WS Technologies Inc.

Beacon Tester
Operator's Manual

BT200

Version 1.40

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WARNING!

DO NOT ACTIVATE ANY BEACON IN ITS NORMAL ACTIVATE MODE UNLESS THE BEACON IS IN A SCREEN BOX (TSE100B) OR A SCREEN ROOM. DOING SO COULD RESULT IN A FALSE DISTRESS ALERT.

WARNING!

WHEN USING DIRECT CONNECTION INPUT MODE DO NOT EXCEED A BURST POWER LEVEL OF 20 WATTS OR A CONTINUOUS POWER LEVEL OF 2 WATTS. DAMAGE WILL RESULT!

INTRODUCTION

Thank you for choosing the BT200 series of 406 Beacon Testers.
This Operator's Manual explains the operation of all available models.

SUMMARY OF MODELS AND OPTIONS

BT200: This model measures and decodes all Cospas-Sarsat EPIRBs and PLBs. It decodes the 406 MHz message, measures the 406 MHz transmitter and the 121.5 MHz transmitter.

BT200 + ELT: This model measures and decodes all Cospas-Sarsat EPIRBs, PLBs and ELTs. It decodes the 406 MHz message, measures the 406 MHz transmitter, the 121.5 MHz transmitter, and the 243 MHz transmitter.

High Stability Option: This option increases the frequency measurement accuracies and allows for a 2 year calibration cycle, compared to the standard 1 year calibration cycle.

Limit Tester Option: This option will indicate pass or fail based on selected measurement parameters.

UNPACKING

Please verify the contents of your package. It should contain:

- Rugged Smartphone with integrated Beacon Receiver
- Operator's Manual
- Certificate of Calibration with Calibration data
- RF Interface cable
- USB interface cable
- AC Adapter with International Plug kit
- OTG/USB cable (for connecting a USB drive)
- Screen cleaning cloth
- Pen with stylus
- Waterproof yellow hard case

BEFORE YOU START

Charging the Battery:
Charge the BT200 using the AC adapter and USB cable for 4 hours.

TIP: To ensure a full charge, when the device power is low, always charge the device for a minimum of 2 hours, regardless of the power level showing on the device.

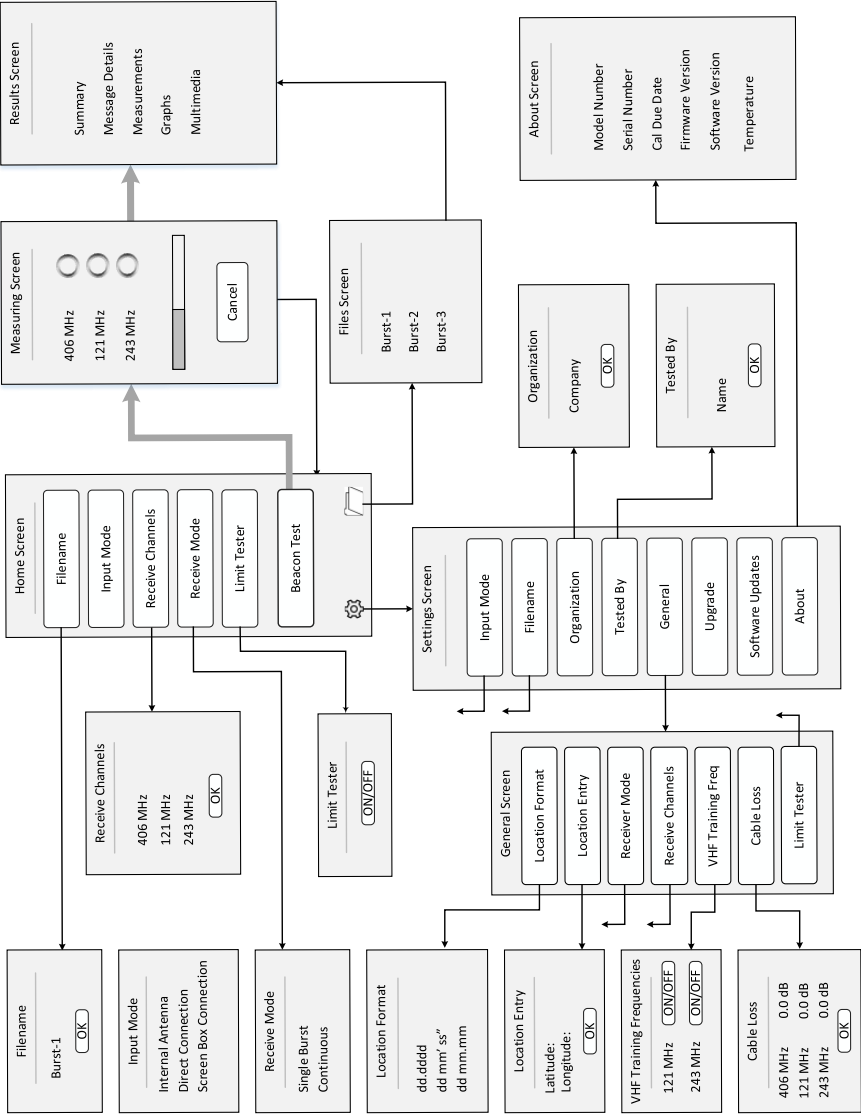**TIP:** If the device has been off for a while, the battery may be in deep discharge. Plug in the charger and leave for 10 hours. The device will recover and the battery will charge fully.

GETTING STARTED

Please read this Operator's Manual to become familiar with the operation of the Beacon Tester.

POWER button

USB port

VOLUME UP button

RF INPUT

VOLUME DOWN button

RESET button

BACK button

Flowchart:

Results Screen
- Summary
- Message Details
- Measurements
- Graphs
- Multimedia

About Screen
- Model Number
- Serial Number
- Cal Due Date
- Firmware Version
- Software Version
- Temperature

Measuring Screen
- 406 MHz
- 121 MHz
- 243 MHz
- Cancel

Files Screen
- Burst-1
- Burst-2
- Burst-3

Organization
- Company
- OK

Tested By
- Name
- OK

Home Screen
- Filename
- Input Mode
- Receive Channels
- Receive Mode
- Limit Tester
- Beacon Test

Settings Screen
- Input Mode
- Filename
- Organization
- Tested By
- General
- Upgrade
- Software Updates
- About

Receive Channels
- 406 MHz
- 121 MHz
- 243 MHz
- OK

Limit Tester
- ON/OFF

General Screen
- Location Format
- Location Entry
- Receiver Mode
- Receive Channels
- VHF Training Freq
- Cable Loss
- Limit Tester

