



Anabat Walkabout Bat Detector

User Manual

Titley Scientific

Version 1.0



TITLEY[™]
S C I E N T I F I C

Notice for Customers in the U.S.A

Federal Communications Commission (FCC) Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION

Modifications

Changes or modifications not expressly approved by Titley Scientific could void the user's authority to operate the equipment.

Interface Cables

Use the interface cables sold or provided by Titley Scientific for your equipment. Using other interface cables may exceed the limits of Class B Part 15 of the FCC rules.

Notice for Customers in European Countries

Symbol for Separate Collection in European Countries

This symbol indicates that this product is to be collected separately.



The following apply only to users in European countries:

- This product is designated for separate collection at an appropriate collection point.
- Do not dispose of as household waste.

For more information, contact the retailer or the local authorities in charge of waste management.

Notice for Customers in Australia

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and failure does not amount to a major failure. Goods presented for repair may be replaced by refurbished goods of the same type rather than being repaired. Refurbished parts may be used to repair the goods. The repair of your goods will result in the loss of any user-generated data. Please ensure that you have made a copy of any data saved on your goods.

TITLEY SCIENTIFIC CONTACT DETAILS

Head Office (Australia)
Titley Scientific
A division of Elexon Electronics

Unit 6, 253 Leitchs Rd (GPO Box 5536),
Brendale QLD 4500, AUSTRALIA
P +61 7 3205 8450
www.titley-scientific.com
info@titley-scientific.com

UK Office

16/17 Arkwright Suite,
Coppull Enterprise Centre, Mill Lane,
Coppull, Lancashire PR75BW, ENGLAND
P +44 (0) 2920 022 099
uk@titley-scientific.com

USA Office

601 Business Loop, 70, Suite 105
Columbia, Missouri 65203, USA
P +1 (573) 442 8745
F +1 (573) 442 8715
usa@titley-scientific.com

AUTHORS AND ACKNOWLEDGMENTS

This manual was written by Julie Broken-Brow and Dean Thompson.

We greatly appreciate the time, comments and assistance given by those people who were 'beta testers' for the Anabat Walkabout and this manual. The testing and troubleshooting have improved the new detector and increased the clarity of the manual.

DOCUMENT HISTORY

Manual Version	Release Date	Firmware Version	Major Additions and Changes
1.0	26/1/2016	0.100	-

CONTENTS

INTRODUCTION	7
FEATURES OF THE ANABAT WALKABOUT.....	7
Hardware	8
SD Cards.....	9
USB Cable.....	9
Microphone & Directional Cone	9
Lanyard & Hand Strap.....	9
Power Requirements.....	10
Battery Safety.....	10
ANABAT WALKABOUT BASIC OPERATION	11
CHARGING.....	11
TURNING DEVICE ON & OFF	12
WALKABOUT APPLICATION.....	12
Home Screen	13
Swipe Menu	13
Main Menu	14
Returning To Walkabout Home Screen/Application.....	14
SETTINGS.....	15
SCROLL WHEEL AND QUICK MENU SETTINGS.....	15
CAPTURE SETTINGS.....	16
Trigger	16
Trigger Minimum Frequency	17
Trigger Maximum Frequency	17
ZC (Zero Crossing) Division Ratio.....	18
Zero Cross Sensitivity.....	18
Crest Factor Threshold.....	18
Manual Record Length.....	19
Maximum File Length.....	19
Record Wave File.....	20
Record Anabat File	20
AUDIO SETTINGS.....	20
Mode Live.....	21
Mode Playback.....	22
Heterodyne Frequency	22
Pitch Shift Maximum Frequency.....	22
Pitch Shift Minimum Frequency.....	23

