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POINT LOAD TESTER

REMOTE APPLICATION OPTIONS

PLT COMPUTER APPLICATION

ANDROID MOBILE APPLICATION

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COMPUTER APPLICATION

POINT LOAD TESTER REMOTE APPLICATION

Version X1.10

The Point Load Tester Remote application is a graphical user interface that enables remote access to all the functions of the point load test frame from a personal computer running the Windows Operating System.-. In addition, it allows the collection and storage of peak load data and descriptive information to a text file that can be readily imported into a spreadsheet software application for further analysis.

The application is a stand-alone executable created with the National Instruments Corporation LabVIEW® program development system. The installation of this application on any computer will confirm your acceptance of the Licence Agreement contained in the **readme.txt** file accompanying this release kit.

Contents

System Requirements

The Point Load Tester remote application utilises the Windows operating system. The interface screen has been designed for a minimum 800 x 600 screen resolution and different settings will result in loss of screen detail. Please contact your supplier if you require the application for different screen resolutions.

MINIMUM SYSTEM

80486-based PC

800 x 600 Monitor using 256 colours

Minimum 8MB of RAM (Recommend 16MB or more)

USB Drive for application installation

A mouse or other pointing device

Installing the Application

INSTALLATION

1. The Point Load Tester remote application is distributed on a USB Memory Device or via a file transfer link. Insert the USB Device, if applicable. Double-click on the **<setup.exe>** file to begin the installation.

2. Change the path, if necessary, to point to the folder where you require the application to be installed. Click **Next** to complete each stage of the installation.

3. The application installer will automatically recognize that an earlier version of the application is installed. Run the **<setup.exe>** file to upgrade or re-install the application and support files.

4. The application may also be installed from USB files copied to an appropriate HDD folder.

INSTALLED FILES

The installer will unzip and create the following remote access files in the directory specified by the user:-

PLTX110.exe	The software application
PLTX110.ini	A LabVIEW initialisation file
Operating Manual X110.pdf	A copy of the PLT Operating Manual
Application Notes X110.pdf	A copy of the PLT Application Notes
ReadMe X110.pdf	A text file with warranty, disclaimer and installation information

Getting Started

TESTING FRAME

The Point Load Tester frame should be running in computer mode before the application is launched. The LCD Display of the frame should indicate **Now Under PC Remote Control**. This will allow the application to detect the frame and correctly establish serial communications.

APPLICATION OPERATION

The Point Load Tester remote application is configured to run automatically when loaded and the default frame parameters will be uploaded from data stored in the frame operating system. The program message line will confirm the serial connection and transfer of data.

The application can be started manually by clicking with the left mouse button on the RUN Arrow [⇒] in the toolbar. Once the application is running, click the appropriate function selector with the left mouse button to access frame functions.

At several pre-defined stages during the application operation, default keys are defined by a heavy black outline. These keys may be operated via the computer keyboard **[Enter]** key for operator convenience and improved execution.

The application can only be closed using the **[END]** selector to ensure the application completes saving all default values and peak load data prior to shutting down. If configured, the testing frame can also be closed remotely under application control.

Serial Communication Link

The PLT Frame is connected to the computer serial port by the custom RS232 cable supplied with this application. A serial cable with a 9-pin plug is provided for connection to a serial port usually located at the rear of the computer.

The connection at the frame is through the 4-pin connector inserted at the rear of the readout head adjacent to the battery charger socket. The spring-loaded protective cap should be lifted, and the pin/socket insert aligned before pushing the cable-mounted plug into the socket until a distinctive click is heard. The plug can be removed by retracting the knurled retaining sleeve of the plug and withdrawing it from the socket.