Filename
- Burst-1
- OK

Input Mode
- Internal Antenna
- Direct Connection
- Screen Box Connection

Receive Mode
- Single Burst
- Continuous

Location Format
- dd.dddd
- dd mm' ss"
- dd mm.mm

Location Entry
- Latitude:
- Longitude:
- OK

VHF Training Frequencies
- 121 MHz   ON/OFF
- 243 MHz   ON/OFF

Cable Loss
- 406 MHz   0.0 dB
- 121 MHz   0.0 dB
- 243 MHz   0.0 dB
- OK

Running the Beacon Tester Application:
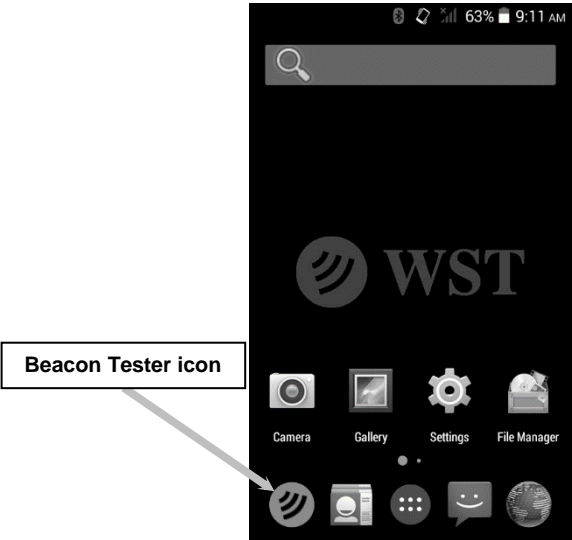
Turn on the device by pressing and holding the Power button on the left side for 5 seconds then releasing. The device will boot up.
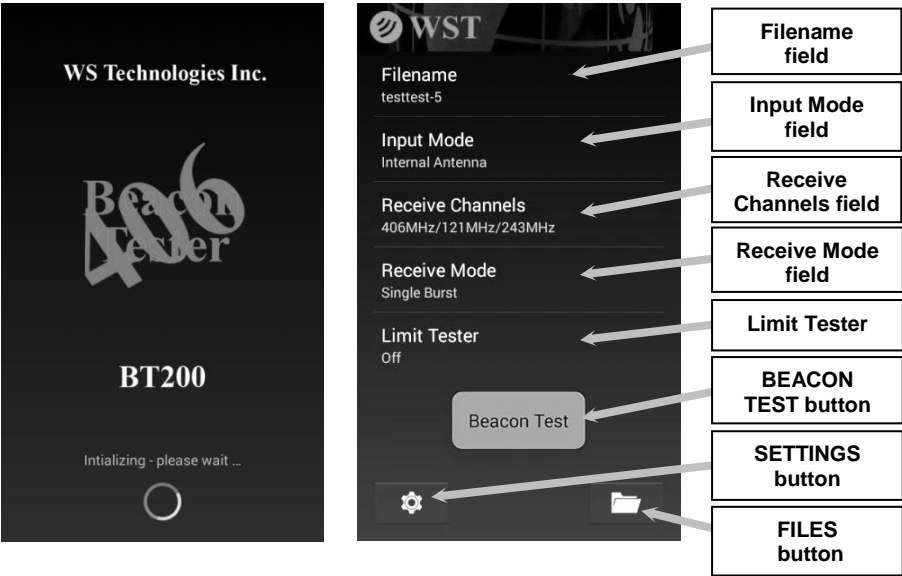
Power Button

Welcome

Unlock the screen by sliding the lock icon.

9:09 AM
WED, OCTOBER 4

WST

NO SIM CARD — EMERGENCY ONLY

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Launch the Beacon Tester application by tapping the Beacon Tester icon on the device:
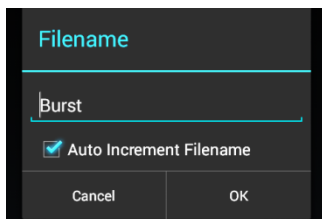
Beacon Tester icon

The 406 Beacon Tester title screen will show for a few seconds followed by the Home screen:

Filename field

Input Mode field

Receive Channels field

Receive Mode field

Limit Tester

BEACON TEST button

SETTINGS button

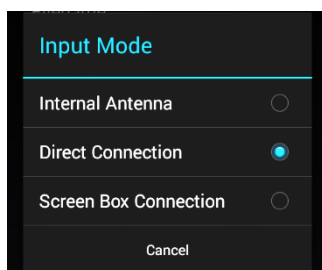**FILES button**

Selecting the Desired Measurement Filename:

• tap the *Filename* field.

• enter the desired measurement file name.

• select the Auto Increment Filename box if you wish to have the filename number *Auto Increment* after each measurement.

• tap *OK.*

NOTE: Do not use forbidden file name characters: / \ : * ? " < > |

Selecting the Input Mode:

• tap the *Input Mode* field. The following screen will appear.

• select *Internal Antenna* to use the internal antenna when receiving the beacon signal through the air.

• select *Direct Connection* to use the 50Ω input port along with the RF Interface cable connected directly to the beacon. Also, use this mode when using the WST RF Screen Box (model TSE100B) with the beacon and tester connected directly and both located in the RF Screen Box.
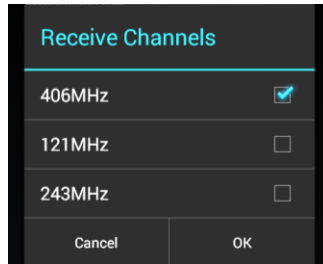
NOTE: Using Direct Connection will result in absolute power measurement units (dBm). Using the Internal Antenna will result in relative power measurement units (%).

WARNING!
WHEN USING DIRECT CONNECTION INPUT DO NOT EXCEED A BURST POWER LEVEL OF 20 WATTS OR A CONTINUOUS POWER LEVEL OF 2 WATTS. DAMAGE WILL RESULT!

• select *Screen Box Connection* when measuring a beacon while it is inside a screen box, with the output of the screen box connected to the tester. The tester will show relative power measurements in %.
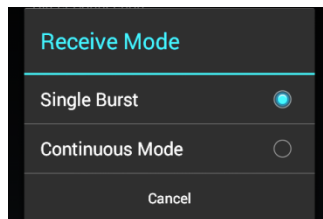
Selecting the Desired Receive Channels:
• tap the *Receive Channels* field. The following screen will appear.

Receive Channels

406MHz	☑
121MHz	☐
243MHz	☐
Cancel	OK

• select the desired channels you wish to receive.
• tap *OK*.

Selecting the Desired Receive Mode:
• tap the *Receive Mode* field. The following screen will appear.

Receive Mode

|	
Single Burst	◉
Continuous Mode	○
Cancel	

• select the desired mode.
• tap *OK*.

In *Single Burst* mode, the receiver will capture one set of measurements and terminate the test.

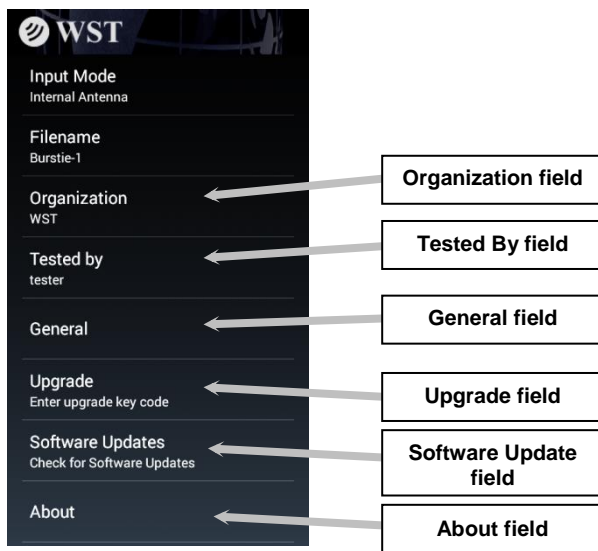In *Continuous* mode, the receiver will continue to capture sets of measurements until Cancel is tapped.

Activating Limit Tester:
- tap the *Limit Tester* field. The following screen will appear.

On/Off button
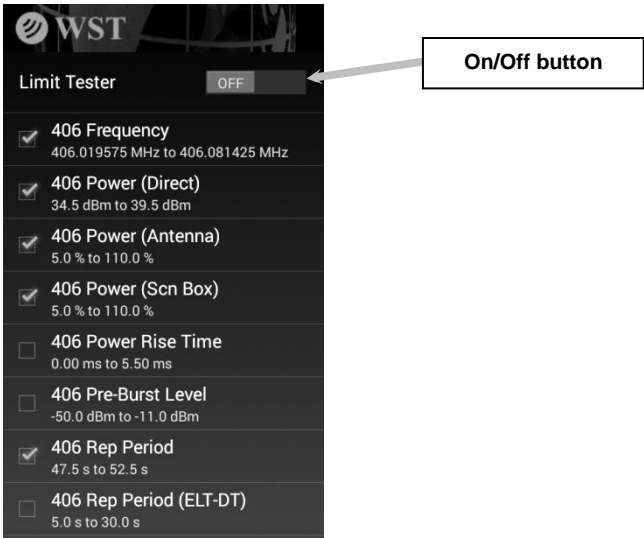
SETTING THE CONFIGURATION SETTINGS
• tap the *Settings* button (the icon at the bottom left of screen).

