems Inc.'. There is a checkbox labeled 'Save Automatic Test setup as Test Sequence file'. Below this, a yellow text提示 says 'To erase an item, press data field and hold'. At the bottom, there is a 'Final comments' field and two large blue buttons labeled 'Cancel' and 'Save'.

Figure 64

On this Save Test Record screen, the user is provided the opportunity (again) to save this test protocol as a named Test Sequence. The difference here is that this is the sequence that will be recorded in the device test data and will be recalled in later tests, rather than just as a protocol based on the device ID.

All of the functions of the Recording option are available for files saved in the Automation option.

4.6 Other Test Start Options

When you first elect to start an automated test, it is expected that you will be testing a device that has some sort of an ID associated with it. However, there may be some other reasons for starting a test. To see the other options, touch on the green check icon  with a blank ID input box, as shown in **Figure 65**, to display the options.

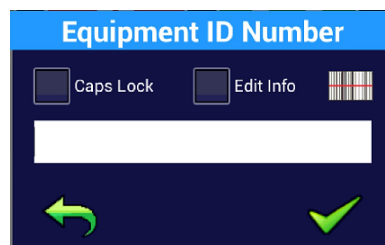
The image shows an 'Equipment ID Number' screen with a blue header. Below the header, there are two checkboxes labeled 'Caps Lock' and 'Edit Info', and a barcode icon. A large white input field is in the center. At the bottom, there are two green icons: a left-pointing arrow and a checkmark.

Figure 65

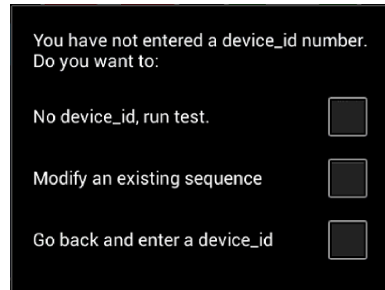



Figure 66

If you select the first option, you will go to the Standards screen, where you will be able to define and Run a protocol based on a standard, or alternately go from the Standards screen to the Sequence screen and select a ‘named’ sequence to Run. While the expectation is that a test Run without a device_ID will not be saved, there is still an opportunity to assign an ID and save the test at the end if you change your mind. However, Equipment Information can only be entered at the Standards screen stage by touching the Back icon . There is no capability to enter Equipment Information at the Test Record save screen.

Note that when starting a test with no device_id or when modifying a sequence, there is no Equipment Information to pre-load. Each time you go to the Equipment Information screen it will be blanked, but can, if required, be loaded with the data from the last saved test by using the Load Last button. However, when you return to the Standards screen, a default standard test may be loaded which overwrites any changes you have made. Make any test protocol changes *after* filling out the Equipment Information data to avoid unexpected changes to your protocol.

If you select the ‘Modify an existing sequence’ option, you will go directly to the Sequences screen where you can select a ‘named’ sequence, select Edit and then modify the protocol and subsequently save it as the same ‘named’ sequence.

Finally, if the blank input was an error, the third option allows returning to the Equipment ID dialog and entering a valid device ID.

5 Upgrades and Maintenance

Software Applications (Apps) may be upgraded from time-to-time to provide enhanced features or improvements. Contact Datrend or your local dealer for information on these upgrades.

In some cases, the changes made to an App may be to correct operational issues that have come to the attention of DSI. These shall generally be referred to as maintenance upgrades. In other cases, the changes may be to improve performance or add features which would enhance the overall functionality of the App. The decision to apply a charge to any upgrade shall be solely at the discretion of DSI.

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