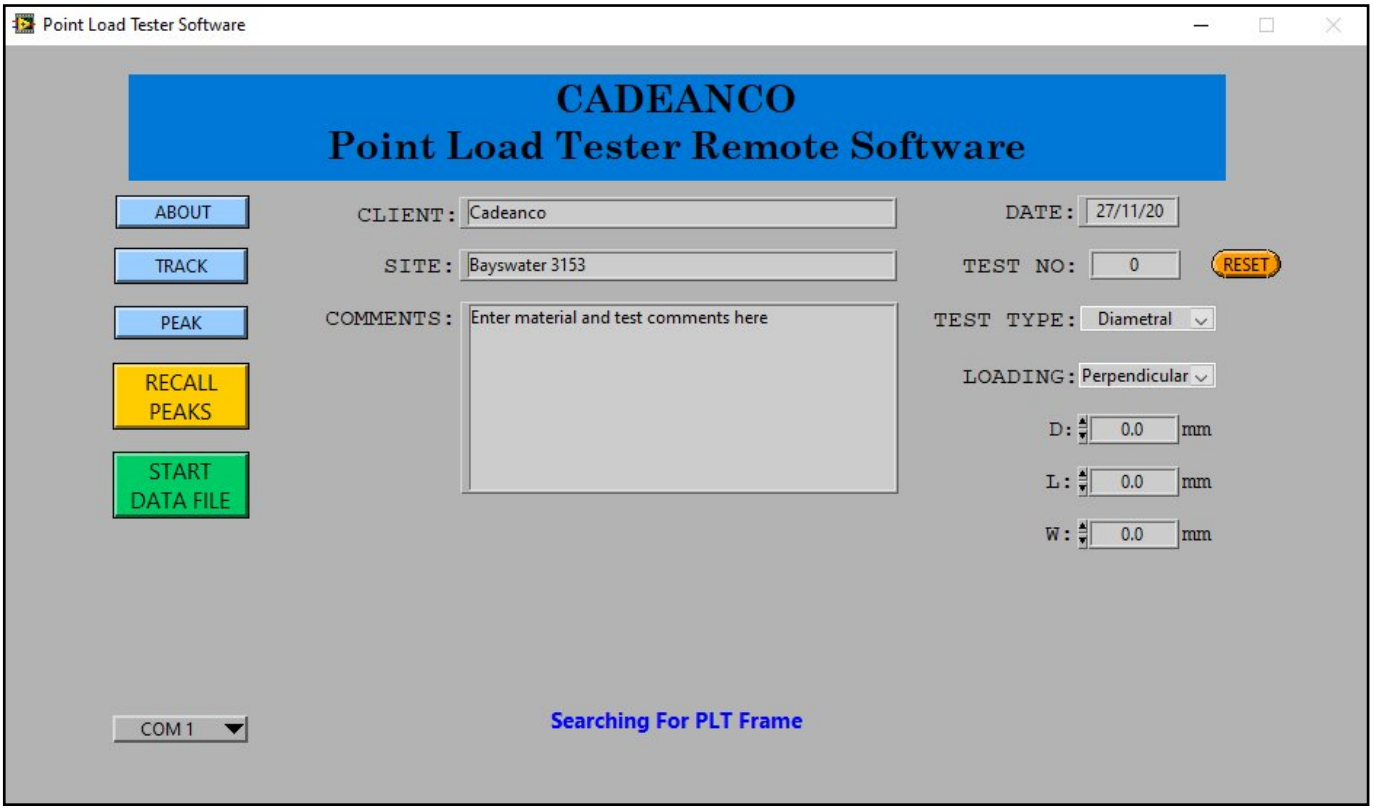
Application Features

LabVIEW® Applications feature a simplified user interface that allows only the operation of the Virtual Instrument. Menus display only the options related to the running of the program. Pop-up menus are short and can be accessed by clicking on a control or indicator with the right mouse button.

Options available to the user include the following:-

- Operate controls and change their values
- Set the default values of controls and indicators
- Use the pop-up menu of a control or indicator to cut, copy or paste data from any control or indicator to another.
- Use the pop-up menu of a control or indicator to view the description of the item, and perform other run-time operations
- Log and print the front panel
- View the **Show VI Info...** information for an application
- Use the **Help** window to see descriptions of controls and indicators

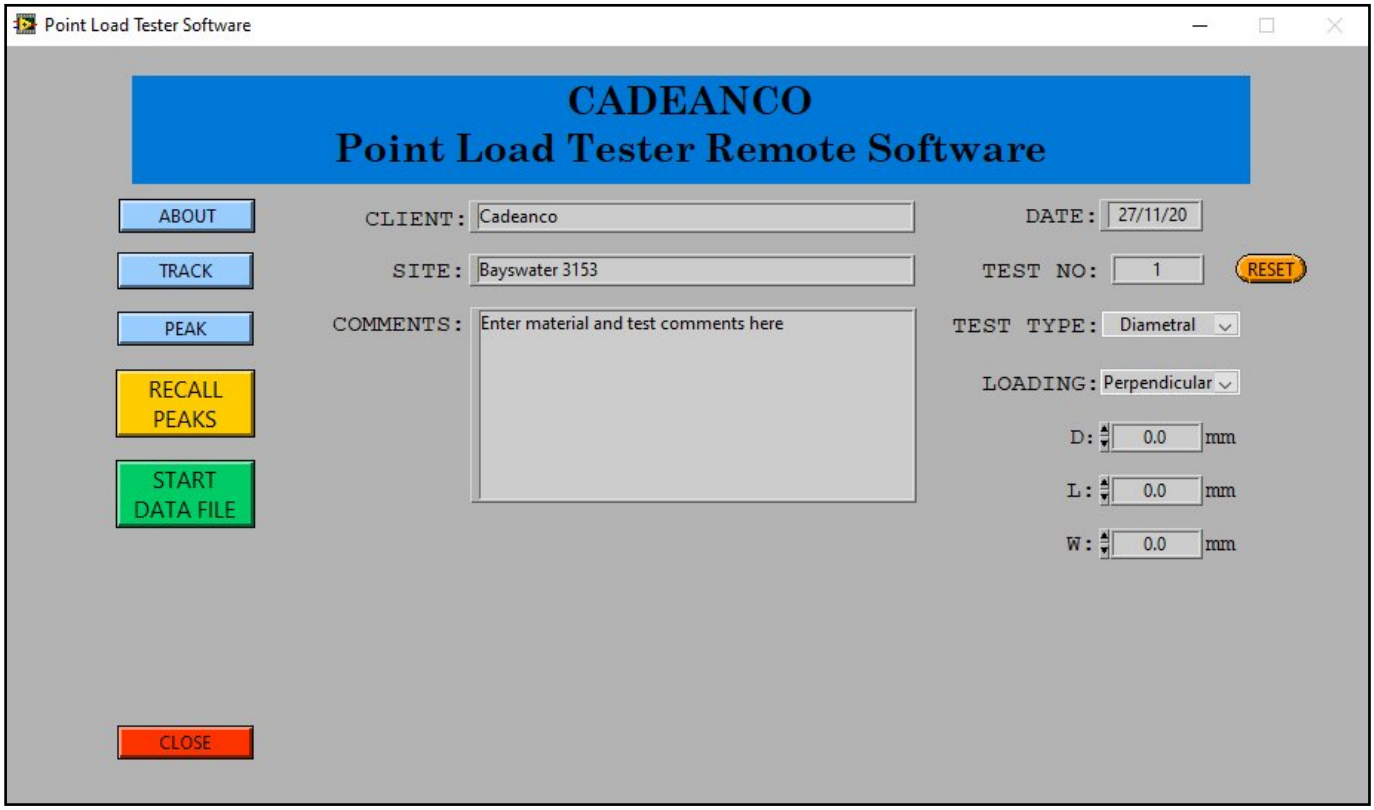
Application Functions



[COMMS] Selector

This data box will appear while the application is searching for the serial connection to the testing frame and will vanish once a connection is established. During this time the operator may change the serial communication port used by the application to reflect the connection used by a particular computer. The range of this port is 1-20 in line with the standard serial protocol and the application will remember the port number for subsequent application sessions.

The application will close automatically if unable to find a testing frame after four attempts.