## Setting the Organization and Tested By Names:
• tap the *Organization* field.
• enter the desired Organization name.
• tap *OK*.

• tap the *Tested By* field.
• enter the desired name.
• tap *OK*.

NOTE: The entered *Organization* and *Tested By* names will appear on each Test Report and in the data file.

General:

• tap on the *General* field.

The *General* screen will allow changing Location Coordinate formats, Location, Receive Mode, Receive Channels, selecting VHF Training Frequencies, entering Cable Loss factors, and Limit Tester (if installed).
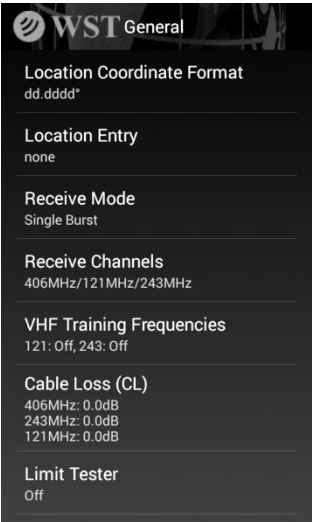
Location Coordinates Setting:
• tap on the *Location Coordinate Format* field
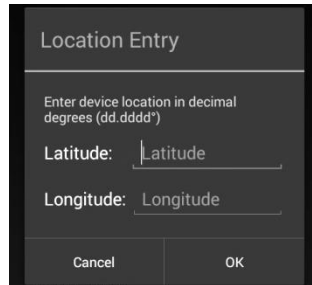• select the box relating to your desired location coordinate display.
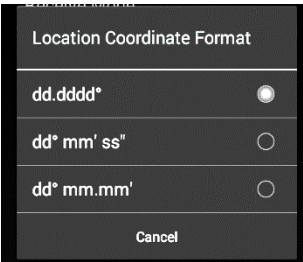
NOTE: dd.dddd° is decimal degrees; dd° mm' ss" is degrees/minutes/seconds; dd° mm.mm' is degrees/decimal minutes.

Entering the BT200 Location:
When the Location data of the BT200 is entered, the delta distance between the BT200 and the decoded location from the location-protocol beacon is provided.
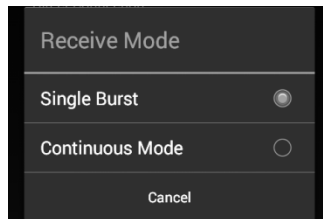
• tap on the *Location Entry* field.
• enter the latitude and longitude data in decimal degrees (dd.dddd).
• tap OK.

Selecting the Desired Receive Mode:
• tap the *Receive Mode* field. The following screen will appear.

• select the desired mode.

In *Single Burst* mode, the receiver will capture one set of measurements.

In *Continuous* mode, the receiver will continue to capture sets of measurements until Cancel is tapped.

Selecting the Desired Receive Channels:
- tap the *Receive Channels* field. The following screen will appear.
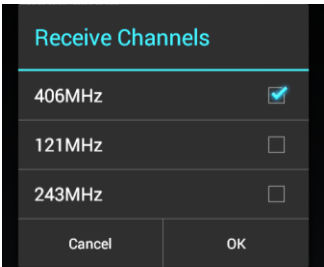
- select the desired channels you wish to receive.
- tap *OK*.

Selecting VHF Training Frequencies:
- tap on the *VHF Training Frequencies* field. The following screen will appear.

- activate the 121 training frequency or the 243 training frequency, or both.
- select the desired training frequency for each channel selected.

Entering Cable Loss Factors:
- tap on the *Cable Loss (CL)* field.

- enter the desired cable loss factor for each frequency.
- tap *OK.*

When the *Input Mode* is set to *Direct Connection*, the cable loss factor will be included in the power measurements for each frequency.

Limit Tester:
- tap the *Limit Tester* field. The following screen will appear.

- tap the *On/Off* button to activate the Limit Tester.
- select or de-select the desired parameters that you wish to be limit tested.

Upgrade:
When upgrading to add new features, such as the ELT option or Limit Tester option, you may purchase an upgrade code.

• tap on the *Upgrade* field.
• enter the upgrade code (supplied by WS Technologies Inc. when you purchase an Upgrade).
• re-start the Beacon Tester application for changes to take effect.

Software Updates:
Software updates are available free of charge to all users.

Three methods of downloading and installing new Beacon Tester software are available from: the Google Play Store; the BT200 via WST website; or via a connected PC.


Software Update Instructions:

From the Google Play Store:

On the device, tap on the *Google Play Store* **icon** to go to the Google Play Store and search for the Beacon Tester app.
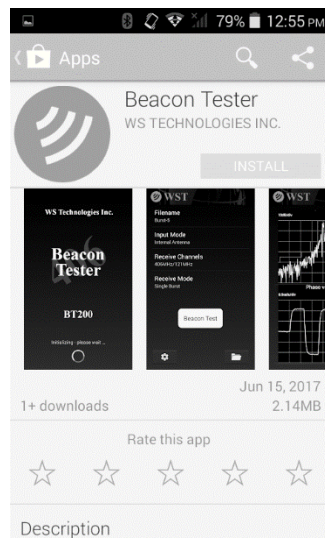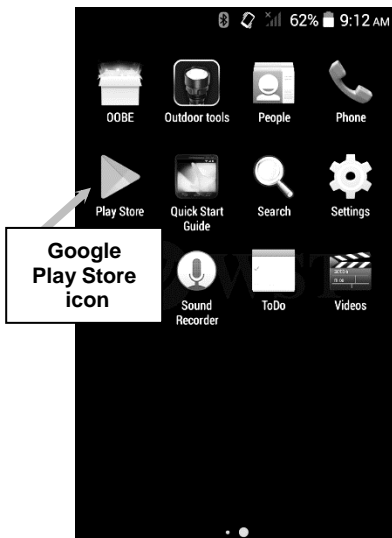
Tap *Install* to install the WS Technologies Inc. Beacon Tester app.
If you wish to have the Google Play Store automatically update the app
when updates are available, then from the Pull Down menu check the
Auto-update box.
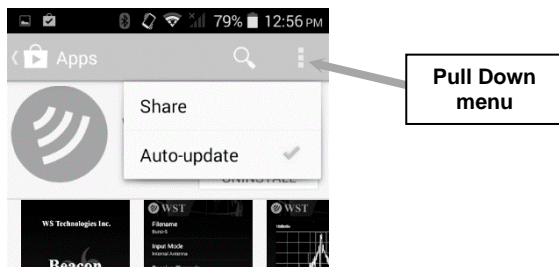
From the BT200 Handheld Device:
• make sure the BT200 device has a network connection capable of
accessing the internet.
• from the **Settings > Software Updates** screen, tap on the hyperlink
or use a browser to navigate to *wst.ca/BT200software.html*
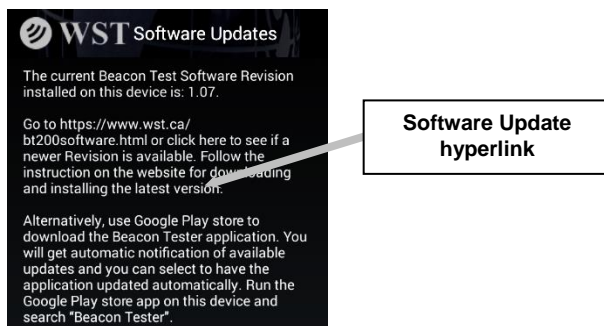
• if a newer software version is available then click the **Download** link.
• save the file to the BT200 device.
• once downloaded, use **File Manager** on the BT200 device to
navigate to the downloaded .apk file and tap to install.
• once installation is complete, run the Beacon Tester application and
go to **Settings > About** to verify the new Software Version was
installed.