Time Expansion Factor.....	23
FD Audio Division Ratio.....	23
Audio Feedback Reduction.....	23
SETTING TIME AND DATE.....	24
TURNING THE MICROPHONE ON & OFF.....	24
SAVING FILES.....	24
Manual Mode.....	25
Auto Mode.....	25
SLEEP & SCREEN OFF MODE.....	25
SECURITY.....	26
Screen Lock.....	26
Lockable Mode.....	26
DISPLAY.....	27
Full Spectrum, Zero Crossing & Oscillogram.....	27
Spectrogram Contrast, Colour Scheme & Brightness.....	27
Screen Brightness.....	28
Compressed & Truetime Modes.....	28
Time & Frequency Scales.....	29
Live Display.....	29
MEMOS & SPECIES LABELS.....	30
Memos.....	30
Species List.....	31
Species Labels.....	31
VIEWING SAVED FILES.....	32
WIFI.....	32
MAPPING.....	33
Turning GPS On/Off.....	33
Viewing a Map.....	34
Loading Tracks.....	35
Viewing Recordings on a Map.....	35
Caching Maps for Offline Use.....	36
Placing Memos on a Map.....	37
Map Settings.....	37
SOFTWARE.....	38
Updating Software.....	38
Checking Software Version & Serial Number.....	38
WEATHER CONSIDERATIONS.....	38
DOWNLOADING DATA.....	39
Using the SD Card.....	39

Using the USB Cable.....	39
VIEWING FILES AND UNDERSTANDING FILE NAMES	40
Full Spectrum Files	40
Zero Crossing Files.....	40
Memo Files.....	41
TIPS FOR ACTIVE MONITORING.....	42
POWER.....	42
DIRECTIONAL CONE OR OMNIDIRECTIONAL MICROPHONE.....	42
USING THE EXTERNAL MICROPHONE AND CAR MOUNT.....	43
TROUBLESHOOTING	44
FAQS.....	47
FURTHER INFORMATION.....	48

INTRODUCTION

All bats belonging to the traditionally recognized suborder Microchiroptera (micro-bats) use echolocation to avoid obstacles and locate prey in conjunction with their eyesight. Evolutionary history and differing ecological requirements mean echolocation calls tend to differ between species, so they are often useful for identification. Echolocation calls vary greatly depending on what a bat is doing, especially in response to how close the bat is to clutter. Bat detectors detect the echolocation calls emitted by bats and produce audible and/or visible images which reveal the presence of bats, their activity and useful features of their calls. This gives us the opportunity to observe, identify, and study bats without catching them.

The Anabat Walkabout is equipped with a broad-band microphone. The detector displays and saves the recordings in both full spectrum and zero crossings analysis (ZCA) to make them visible as sonograms (time vs frequency graphs). This manual contains the operating instructions for the Anabat Walkabout, including advice for successful recording of bat calls. Furthermore, this manual includes testing and troubleshooting procedures.

FEATURES OF THE ANABAT WALKABOUT

The Anabat Walkabout is designed for active bat detection with many advanced features to aid in bat surveying. It is an all-in-one detector with a built in omnidirectional microphone, detachable directional cone and colour touchscreen display. The Anabat Walkabout utilises the Android operating system. Some of the key features of the Anabat Walkabout include:

- 5" colour touchscreen display
- Time expansion, heterodyne, pitch shifting or frequency division audio output
- Omnidirectional Knowles FG microphone with directional cone attachment
- Built-in GPS and mapping system with offline map caching

- WiFi enabled
- Comfortable hand strap and lanyard
- 16 bit resolution, 500ksps sample rate



Hardware

Your Anabat Walkabout comes supplied with the following items, please check they are all present in the package.

- 16GB Class 10 SD Card
- Directional Cone Attachment
- USB Cable
- Wrist Strap Lanyard
- Headphones
- Hand strap
- USB Wall Charger with International Plug Set (AU, UK, US, EU)
- Screen Cleaning Cloth

SD Cards

The Anabat Walkabout comes with a SD card for data storage. The detector can use SDXC and SDHC memory cards. Memory cards can be purchased from Titley Scientific, or most electronics/office stores. For optimum performance, make sure to use cards that are at least Class 10 speed rated or UHS rated. Slower cards will result in longer file saving times.