SAMPLE INFORMATION Data Entry Boxes

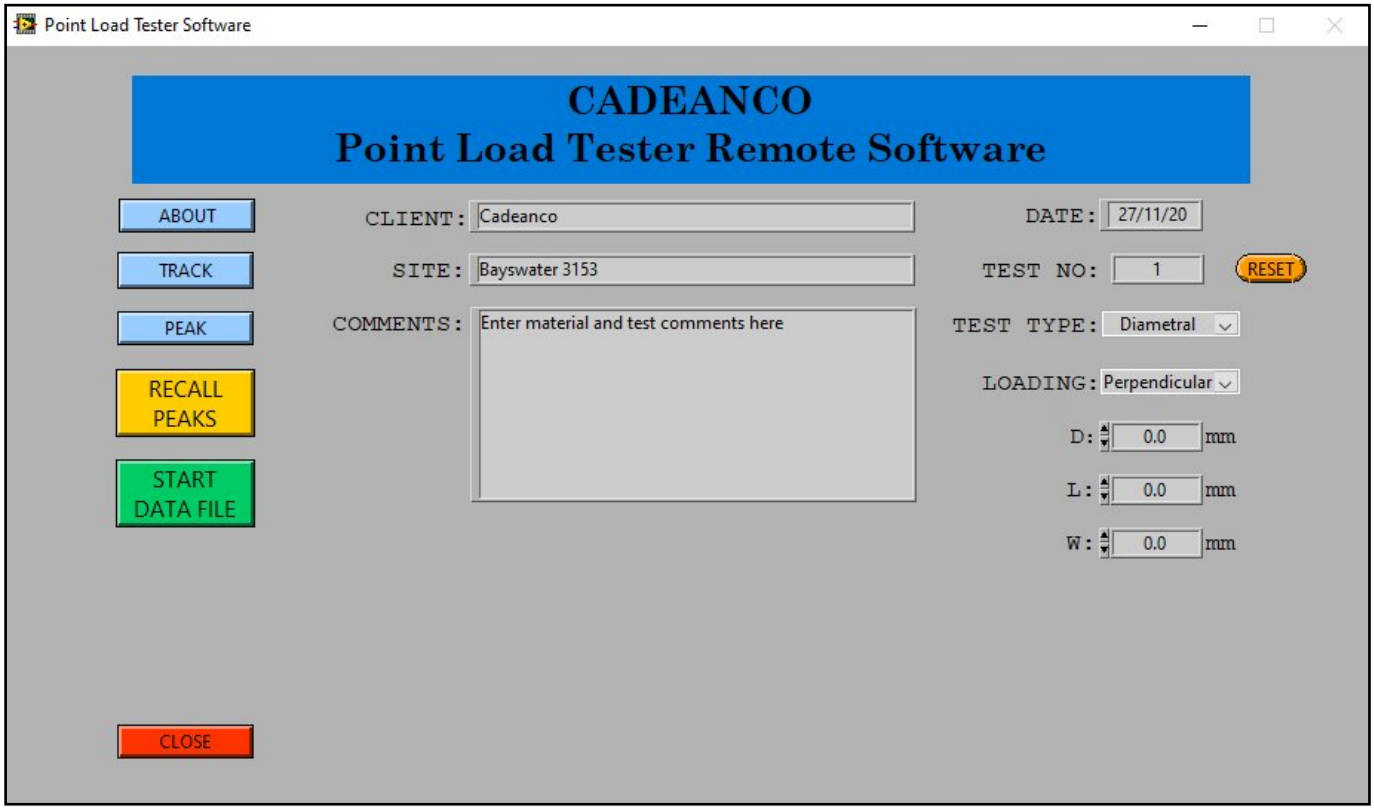
The **[CLIENT]**, **[SITE]** and **[COMMENTS]** data entry boxes allow the operator to manually enter sample information associated with the samples being tested. The information typed into these fields is saved once as header information in each test sample file recorded and is also saved between run sessions to avoid the necessity for the operator to re-enter data. The information can be edited to update any data for subsequent samples.

[CLIENT] and **[SITE]** entries are limited to 22 characters to allow information to be shared between remote devices. Data in the **[COMMENTS]** field is saved locally on remote devices and can be as verbose as necessary

[CLOSE] Selector

Click to exit from the PLT Remote application.

This control selector must be used to close the application to ensure that all default values and peak load data is saved prior to shutting down. If configured, the testing frame can also be closed down remotely under application control.



[DATE] Data Box

The initial **[Date]** information is derived from the host computer and this should be adjusted through the Windows® Date/Time Dialogue function if found to be incorrect.

[TEST NO] Data Box

The **[TEST NO]** value is automatically incremented once the operator has selected either of the TRACK MODE or PEAK MODE functions. The test no will be recorded with TEST TYPE, LOADING and SAMPLE DIMENSION data if a data file has been opened.

The TEST NO can be reset at any time by clicking on the RESET selector.

[TEST TYPE], [LOADING] Data Boxes

These two selection menus are used in conjunction to describe the test sample and the direction of loading used to obtain the load. These details are recorded in an abbreviated format with the peak load attained for each sample saved in the test file record.

[SAMPLE DIMENSION] Data Boxes

Enter the test sample dimensions [D], [L] and [W] measured with a vernier caliper according to the procedure outlined in the ISRM: Suggested Method of Point Load Testing enclosed with the test frame. The sample [D] dimension can be obtained by direct caliper measurement or by reading the point separation distance on the PLT frame scale provided for this purpose. The value can be typed in directly or by clicking the increment or decrement arrows on the data box.

[ABOUT] Selector

This selector will display the version, creation date and serial number of the frame measurement and readout application in the program message line. The system is returned to the main screen by clicking on the **[RETURN]** selector.

[TRACK] Selector

This function is provided for testing samples where the user needs to observe the plastic nature of the failure. Click on the **[TRACK]** selector and the display will indicate that the measurement system is ready to take its auto-zero measurement.