From a PC:
• from your network-connected PC, navigate to **wst.ca/BT200software**
• if a newer software version is available then click Download and save
to Desktop.

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- connect the BT200 device to the PC using the USB cable.
- on the BT200 device tap *Turn on USB storage*.
- on the PC, locate the connected drive representing the BT200 device.
- copy the .apk file downloaded to the Desktop to the BT200 device.
- once downloaded, tap *Turn Off USB storage* on the BT200 device.
- disconnect the USB cable.
- on the BT200 device use **File Manager** to navigate to the downloaded .apk file and tap to install.
- once installation is complete, run the Beacon Tester application and go to **Settings > About** to verify the new Software Version was installed.

About:
Tapping on the *About* field will display the following screen:

The *About* screen provides information relating to the BT200. The information provided includes the Model Number, Serial Number, Calibration Due Date, Firmware Version, Software Version, and internal temperature of the BT200.

MAKING MEASUREMENTS

NOTE: Interpreting the results provided by the Beacon Tester requires some knowledge of beacon requirements. Using the self test mode of the beacon may result in some measurements being outside the required limits due to the lack of a warm-up period.

> **WARNING! DO NOT ACTIVATE ANY BEACON IN ITS NORMAL ACTIVATE MODE UNLESS THE BEACON IS IN A SCREEN BOX (TSE100B) OR A SCREEN ROOM. DOING SO COULD RESULT IN A FALSE DISTRESS ALERT.**

General:

All measurements will produce a Test Report in a PDF format, and a data file in comma separated values (.csv) format for easily importing into a spreadsheet for data parsing and data saving.

Measurement results are stored in the BT200 device. Each measurement will be saved in a folder with the same name as the measurement filename. For example, a measurement with the filename "Burst-1" is made on a beacon. When the measurement is completed, the following is created:

<Burst-1>	folder name
<images>	folder of graphic images
Burst-1.csv	measurement data file
Burst-1.pdf	PDF Test Report

When the *Auto Increment* feature is enabled in the *Filename* field, the next measurement will be named *Burst-2*.

When the *Receive Mode* settings are set to *Continuous Receive*, then each subsequent burst measurement data will be appended to the stored data file (.csv file).

Connecting the Beacon:

There are 3 methods for receiving a signal from a beacon – using the Internal Antenna, the Direct Connection mode, or the Screen Box Connection mode.

Internal Antenna:
- select *Internal Antenna* from the *Input Mode* on the *Home* screen.

When a measurement is completed, the power level units will be shown in %, with 100% being displayed when the tester is very close to the antenna of the transmitting beacon.

Direct Connection:
- select *Direct Connection* from the *Input Mode* on the *Home* screen.
- attach the RF Interface Cable (p/n 130-024) to the *RF IN* connector located on the rear of the BT200 device. Attach the beacon.

When a measurement is completed, the power level units will be shown in dBm. This measurement is very accurate. If cable loss factors are setup in the **Settings > General > Cable Loss** section, then these factors are included in the power level measurements.

Screen Box Connection:
- select *Screen Box Connection* from the *Input Mode* on the *Home* screen.
- attach a cable from the output of a Screen Box to the RF Interface Cable (p/n 130-024) which is connected to the *RF IN* connector located on the rear of the BT200 device.
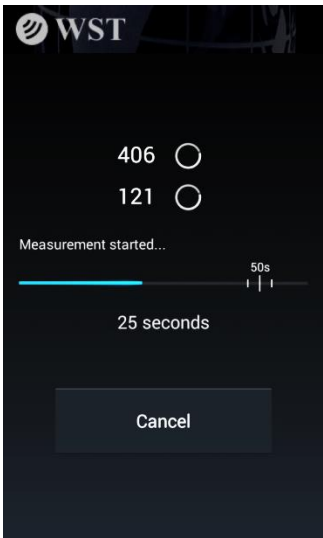
Single Burst Measurement:

- activate the beacon under test.
- tap the *Beacon Test* button.
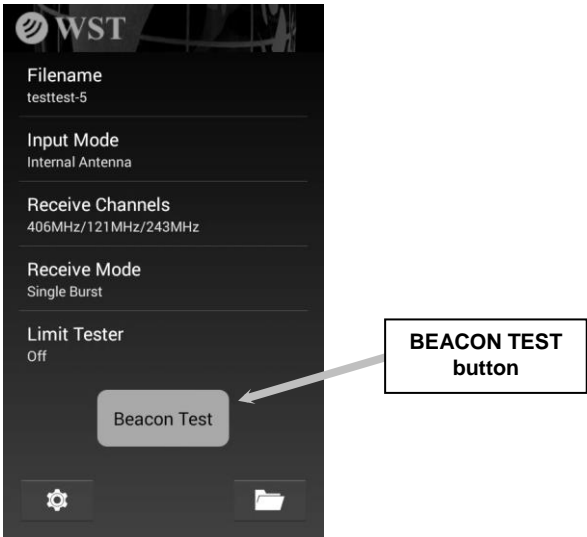
The following screen will appear and the timer will start.

• if the beacon is transmitting a 121.5 and/or 243 MHz homing signal, the tester will produce the characteristic swept audio tone and indicate on the display that channel has been received. These signals must be received prior to the 406 MHz burst in order to be measured.

Channel received indicator
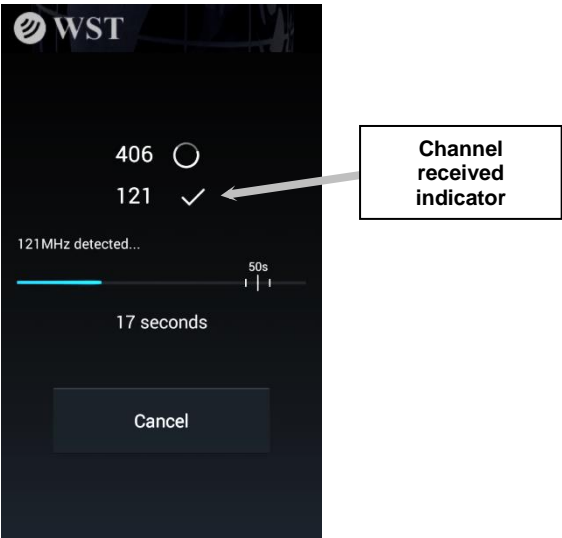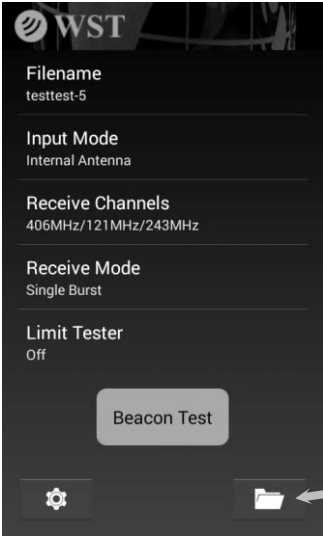
• once a 406 MHz burst is received, the measurement is complete and the results are displayed.
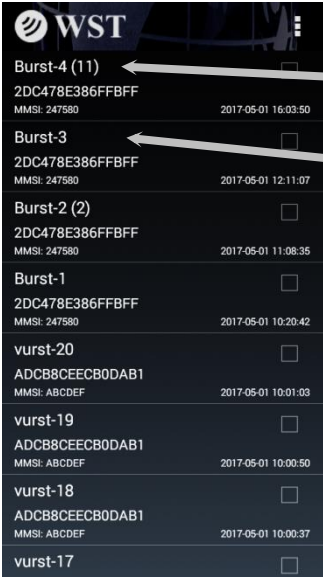
Continuous Measurement:

• when making a measurement in *Continuous* mode, once a measurement is complete, the device will return to the *Measuring* screen and continue waiting for another measurement. This will continue until the user taps *Cancel,* at which time the measurement will end.