You will see this symbol on Class 10 cards: 

USB Cable

The Anabat Walkabout comes with a USB cable for connection to your computer. You can use this cable to charge your detector (through your computer or USB wall charger) and download data. Be sure to use the cable supplied with the Walkabout. Other USB cables may cause longer charge times or poor connectivity.

Microphone & Directional Cone

The Anabat Walkabout features a built-in, omnidirectional Knowles FG microphone. This detector is also supplied with a click-on directional cone that adds directivity. This helps to reduce the amount of background noise detected, such as insects, and makes pinpointing sounds easier. The cone can simply be removed to switch back to omnidirectional recording. Features of the microphone include:

- Sensitive from 5 kHz to 200 kHz
- Extension cables and adaptors for external microphones are available for purchase from Titley Scientific. We can provide custom cables for your application.

Lanyard & Hand Strap

The Anabat Walkabout comes with an elastic hand strap and a lanyard for ease of use. The lanyard can be attached through the lanyard loop on the bottom left of the detector. The hand strap can be removed by unscrewing the four Pozidrive PZ1 screws on the brackets using a screwdriver.

Power Requirements

The Anabat Walkabout is powered by an internal rechargeable lithium battery. **Please charge your Anabat Walkabout fully before first use, this will calibrate the battery gauge.** Battery life will depend on many factors, including screen brightness, ambient temperature, whether the GPS & WiFi are being used, and amount of bat activity/ambient noise.

Battery Safety

This product contains a rechargeable lithium battery. Please pay particular attention to the important information regarding the use of lithium batteries below. Failure to do so may result in fire and/or explosion of the battery.


- Do not dismantle, open, puncture, or shred batteries.
- Do not expose batteries to heat or fire. Avoid placing the equipment in direct sunlight.
- Do not leave charging batteries unattended.
- Do not attempt to charge a battery when its temperature is above 45°C or below 0°C
- When charging, ensure there is good airflow. Avoid covering the battery, equipment, and charger with items such as blankets or clothes.
- Do not use any charger other than specifically provided for use with the equipment.
- Do not use any battery which is not designed for use with the equipment.
- Do not leave a battery on prolonged charge. Disconnect the equipment from the charger as soon as possible when the battery has finished charging.
- Do not subject batteries to mechanical shock.
- Do not short-circuit a battery.
- In the event of a battery leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.
- Seek medical advice immediately if a battery or part thereof has been swallowed.
- Keep the equipment and batteries clean and dry.

- Retain the original product literature for future reference.
- After extended periods of storage, it may be necessary to charge and discharge the batteries several times to obtain maximum performance.
- Dispose of used batteries and equipment properly. Follow the regulations applicable to your area.

ANABAT WALKABOUT BASIC OPERATION


Before you use your detector, it is important to fully charge the battery. Once fully charged, insert a SD card into the SD card slot on the side of the detector. Please note that you should regularly check for online updates and install them to ensure your detector is working optimally.

CHARGING

To charge, simply connect the detector to a wall charger or USB port via the USB cable. The **Power Button** will light orange when the detector is charging; this light will turn off when charging is complete. The orange charge light may flash if there is insufficient charging current or the unit is too hot. A **battery gauge** and percentage  is shown at the top right of the screen while the detector is turned on. You can also check the charge progress while the detector is off by briefly pressing the power button (<2 seconds). The detector will charge more quickly while it is turned off.

For optimum charging the provided USB cable and wall charger should be used. Charging will be slower using a PC USB port compared to the provided charger. Charging behaviour with other chargers/cables cannot be guaranteed. **Please charge your Anabat Walkabout fully before first use, this will calibrate the battery gauge.** Please familiarise yourself with the **Battery Safety** information above before charging your Walkabout.

TURNING DEVICE ON & OFF

Turn your detector on by pressing the **Power Button** at the top of the detector for 2 seconds. The  logo will appear while the detector starts up, this process takes several seconds. Once complete, you will be presented with the user interface on the touch screen.