It is critical that there is no load on the conical points at this stage, as the value recorded during the zero-measurement phase will be subtracted automatically from all subsequent load measurements.

Click on the **[ZERO LOAD]** selector to confirm there is no load on the points. The computer display will now indicate the current load value during the test. This load value will continue to be displayed until the system is returned to the main screen by clicking on the **[RETURN]** selector.

[PEAK HOLD] Selector

This is the usual function for testing core samples. Click on the **[PEAK]** selector and the display will indicate that the measurement system is ready to take its auto-zero measurement.

It is critical that there is no load on the conical points at this stage, as the value recorded during the zero-measurement phase will be subtracted automatically from all subsequent load measurements.

Click on the **[ZERO LOAD]** selector to confirm there is no load on the points. The computer display will indicate the maximum load value attained during the test so that spalling etc. of the sample can be ignored by the operator. The peak value will continue to be displayed until the measurement system is re-initialised via the **[RESET]** selector. If a data file is open, the operator must decide whether to record or discard the displayed peak value via the **[SAVE DATA]** or **[REJECT]** selector before returning to the main screen.

The application will automatically reset for another peak value test unless the **[EXIT PEAK]** selector is selected to return to the main screen.

[RECALL PEAK] Selector

This control will access a table of the last five values attained during peak load testing. A reading of **[#####]** indicates that the load on the sample has exceeded the maximum range of the testing frame (50.22kN, 11290lbf) The system is returned to the main screen by clicking on the **[RETURN]** selector.

[START DATA FILE] Selector

If a record of the maximum values attained during the testing of a sample is required, click on this control selector to open a dialogue box and create a target file and directory for the text file record. A data box will open on the display screen to confirm the full data file path.

While the data file is open, two extra selectors will allow the operator to accept or reject peak values displayed during the testing of samples in the PEAK mode:-

[SAVE DATA] Click on this selector to add the Test No, Test Type, Sample Dimensions and Peak Load values to the current data file.

[REJECT] Clicking this control can reject the test data. The program will return to the main screen. (the Test No will not increment and the Peak Load data will not be saved)

[CLOSE DATA FILE] Selector

The operator can close the current data file with this control.

Data File Format

The PLT Communication application creates a tab-separated text file with the filename provided by the operator. The file has a default extension denoting the type of data saved and text files may be readily imported into common spreadsheet applications.

```
DATE:         14/09/21
PLT ID:       7000-7001
CLIENT:       ABC Geotechnical P/L
SITE:         Gamblethorn Opencast
COMMENTS:     Samples 1-2 cored and air-dried 2 weeks
              Sample 3 taken from broken section of sample
              Samples 4-6 sawn and air-dried 2 weeks

TEST LEGEND: d = diametral     p = perpendicular
             a = axial        // = parallel to weak plane
             b = block         ? = unknown
             i = irregular

 No    Type    W(mm)        D(mm)        L(mm)       Peak Load

  1    d,//     N/A         50.0         65.0        21.15 kN
  2    a,p     45.0         30.2          N/A        35.05 kN
  3    i,p     45.3         40.2         65.0        33.18 kN
  4    b,p     60.0         50.1         55.0        20.02 kN
  5    b,//    60.0         49.6         55.0        48.99 kN
  6    b,?     60.0         50.3         55.0        44.10 kN
```

The header information contains the following information:-

i) Date of the test
ii) The testing frame ID
iii) Client information
iv) Site identification information
v) Other comments relevant to the sample from which the samples were taken
vi) A listing of the abbreviations used for Test Type and Loading Direction

The test data for each sample is recorded as follows:-

i) The sample test number.

ii) The type of test and the direction of loading with respect to any Plane of Weakness in the sample.

iii) The sample dimensions taken with respect to the test type.

iv) The peak load recorded during the test.

Remote Peak Hold Sample Testing

1. Press the **[MENU]** key and observe that the sign-on display is shown.
2. Continue to press the **[MENU]** key to cycle the display through the available function menus.
3. When the **COMPUTER MODE** function is displayed press the **[SELECT]** key.
4. Start the **PLTX110.exe** application and observe that serial communication is established.
5. Open a file to save the sample test values in text file format using the **[START DATA FILE]** selector.
6. Enter the test sample dimensions taken according to the procedure outlined in the ISRM: Suggested Method of Point Load Testing (Revised Edition) enclosed with the test frame.
7. Click on the **[PEAK]** selector with the left mouse button.
8. Ensure that there is no load on the upper point and click on the **[ZERO LOAD]** selector to reference the measurement system.
9. Place a sample between the points ensuring a full diameter between the tips.
10. Use the jack handle to close the ram valve clockwise.
11. Bring the points into contact with the sample using the jack.
12. Load the sample with even strokes to fail the sample over 10-15 seconds, avoiding dynamic failures caused by the loading rate. Slow even loading is especially important for samples that fail below 5kN to ensure that reliable and accurate data is obtained. If the sample 'spalls' during the test, release the ram and reposition the sample between the points and reload core. The measurement system will only update if the original peak load value is exceeded.
13. If the peak value is valid, save it to the data file by clicking the **[SAVE DATA]** selector. If not, clear the data by clicking the **[REJECT]** selector.

    The application will automatically reset for another peak load test unless the **[EXIT PEAK]** selector is selected to return to the main screen.
14. Release the ram by turning the valve anti-clockwise and remove all rock fragments.
15. For subsequent tests, repeat steps 8-14

MOBILE APPLICATION

PLT REMOTE ANDROID APPLICATION

Version X1.10

The Android PLT application enables remote access to all the functions of the point load test frame via a Bluetooth® link to an Android mobile device. In addition, it allows the collection and storage of peak load data and descriptive information to a text file that can be readily imported into a spreadsheet software application for further analysis.

Contents

Mobile Device Requirements

The PLT app utilises the Android operating system. The interface screen has been designed for use with either a tablet or mobile telephone device however a tablet will allow easier access to the front panel controls. The mobile device may be operated in either portrait or landscape mode.