• the *Continuous* mode measurement file will show the number of measurements contained in the file in brackets after the measurement name: *Burst-4(11)*

Viewing Measurements for Single Burst Mode:

Files button

Continuous Mode Measurement file

Single Burst Mode Measurement file

- go to the *Files* screen and tap the desired Measurement file.

Example *Burst-15*

A very useful feature of the BT200 is the ability to view adjacent
measurements easily with the swipe of a finger.
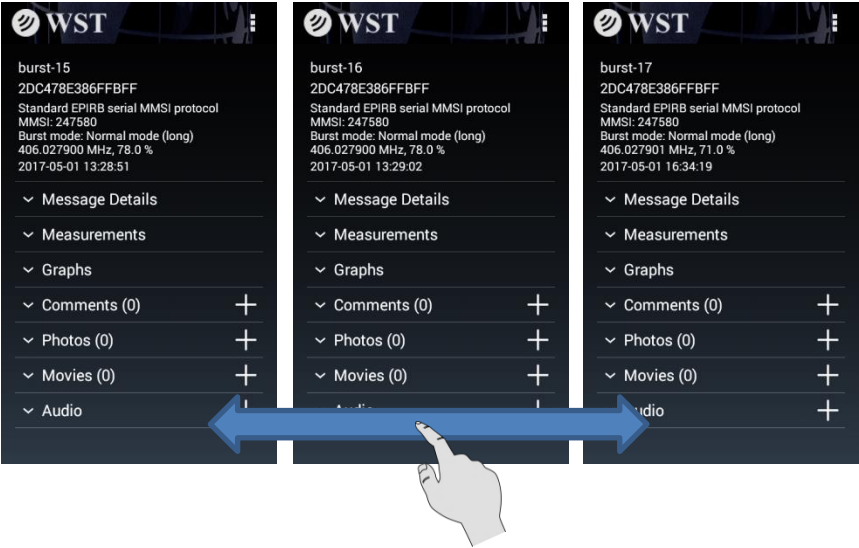
Viewing Measurements for Continuous Mode:

• go to the *Files* screen and tap the desired Measurement file.
Example *Burst-4(11)*
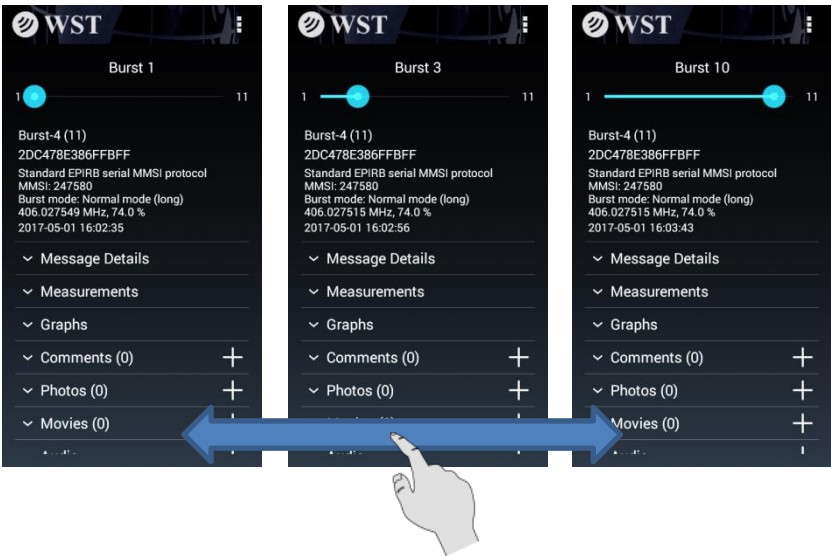
• you can now view the first burst and scroll horizontally through the
remaining bursts within the same filename.
• the slider at the top of the screen shows which burst you are viewing.

**Note: In Continuous mode, all beacons within range of the tester
will be captured. The 15 Hex IDs may not necessarily be the same.**

MEASUREMENT RESULTS

Results Screen:
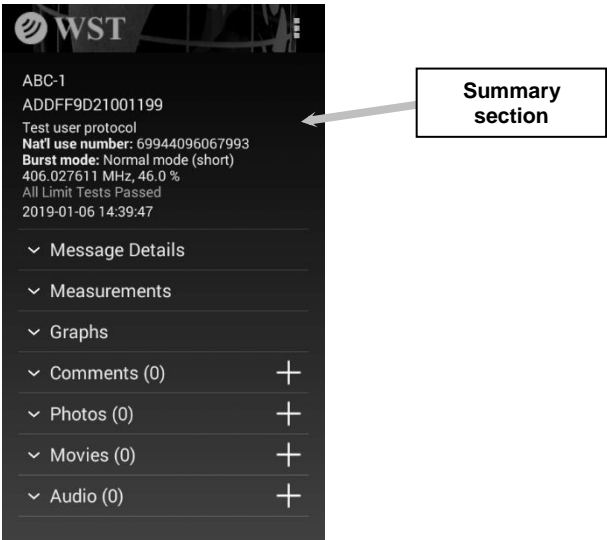
The *Results* screen consists of a summary section, along with collapsible sections for *Message Details*, *Measurements*, and *Graphs*.

Sections can be expanded or collapsed by tapping on the section headings. The screen can be scrolled up and down using your finger.

Summary Section:
The Summary section includes:
- Filename
- 15 Hex ID
- Beacon information (protocol dependent)
- Burst mode (Normal or Self Test mode)
- Channel frequency and power level
- Limit Test pass or fail indicator (requires Limit Tester option)
- Date and time of receiving burst

Message Details:

Message
Details
section

The *Message Details* section shows the details from the decoded message of the beacon transmission.

Measurements:

Measurements
section

The *Measurements* section shows the detailed measurements for all received channels.

Graphics:
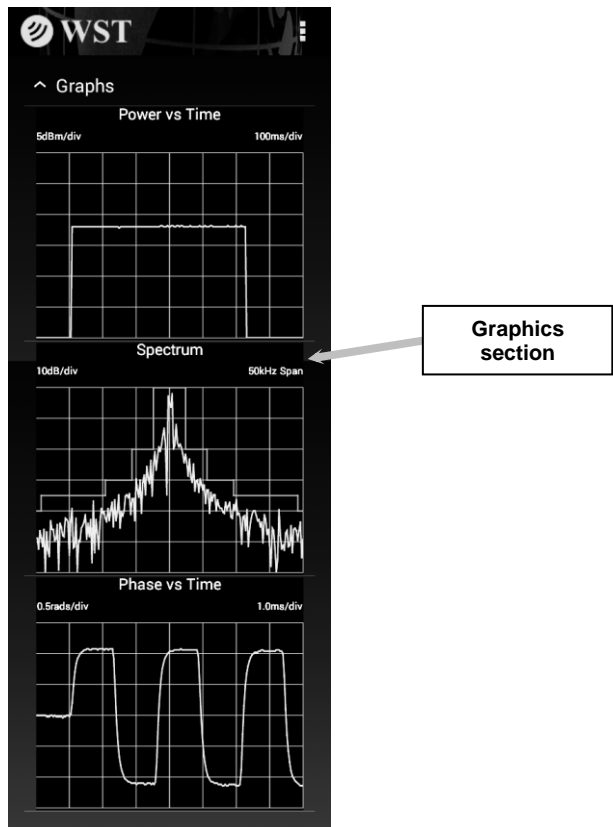
The *Graphics* section displays the Power vs. Time for the 406 MHz burst, the 406 MHz frequency Spectrum, and the demodulated Phase vs. Time waveform.