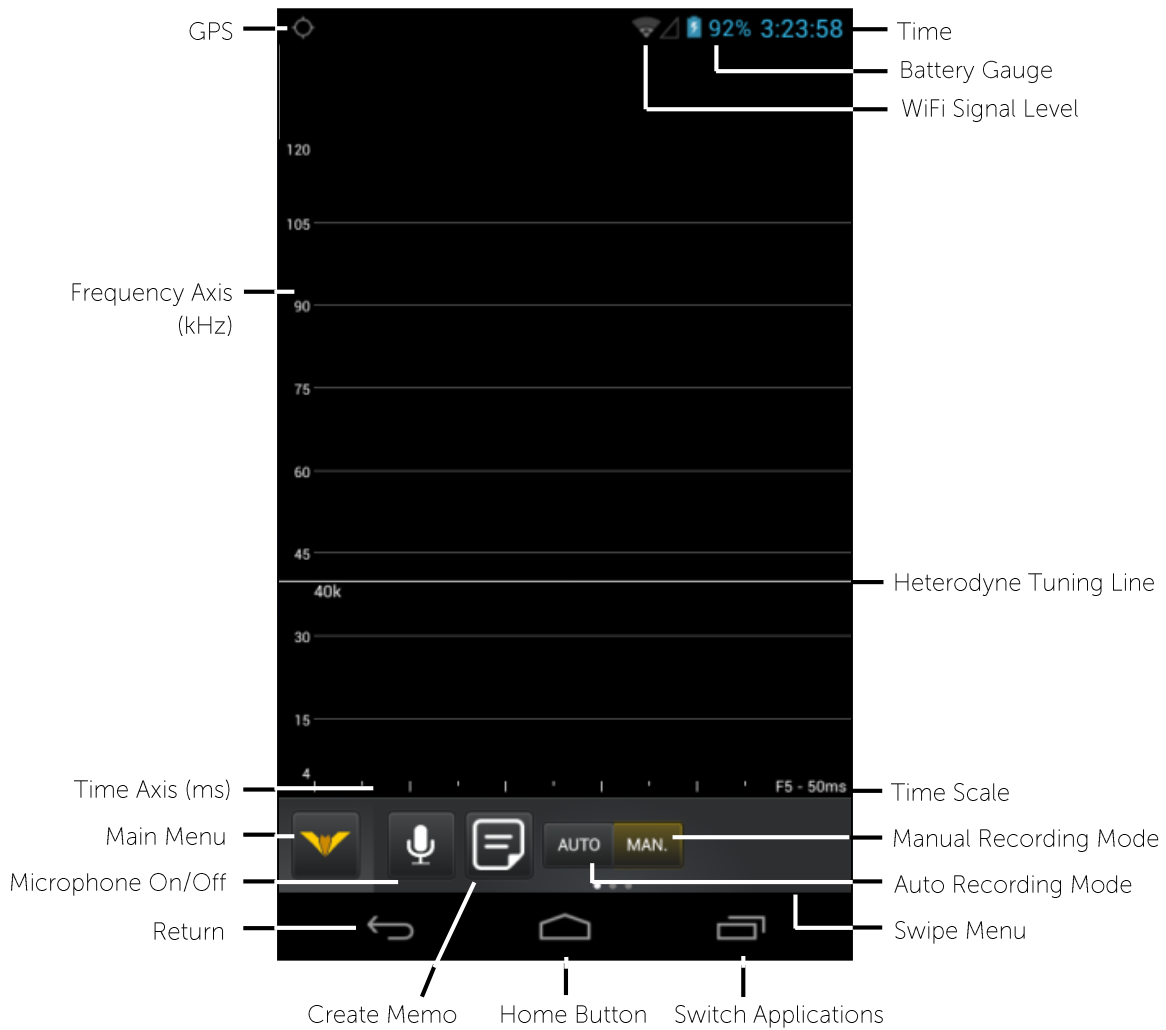
To turn the detector off, hold the power button for about 2 seconds. A menu will appear, press **Power off** on the touchscreen, and then press **Ok**. The detector will shut down. If the power button is pressed for less than 2 seconds, the detector will enter sleep mode. See below for more information on this function.