MINIMUM SYSTEM

The application will run on Android v11 OS or later. Any Android device that can run this OS will be suitable to run the application.

Installing the Application

The PLT app is distributed as a <PLT-v1.5.0.apk> file that may be imported directly to the Android mobile device. The latest version is available from this link.

Getting Started

TESTING FRAME

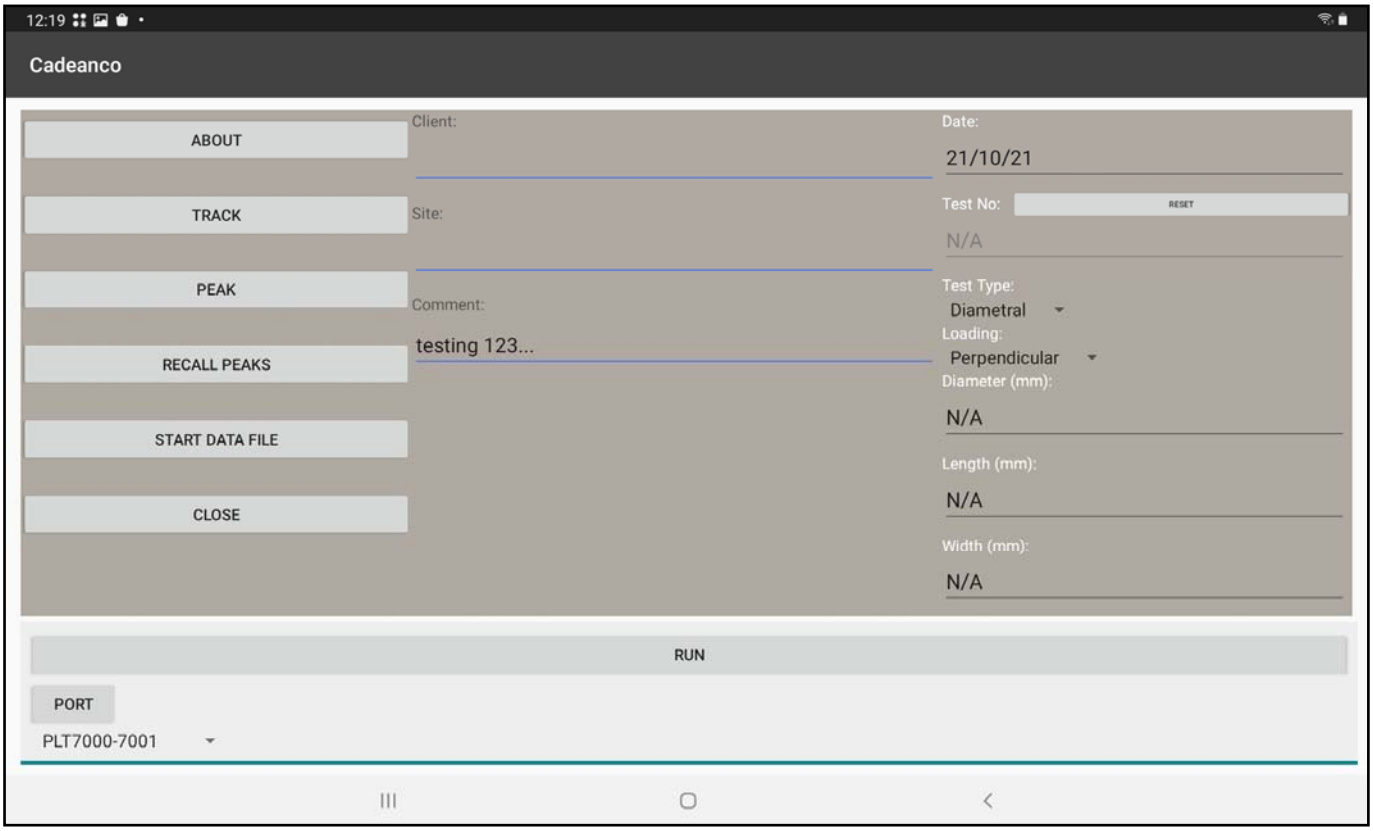
The Point Load Tester frame should be running in the Bluetooth® mode before the application is launched. The LCD Display of the frame should indicate **Bluetooth Remote Control**. This will allow the application to detect the frame and correctly establish Bluetooth® communications.

APPLICATION OPERATION

The PLT app will run automatically when opened. Click on PORT at the base of the screen to display a list of all available Bluetooth® connections. The user must select the frame serial number and click on the RUN selector to complete the link to the measurement system. A message line at the top of the screen will confirm the Bluetooth® connection. Once the application is running, tap the appropriate function selector to access frame functions.