Multi-Media Data:

The *Results* screen allows the addition of one or more Comments, Photos, Movies, and Audio clips to each measurement. This feature is very useful for recording various conditions relating to measuring beacons. Each additional file is also saved in the measurement folder.
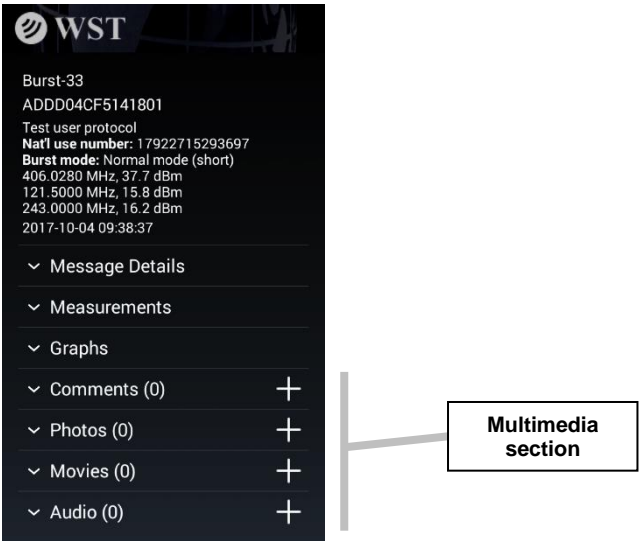
Comments:

- tap the + symbol adjacent to the *Comments* field.
- type the desired comment and tap *OK*.

Photos:

- tap the + symbol adjacent to the *Photos* field.
- take the photo and tap ✓.

Movies:

- tap the + symbol adjacent to the *Movies* field.
- record the movie and tap ✓.

Audio:

- tap the + symbol adjacent to the *Audio* field.
- record the audio and tap ✓.

More than one multimedia file can be recorded. The number of files is shown in brackets beside each section.

FILES

Getting to the Files Screen:
• tap *Files* from the Home screen.

Delete symbol

• tapping on a file name will select and display the that measurement.

Deleting Files:
• tap <u>and hold</u> the file to be deleted.
• tap on any other files you also wish to delete.
• tap the Delete symbol.

Deleting Files Using the PC:

• connect the BT200 device to the PC using the USB cable.

• tap on the *Turn on USB storage* button

• on the PC go to File Explorer and navigate to the connected device
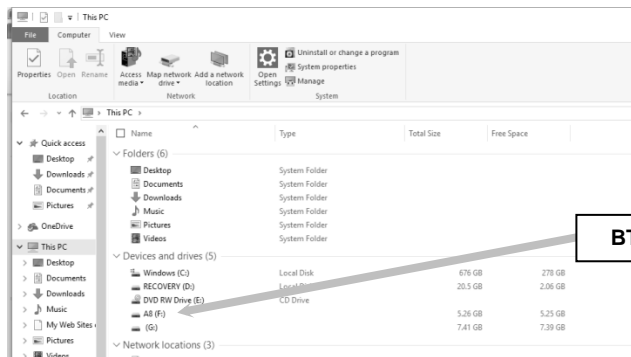
• navigate to **Beacon Tester > Measurements** and select the measurements to be deleted.

• click delete.

• Tap *Turn off USB storage* button on the device.

• disconnect the BT200 from the PC.

TEST REPORTS AND DATA FILES

Each measurement generates a folder containing the measurement data. The measurement data includes a Test Report in a PDF format, and a data file in CSV format for easily importing into a spreadsheet for data parsing and saving.

Measurement results are stored in the BT200 device. Each measurement will be saved in a folder with the same name as the measurement filename. For example, a measurement with the filename "Burst-1" is made on a beacon. When the measurement is completed, the following is created:

<Burst-1>	folder name
<images>	folder contain graphic images
Burst-1_comments.csv	comments data
Burst-1_phase.csv	phase graphics data
Burst-1_power.csv	power graphics data
Burst-1_spectrum.csv	spectrum graphics data
Burst-1.csv	delimited measurement data file
Burst-1.pdf	PDF Test Report

NOTE: The BT200 device can store many measurements. It is strongly advised to transfer your measurements to a USB drive or a PC. The BT200 is an Android based device and is subject to periodic situations where data may be lost.

Moving Measurement Folders:
Measurement folders can be moved to a USB drive or to a PC.

Move to USB Drive (via OTG/USB Cable):
• connect the OTG/USB cable supplied to the USB connector on the BT200. Plug in a USB drive.
• using File Manager on the BT200 device, navigate to the **Beacon Tester > Measurement** folder and select the measurement folders that you wish to move by tapping and holding on the first folder, then tapping on any additional folders.
• tap the Copy/Move icon 🗐 at the bottom.
• use the Back button to navigate back to the Android home page and select *External USB storage*.
• tap the Clipboard icon 🗐 at the bottom to paste the selected folders into the new location.

Move to PC:

- connect the BT200 to the PC using the USB cable supplied.
- go to *File Explorer* on the PC and double-click on the BT200 device.
- navigate to **Beacon Tester > Measurements** and select the measurement folders you wish to move.
- using standard Windows techniques, Copy and Paste the selected measurement folders to the desired location on the PC.

Measurement Files:

A folder will exist for each successfully completed measurement. Each measurement folder will contain the following files:
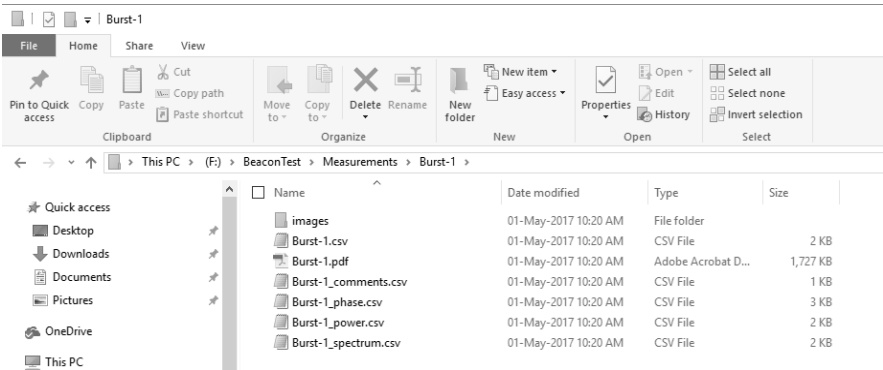
PDF Test Report:

The PDF Test Report contains all of the measurement data along with 406 graphics showing the Power vs Time, 406 Spectrum, and 406 Phase Modulation. The Test Report can be viewed and printed from a PC. The Test Report can also be viewed directly on the BT200 by using File Manager and navigating to **Beacon Tester > Measurements** > **filename** and tapping on the filename.pdf file.

Manually Adding a Pass or Fail Indication to the PDF Test Report

If Limit Tester is installed and turned ON, the Pass or Fail indication will automatically be selected in the PDF Test Report.

If Limit Tester is not installed, or turned off, the user can manually select Pass or Fail on the PDF Test Report.

• tap the *Menu* button on the upper right of the Measurement screen
• tap on the *Save Report* button
• select the appropriate Pass or Fail item
• tap *OK.* A message will indicate when the report has been successfully saved.
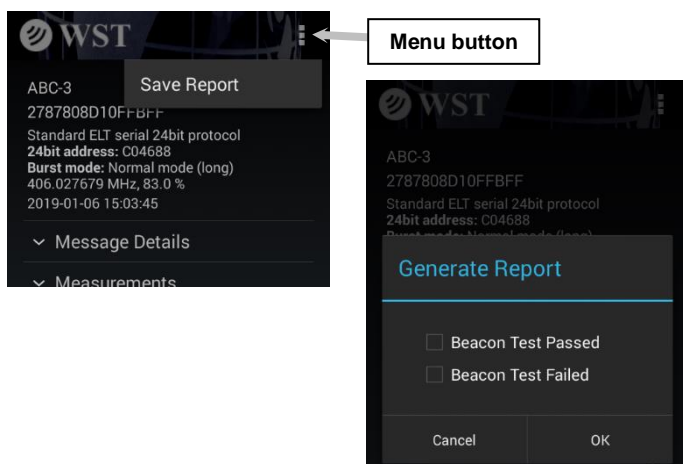
PDF Test Reports when in Continuous Mode

When the BT200 is in Continuous mode, although many measurements may be captured, only the first measurement has a PDF Test Report generated. You can easily generate a PDF Test Report for any measurement by navigating to any burst number from the Measurement screen and tapping *Save Report* form the Menu button (see above).