In the event that the detector becomes unresponsive, you can manually shut down by holding down the power button for longer than 8 seconds.

WALKABOUT APPLICATION

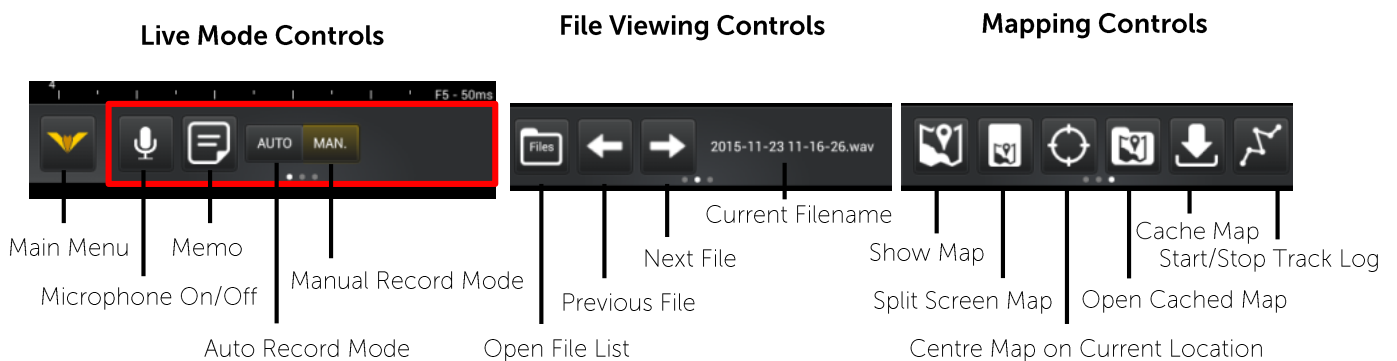
Upon startup, the Walkabout will automatically load the bat detector user interface. Other Android applications can be run on the detector, however this manual will not discuss the operation of other applications.