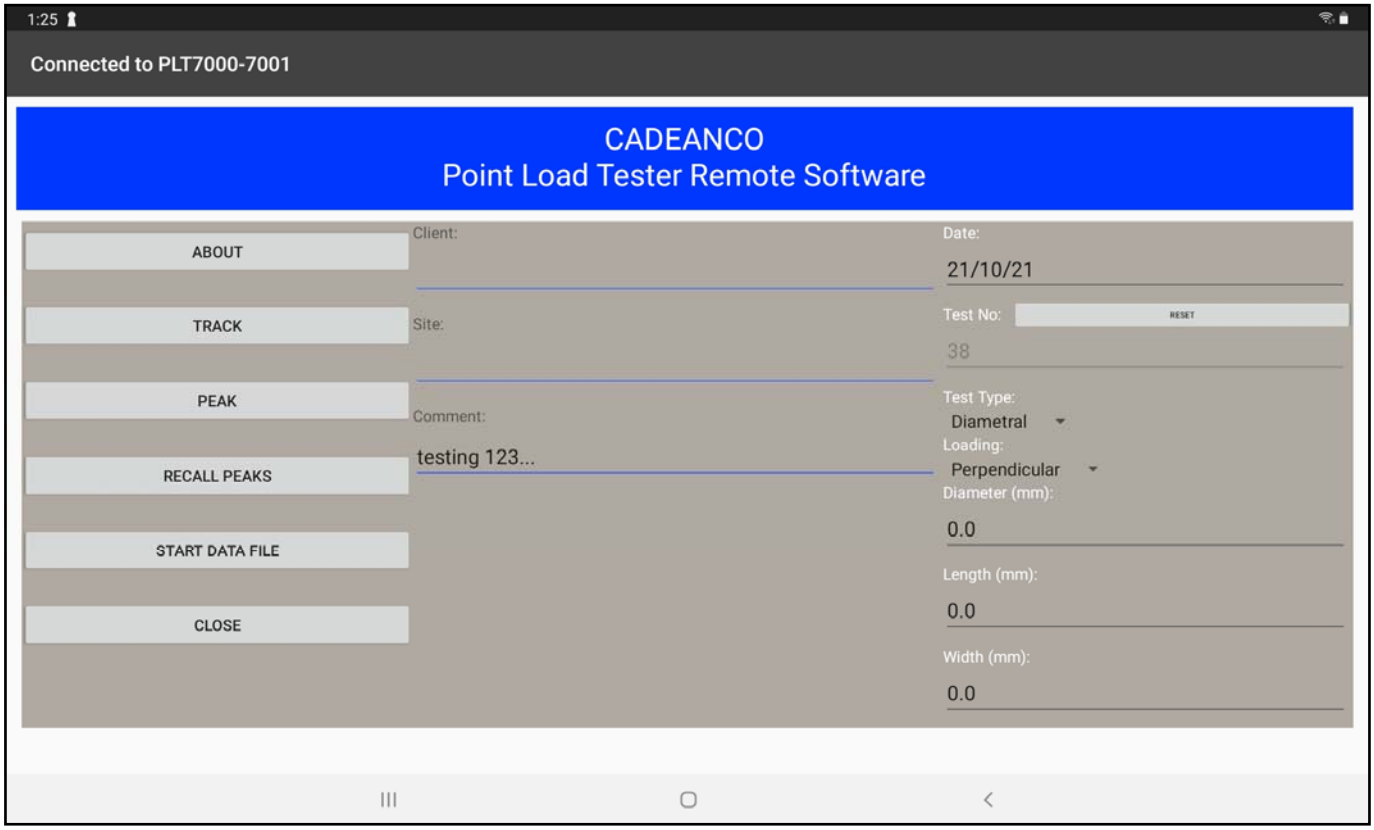
The application should only be closed using the **[CLOSE]** selector to ensure the application completes saving all default values and peak load data prior to shutting down

Application Functions



[PORT] Selector

Click on the **PORT** selector to display a list of all available Bluetooth® connections available to the app. Choose the serial no of the PLT frame required and click on the **RUN** selector to initiate a link to the selected PLT frame.



[SAMPLE INFORMATION] Fields

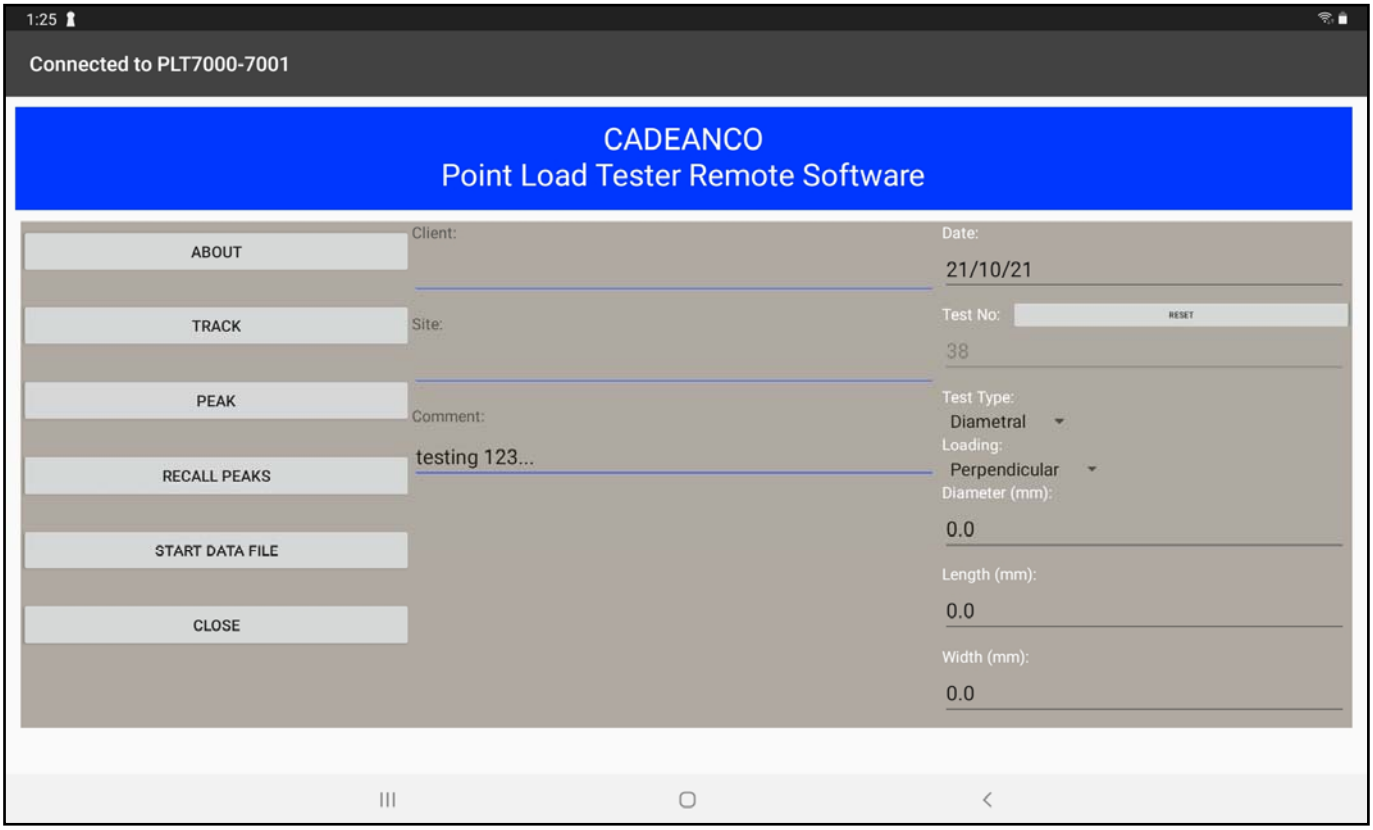
The **[CLIENT]**, **[SITE]** and **[COMMENTS]** data entry boxes allow the operator to manually enter information associated with the samples being tested. The information typed into these fields is saved once as header information in each test sample file recorded and is also saved between run sessions to avoid the necessity for the operator to re-enter data. The information can be edited to update any data for subsequent samples.