Adding a Logo to the PDF Test Report

A logo may be automatically added to each PDF Test Report by adding the desired graphic logo to the Settings folder with the name ReportLogo.png

If the file is present in the Settings folder it will be added to the PDF Test Report, if it is not present, it will not be added.

The recommend size of the logo graphic is 100 pixels x 240 pixels.

Adding a Signature to the PDF Test Report

• from the BT200 device home screen, tap on *File Manager* and navigate to *Beacon Tester > Measurements*.
• select the desired measurement folder and tap on the associated pdf file.

The PDF Test Report will open in Adobe Acrobat™:

Add Comment button

Add Signature button
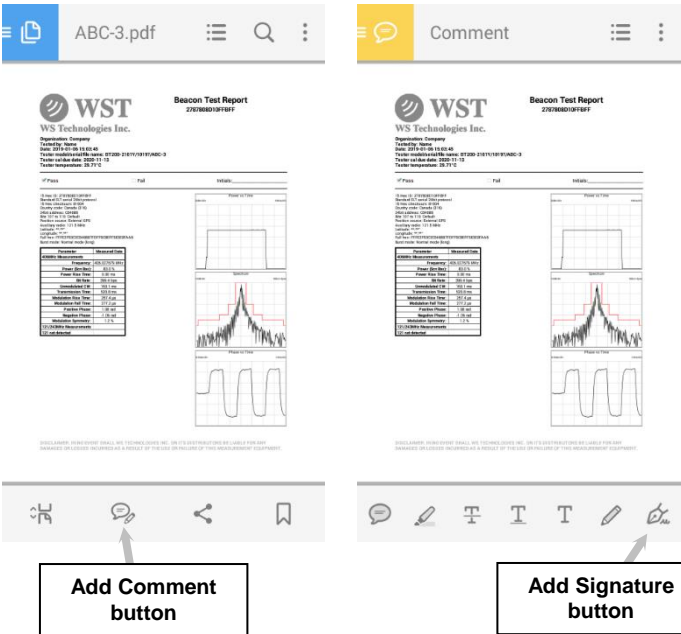
- tap the *Add Comment* button
- tap the *Add Signature* button
- follow the instructions on the screen.

Measurement Data File:

The Measurement Data file is a delimited text file (csv format) suitable for importing into a spreadsheet or database.

The header section of the file contains the Filename, Tester Model, Serial Number, Tester Cal Due Date, Tester Temperature, Input Mode, Cable Loss factors, Organization Name, Tested By name, and Receive Channels.

The body contains the Date/Time, Burst #, 15 Hex ID, Full HEX, Latitude, Longitude, 406 Freq (MHz), 406 Power (dBm or %), 406 Power Rise Time (ms), 406 Pre-Burst Level (dBm), 406 Rep Period (s), 406 Bit Rate (bps), 406 Unmodulated CW Time (ms), 406 Transmission Time (ms), 406 Mod Rise Time (µs), 406 Mod Fall Time (µs), 406 Positive Phase (rad), 406 Negative Phase (rad), 406 Phase Symmetry (%), 121 Freq (MHz), 121 Peak Power (dBm or %), 121 Sweep Direction, 121 Audio Freq Upper (Hz), 121 Audio Freq Lower (Hz), 121 Audio Sweep Range (Hz), 121 Mod Index (%), 121 Sweep Rep Rate (Hz), 121 Duty Cycle (%), 243 Freq (MHz), 243 Peak Power (dBm or %), 243 Sweep Direction, 243 Audio Freq Upper (Hz), 243 Audio Freq Lower (Hz), 243 Audio Sweep Range (Hz), 243 Mod Index (%), 243 Sweep Rep Rate (Hz), 243 Duty Cycle (%), Full Binary, and Decoded Message Details.

When the Tester is in *Continuous Mode*, each set of measurement data will be appended to the measurement data file.

Graphics Files:

The Measurement folder contains the data used for the graphics files. This data represents the Graphic plot with 200 data points in a CSV format.

The sub-folder *Images*, contains the graphic images created for each measurement.

Multimedia Files:

The Measurement folder also contains the multimedia files including Comments, Photos, Movies, and Audio Clips.

SOFTWARE UPDATES

Software updates are available free of charge on the Google Play Store or WS Technologies Inc. website: **wst.ca/BT200software**

You are encouraged to keep your Beacon Tester software up to date by downloading and installing the most current software revision.

BEACON TESTER MODEL UPGRADING

All models can be remotely upgraded as desired. Please contact WS Technologies Inc. at **sales@wst.ca** for upgrade costs and procedures.

USING THE TSE100B SCREEN BOX

The TSE100B Screen Box will allow testing of the beacon in normal activate mode without the risk of being detected by a satellite (causing a false alert). If the beacon being tested has an internal GPS receiver, the TSE100B will allow you to verify the GPS reception and ensure proper encoding of location data onto the 406 MHz transmission.

Both the beacon and the BT200 are placed into the TSE100 Screen Box. The viewing window and the screened gloves allow you to control both the beacon and the Beacon Tester. If connecting the beacon and tester directly, use *Direct Connection* mode. Use *Internal Antenna* mode if the beacon is transmitting through its antenna.

The TSE100B Screen Box also has a sniffer antenna and an RF out connector. Use the *Screen Box Connection* mode when the BT200 is connected to the RF Out Connector.

FREQUENTLY ASKED QUESTIONS

Why is my battery depleting so quickly?
In order to save battery power, turn off WiFi and keep the screen brightness to a minimum whenever possible. Do not turn off Bluetooth as this is used internally to the BT200.

My Beacon Tester won't receive either 406 MHz or 121.5 MHz.
Ensure that the proper Input mode is selected. If you are receiving a beacon self test transmission through its antenna, then select *Internal Antenna*. If you are connected directly to the beacon then select *Direct Connection*.

The Bluetooth on my device is not functioning.
Some functions on the device, such as Bluetooth, are functions dedicated to the operation of the Beacon Tester. The NFC is also not functional.

My GPS coordinates are being displayed in degrees/decimal minutes (dd° mm.mm'). I prefer degrees/minutes/seconds (dd° mm' ss"). How do I change this?
Tap **Settings > General > Location Coordinate Format**. Select the desired format.

When I launch the Beacon Tester app, after it is Initialized the spinning timer goes for a long time.
The length of time the timer continues depends on the number of measurement files in the Measurements folder. If you reduce the number of files the app will launch quicker.

How do I update the Beacon Tester software?
Use the Google Play Store to install the Beacon Tester app, or go to the WS Technologies Inc. website at **wst.ca/BT200software** and follow the instructions on updating the application software.

When I activate the beacon in self test mode, the measurements produce questionable results. Is there a problem with the beacon?
In order to meet all of the Cospas-Sarsat requirements, a beacon is allowed a 15 minute warm-up period. When testing a beacon in self test, there is no warm-up period, hence some measurements may be somewhat skewed.
Also, in self-test, the 121.5 homing transmission may be different depending on the particular beacon. Some beacons transmit a short

modulated signal, some beacons transmit a shorter unmodulated signal and some beacons transmit no signal. The Beacon Tester may indicate "unable to measure details" or "unmodulated carrier" depending on the beacon characteristics.