Home Screen



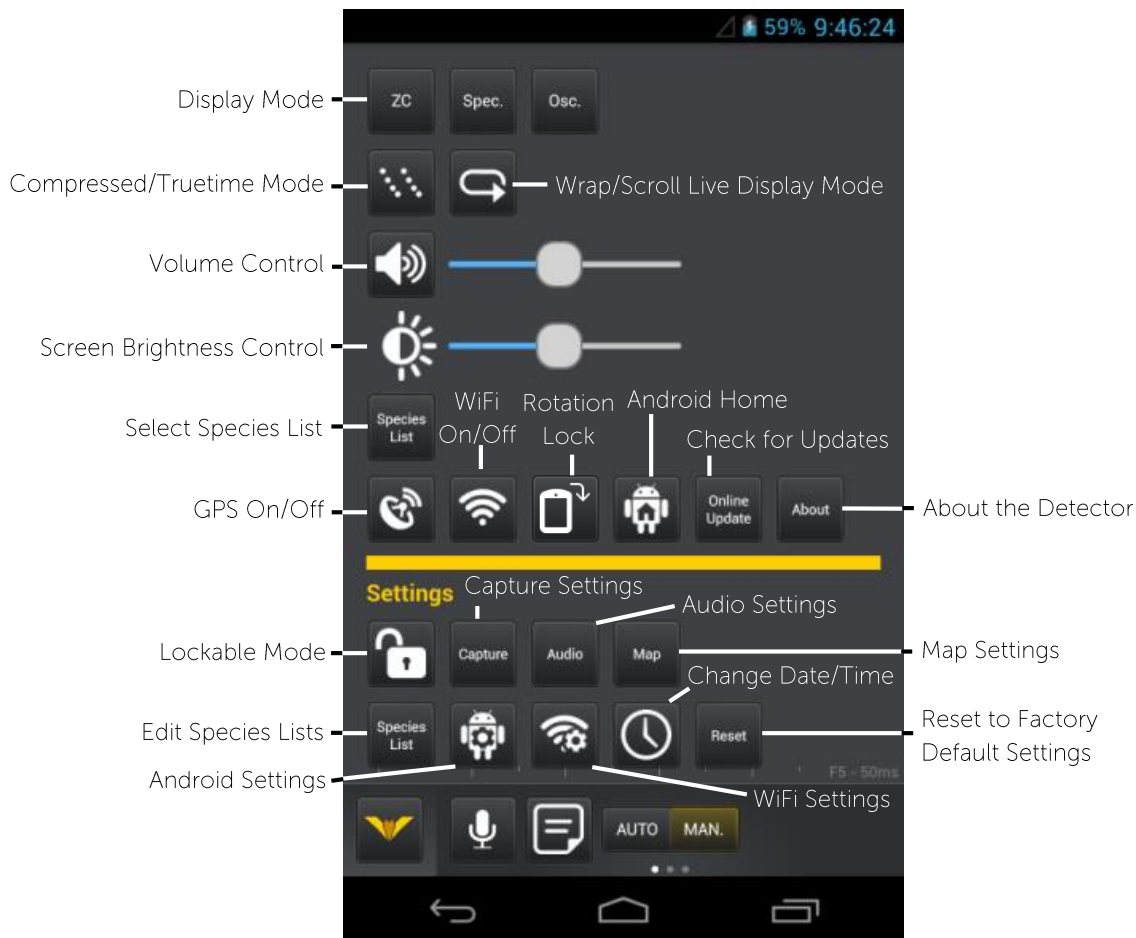
Swipe Menu

To use the Swipe Menu, swipe your finger across anywhere on the grey bar of buttons (highlighted in red below). The default Swipe Menu buttons are the **Live Mode Controls**. One left swipe will display the **File Viewing Controls**, another swipe will display the **Mapping Controls**. To return to a previous Swipe Menu, swipe the grey bar back to the right.






Main Menu

To enter the Main Menu, press the  button on the **Home Screen**.




Returning To Walkabout Home Screen/Application

To return to the Home Screen from the Main Menu, you can either press the  button or press anywhere in the blank space. When you are changing the detector settings and you wish to return to the Home Screen, press the **Close Button** at the bottom of the page. If you are in the Android Settings menu and wish to return to the Walkabout Home Screen, press the **Return Arrow**  at the base of the screen until you reach the Home Screen.

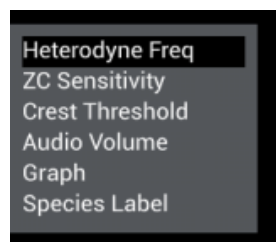
If you are using other applications on the device (eg. Web browser) press the **Home Button**  at the base of the screen and it will return to the Walkabout application.

SETTINGS

Your display, audio and capture settings are remembered even when the detector is turned off and when the battery is flat. To reset to factory default settings, press  then press the **Reset** button in the **Settings Menu**. **Map Settings** will be discussed in the **Mapping section** of this manual.

SCROLL WHEEL AND QUICK MENU SETTINGS


Using the **Scroll Wheel**, you can quickly change the heterodyne frequency, trigger sensitivity, audio volume, display mode (zero crossing or full spectrum), or add a species label, all singlehandedly and without having to use the touch screen. The setting controlled by the Scroll Wheel is selected using the **Quick Menu Button** directly below the Scroll Wheel. Press this button and a menu will appear on the left of the display (see below).



To use the Quick Menu, roll the scroll wheel to the setting you would like to change and gently press the scroll wheel in. You will notice it clicks and the menu disappears. You will now be able to change that setting simply by scrolling the wheel up or down. As you scroll the wheel, you will see your selected setting appear on the left of the screen. This is the simplest way to change your audio volume, trigger sensitivity, or heterodyne frequency on the go. It can also be useful for quick labelling of species.

When using the Quick Menu to change your graph or add a species label to a file, you will need to press in the scroll wheel to confirm your selection.