[CLIENT] and **[SITE]** entries are limited to 22 characters to allow information to be shared between remote devices. Data in the **[COMMENTS]** field is saved locally on remote devices and can be as verbose as necessary

[CLOSE] Selector

Click to close the Bluetooth® connection and exit from the PLT app.

This selector should be used to close the application to ensure that all default values and peak load data is saved prior to shutting down.



[DATE] Field

The **[Date]** information is derived from the host device and this should be adjusted through the Windows® Date/Time Dialogue function if found to be incorrect.

[TEST NO] Field

The **[TEST NO]** value is automatically incremented once the operator has selected either of the **TRACK** mode or **PEAK** mode functions. The test number will be recorded with **TEST TYPE**, **LOADING** and **SAMPLE DIMENSION** data if a data file has been opened.

The **TEST NO** can be reset at any time by clicking on the **RESET** selector.

[TEST TYPE], [LOADING] Fields

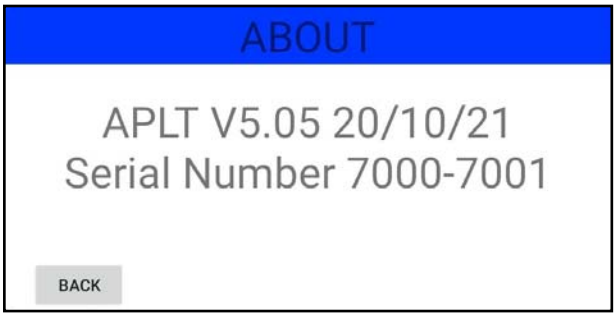
These two selection menus are used in conjunction to describe the test sample and the direction of loading used to obtain the load. These details are recorded in an abbreviated format with the peak load attained for each sample saved in the test file record.

[SAMPLE DIMENSION] Fields

Enter the test sample dimensions [Diameter], [Length] and [Width] measured with a vernier caliper according to the procedure outlined in the ISRM: Suggested Method of Point Load Testing enclosed with the test frame. The sample [Diameter] dimension can be obtained by direct caliper measurement or by reading the point separation distance on the PLT frame scale provided for this purpose. The value can be typed in directly or by clicking the increment or decrement arrows on the data box.

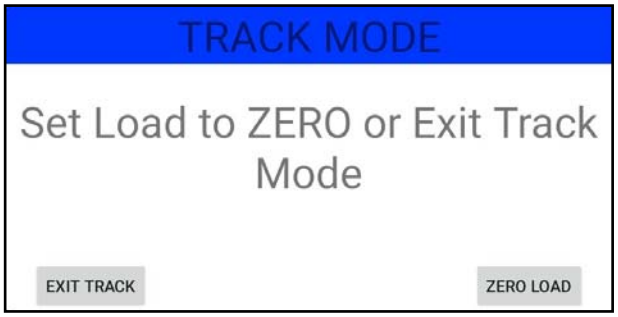
[ABOUT] Selector

This selector will display the version, creation date of the frame firmware and the serial number of the frame. The system is returned to the main screen by clicking on the **[BACK]** selector.



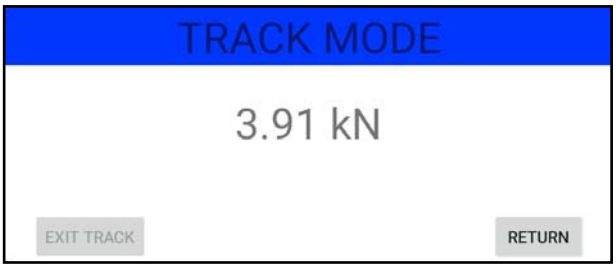
[TRACK] Selector

This function is provided for testing samples where the user needs to observe the plastic nature of the failure. Click on the **[TRACK]** selector and the display will indicate that the measurement system is ready to take its auto-zero measurement.



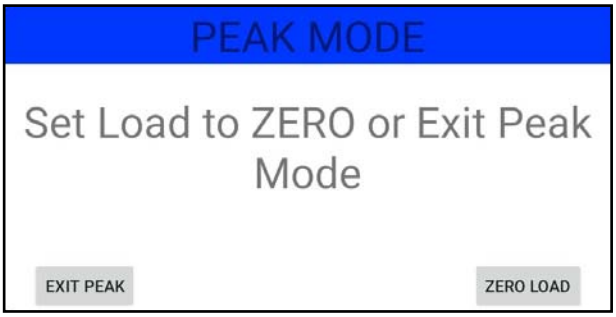
It is critical that there is no load on the conical points at this stage, as the value recorded during the zero-measurement phase will be subtracted automatically from all subsequent load measurements.

Click on the **[ZERO LOAD]** selector to confirm there is no load on the points. The frame will reset to Track mode and the mobile display will indicate the current load value during the test. This load value will continue to be displayed until the system is returned to the main screen by clicking on the **[EXIT TRACK]** selector.



[PEAK] Selector

This is the usual function for testing core samples. Click on the **[PEAK]** selector and the display will indicate that the measurement system is ready to take its auto-zero measurement.