I am testing an ELT with separate 121.5 and 406 output connectors. What do I do to get the results printed on one Test Report?
Connect to the 121.5 transmitter first, then start the test. Once the Beacon Tester gives the indication that the 121.5 signal has been received, switch the cable to the 406 transmitter without stopping the test. Once the 406 burst is received on the Beacon Tester, the measurement will be complete.

Is the characteristic swept tone audio that I hear when the Beacon Tester receives a 121.5 MHz signal the actual demodulated audio from the beacon?
No, the swept tone audio is just an audio file played when the tester has received a 121 MHz signal.

The beacon I want to measure has offset training frequencies on 121.5 and 243 MHz. How do I setup the Beacon Tester to receive these training frequencies?
Tap **Settings > General > VHF Training Frequencies**. Activate one or both of the channels, and select the desired training frequencies.

SPECIFICATIONS

BT200 SPECIFICATIONS	BT200	-add ELT	
406 MHz Measurements			**Uncertainty**
Measure all Cospas-Sarsat Channels	●		-
15 HEX ID	●		-
Full HEX	●		-
Decode Message – EPIRB & PLB	●		-
Decode Message – ELT		●	-

Frequency
  Leaving factory
  Long Term
  Leaving factory – High Stability
  Long Term – High Stability
	●		± 100 Hz
			± 1.5 ppm/yr
			± 50 Hz
			± 1.0 ppm/yr

Power output	●		± 0.25 dB*
Power rise time	●		± 0.5 ms
Pre-burst level	●		± 1 dB
Pulse Repetition period	●		± 10 ms
Bit rate	●		± 0.2 bps
CW preamble time	●		± 0.5 ms
Total transmission time	●		± 0.5 ms
Rise time	●		± 20 µs
Fall time	●		± 20 µs
Phase deviation: positive	●		± 0.04 rad
Phase deviation: negative	●		± 0.04 rad
Modulation phase symmetry	●		± 0.005
121.5 MHz Measurements			

Frequency
  Leaving factory
  Long Term
  Leaving factory – High Stability
  Long Term – High Stability
	●		± 100 Hz
			± 1.5 ppm/yr
			± 60 Hz
			± 1.0 ppm/yr

Peak Power	●		± 1 dB
Sweep Direction	●		-
Audio Frequency – upper and lower	●		± 30 Hz
Audio Sweep Range	●		± 60 Hz
Modulation Index	●		± 5%
Sweep Rep Rate	●		± 0.1 Hz
Duty Cycle	●		± 2%
243 MHz Measurements			

Frequency
  Leaving factory
  Long Term
  Leaving factory – High Stability
  Long Term – High Stability
	●		± 100 Hz
			± 1.5 ppm/yr
			± 60 Hz
			± 1.0 ppm/yr

Peak Power		●	± 1 dB
Sweep Direction		●	-
Audio Frequency – upper and lower		●	± 30 Hz
Sweep Range		●	± 60 Hz
Modulation Index		●	± 5%
Sweep Rep Rate		●	± 0.1 Hz
Duty Cycle		●	± 2%
*between 35-39 dBm			
Graphic Measurements			
-406 spectrum mask graphics data	●		-
-406 output power during burst graphic data	●		-
-406 phase modulation graphics data	●		-

SPECIFICATIONS (cont'd)

Miscellaneous Parameters		
RF Range 406 MHz 121.5 MHz/243 MHz		>10 m >1 m
RF Input VSWR		1.20:1
Dynamic Range (Antenna equivalent and Direct)	406 MHz Burst	-20 dBm to +40 dBm
	121.5 MHz/243 MHz	-5 dBm to +35 dBm
Maximum Input Power (Burst)		+43 dBm
Maximum Input Power (Continuous)		+33 dBm
Operating Temperature Range		+5°C to +50°C
Storage Temperature Range		-20°C to +60°C
Ingress Rating		IP68
RF Input Cable Termination		BNC-female
Dimensions and Weight BT200: w x l x h mm (inches) Weight		135 (5.31) x 70 (2.76) x 20.0 (0.79) 222 g (0.49 lbs)
Hard Case: w x l x h mm (inches) Weight		363 (14.29) x 284 (11.18) x 124 (4.88) 1.90 kg (4.2 lbs)

REGULATORY INFORMATION

CANADA

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

USA

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

EUROPEAN UNION

DECLARATION OF CONFORMITY

Supplier Name: WS Technologies Inc.

Supplier Address: #2 – 215 Neave Road
Kelowna, B.C.
Canada V1V 2L9

Declares under our sole responsibility that the following product

Product Name: Beacon Tester
Model BT200
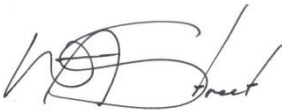
Conforms to the following normative European and International Standards

Normative ANSI/ISO 17025:2005
Standards: EN 61000-4-2
EN 61000-4-3
EN 61000-6-1

Following the provisions of the normative European Council 1999/5/EC R&TTE Directive.

Product conformance to cited product specifications is based on sample (type) testing, evaluation, or assessment at Celltech Labs Inc. located in Kelowna, Canada.

Supplementary Information: This product was tested and complies with all the requirements for the CE Mark.

W. Street
President
WS Technologies Inc.
#2 – 215 Neave Road
Kelowna, BC
Canada V1Y 5L9
Phone: (250) 765-7583
FAX: (250) 765-1652

WARRANTY INFORMATION

WS Technologies Inc. (WST) warrants the products manufactured by WST to be free from defects in material and workmanship for one year from the date of shipment. Liability of WST under the foregoing warranty is limited to the replacement or repair, at the option of WST, of any products which show defective workmanship or materials within one year from the date of shipment, which replacement shall be made Exworks (EXW) WST's facility in Kelowna, BC, CANADA, upon proof satisfactory to WST of the defect claimed. Except for the foregoing warranty, WST makes no other warranty, express or implied, as to the merchantability or fitness for a particular purpose of products shipped or the performance thereof, and does not make any warranty to the purchaser's customers or agents.

CALIBRATION

The BT200 series of Beacon Testers has been designed to have a standard one year calibration cycle or a two year calibration cycle for the High Stability version. The calibration date appears on the Calibration Certificate supplied with the Beacon Tester and the Cal Due date appears on the back of the BT200 device.

Before returning a unit for calibration, email **returns@wst.ca** to obtain an RMA (Return Materials Authorization) number and shipping instructions. Once calibrated, a new Cal Due date label will be placed on the back of the unit and a new Calibration Certificate will be issued.

RETURNS

An RMA (Return Materials Authorization) number must be obtained by emailing **returns@wst.ca** . If the unit being returned is not covered under warranty, a minimum repair charge will apply. If damage is severe or the products have been tampered with, there may be additional charges.

POWER CONVERSION CHART - dBm to Watts

dBm	Watts	dBm	Watts	dBm	Watts
-12	0.06 mW	8	6 mW	28	630 mW
-11	0.08 mW	9	8 mW	29	800 mW
-10	0.10 mW	10	10 mW	30	1.0 W
-9	0.13 mW	11	13 mW	31	1.3 W
-8	0.16 mW	12	16 mW	32	1.6 W
-7	0.20 mW	13	20 mW	33	2.0 W
-6	0.25 mW	14	25 mW	34	2.5 W
-5	0.32 mW	15	32 mW	35	3.2 W
-4	0.40 mW	16	40 mW	36	4.0 W
-3	0.50 mW	17	50 mW	37	5.0 W
-2	0.63 mW	18	63 mW	38	6.3 W
-1	0.8 mW	19	79 mW	39	8.0 W
0	1.0 mW	20	100 mW	40	10 W
1	1.3 mW	21	126 mW	41	13 W
2	1.6 mW	22	158 mW	42	16 W
3	2.0 mW	23	200 mW	43	20 W
4	2.5 mW	24	250 mW	44	25 W
5	3.2 mW	25	316 mW	45	32 W
6	4 mW	26	398 mW	46	40 W
7	5 mW	27	500 mW	47	50 W

NOTES