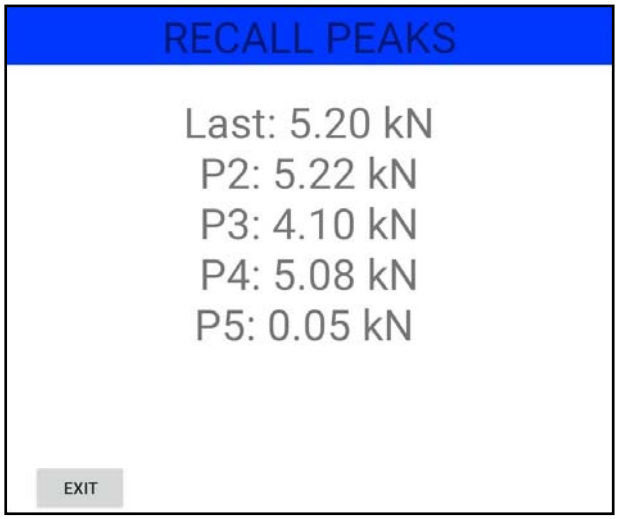
It is critical that there is no load on the conical points at this stage, as the value recorded during the zero-measurement phase will be subtracted automatically from all subsequent load measurements.

Click on the **[ZERO LOAD]** selector to confirm there is no load on the points. The frame will reset to **Holding Peak** mode and the mobile display will indicate the maximum load value attained during the test so that spalling etc. of the sample can be ignored by the operator. The peak value will continue to be displayed until the frame is re-initialised via the **[RESET]** selector.

If a data file is open, the operator must decide whether to record or discard the displayed peak value via the **[SAVE DATA]** or **[REJECT]** selector before returning to the main screen. The application will automatically reset for another peak value test unless the **[EXIT PEAK]** selector is selected to return to the main screen.

[RECALL PEAKS] Selector

This control will access a table of the last five values attained during peak load testing. A reading of **[#####]** indicates that the load on the sample has exceeded the maximum range of the testing frame (50.22kN, 11290lbf) The system is returned to the main screen by clicking on the **[EXIT]** selector.



[START DATA FILE] Selector

If a record of the maximum values attained during the testing of a sample is required, click on this control selector to open a dialogue box and create a target file and directory for the text file record. An indicator will open on the display screen to confirm the full data file path.

While the data file is open, two extra selectors will allow the operator to accept or reject peak values displayed during the testing of samples in the PEAK mode:-

[SAVE DATA] Click on this selector to add the Test No, Test Type, Sample Dimensions and Peak Load values to the current data file.

[REJECT] Clicking this control can reject the test data. The program will return to the main screen. (the Test No will not increment and the Peak Load data will not be saved)

[CLOSE DATA FILE] Selector

The operator can close the current open data file with this control.

Data File Format

The PLT Communication application creates a tab-separated text file with the filename provided by the operator. The file has a default extension denoting the type of data saved and text files may be readily imported into common spreadsheet applications.

```
DATE:         22/01/13
CLIENT:       ABC Geotechnical P/L
SITE:         Gamblethorn Opencast
COMMENTS:     Samples 1-2 cored and air-dried 2 weeks
              Sample 3 taken from broken section of sample
              Samples 4-6 sawn and air-dried 2 weeks

TEST LEGEND: d = diametral     p = perpendicular
             a = axial        // = parallel to weak plane
             b = block         ? = unknown
             i = irregular

 No    Type    W(mm)        D(mm)        L(mm)       Peak Load

  1    d,//     N/A         50.0         65.0        21.15 kN
  2    a,p     45.0         30.2          N/A        35.05 kN
  3    i,p     45.3         40.2         65.0        33.18 kN
  4    b,p     60.0         50.1         55.0        20.02 kN
  5    b,//    60.0         49.6         55.0        48.99 kN
  6    b,?     60.0         50.3         55.0        44.10 kN
```

The header information contains the following information:-

i) Date of the test
ii) Client information
ii) Site identification information
iv) Other comments relevant to the sample from which the samples were taken
v) A listing of the abbreviations used for Test Type and Loading Direction

The test data for each sample is recorded as follows:-

i) The sample test number.

ii) The type of test and the direction of loading with respect to any Plane of Weakness in the sample.

iii) The sample dimensions taken with respect to the test type.

iv) The peak load recorded during the test.

Remote Peak Hold Sample Testing

1. Press the **[MENU]** key on the PLT frame and observe that the sign-on display is shown.
2. Press the **[MENU]** key to cycle the display through the available function menus.
3. When the **Bluetooth® Mode** function is displayed press the **[SELECT]** key.
4. Open the **PLT** app and established a **Bluetooth®** link.
5. Open a file to save the sample test values in text file format using the **[START DATA FILE]** selector. Use the default file name or change as required.
6. Enter the test sample dimensions taken according to the procedure outlined in the ISRM: Suggested Method of Point Load Testing (Revised Edition) enclosed with the test frame.
7. Click on the **[PEAK]** selector.
8. Ensure that there is no load on the upper point and click on the **[ZERO LOAD]** selector to reference the measurement system.
9. Place a sample between the points ensuring a full diameter between the tips.
10. Use the jack handle to close the ram valve clockwise.
11. Bring the points into contact with the sample using the jack.
12. Load the sample with even strokes to fail the sample over 10-15 seconds, avoiding dynamic failures caused by the loading rate. Slow even loading is especially important for samples that fail below 5kN to ensure that reliable and accurate data is obtained. If the sample 'spalls' during the test, release the ram and reposition the sample between the points and reload core. The measurement system will only update if the original peak load value is exceeded.
13. If the peak value is valid, save it to the data file by clicking the **[SAVE DATA]** selector. If not, clear the data by clicking the **[REJECT]** selector.

    The application will automatically reset for another peak load test unless the **[EXIT PEAK]** selector is selected to return to the main screen.
14. Release the ram by turning the valve anti-clockwise and remove all rock fragments.
15. For subsequent tests, repeat steps 8-14