CAPTURE SETTINGS

The capture settings menu allows you to customise your trigger and recording settings. To access the Capture Settings, press  then press the **Capture button**.

Trigger

This allows you to select between a zero crossing trigger or crest factor trigger. The trigger is used for both **Auto Recording** and for **Compressed Mode** display. Typically the Crest Factor Trigger will provide the best results (less false triggering on noise).

The easiest method to set the trigger (either Crest Factor or Zero Crossing) to an appropriate level is to:

1. Set the display to Compressed Mode.
2. Start with the Crest Threshold/Zero Crossing Sensitivity set to maximum and gradually lower the sensitivity until it is no longer triggering on background noise.
3. Once correctly set, you will notice that the graphing display then only updates when there is a loud noise and isn't constantly scrolling due to background noise.

This is also a good way to adjust the min/max trigger frequencies to account for insects or other persistent noises outside the frequency band of interest that can cause false triggers.

Crest Factor Trigger: The Crest Factor Trigger works by only triggering when the difference between the background noise level and the level of the loudest frequency exceeds the set level. In practice this means that the trigger will only respond to loud, narrowband sounds that are above the background noise. Adjust the Crest Factor Threshold to set the sensitivity of this trigger.

Zero Crossing Trigger: The Zero Crossing trigger occurs every time the incoming signal crosses a preset amplitude level (set by the Zero Crossing Sensitivity). This level is adjusted so that quiet sounds (background noise) don't cause a trigger event, but loud sounds like bat calls do.

The Zero Crossing Sensitivity is also used for other functions; saving ZC files, Frequency Division Audio, and ZC Graph display. Please refer to the section on Zero Crossing Sensitivity below for more information.

Trigger Minimum Frequency

This is the minimum frequency that can create a triggering event. Any sound below this will not trigger a recording (manual recordings can still be made). Once a trigger event has occurred (above the selected frequency), the detector will still record and display sounds below this frequency. The trigger minimum frequency also affects the data shown in compressed display mode, i.e. an incoming sound must meet all trigger requirements to be displayed on screen in compressed mode.

To change the trigger minimum frequency, press in the number window and a numeric keypad will appear. You can type in your desired frequency (kHz), alternatively you can press the up/down arrows to change the frequency in increments of 1kHz. Press **Done** when finished.

Trigger Maximum Frequency

This is the maximum frequency that can create a triggering event. Any sound above this will not trigger a recording (manual recordings can still be made). Once a trigger event has occurred (below the selected frequency), the detector will still record and display sounds above this frequency. The trigger maximum frequency also affects the data shown in compressed display mode, i.e. an incoming sound must meet all trigger requirements to be displayed on screen in compressed mode.

To change the trigger maximum frequency, press in the number window and a numeric keypad will appear. You can type in your desired frequency (kHz), alternatively you can press the up/down arrows to change the frequency in increments of 1kHz. Press **Done** when finished.

ZC (Zero Crossing) Division Ratio

The ZC division ratio affects the amount of data which is displayed and saved in Zero Crossing mode, the lower the division ratio, the greater the number of data points in the resulting sonogram (better resolution). To change the ZC division ratio, press on the ZC division ratio row and four division ratio options will appear (4, 8, 16 and 32), press on your preferred division ratio. Typically, a division ratio of 8 is appropriate for most situations.

Zero Cross Sensitivity

A higher number represents a more sensitive trigger (more likely to be triggered), and smaller numbers represent a less sensitive trigger (less likely to be triggered).

If you are using any zero crossings features (i.e. saving ZC files, using ZC graph display, listening to frequency division audio, or using a zero crossing trigger) you will need to adjust this setting appropriately for your situation.

This sensitivity should be increased right up to the point where you start to get the occasional dot drawn on the Zero Crossing graph by background noise or hear the odd sound in the Frequency Division Audio. Typically a ZC sensitivity of around 16-18 is appropriate, depending on background noise. Be careful not to reduce the sensitivity so much that it will be impossible to detect bat calls & no useful data will be saved in the Anabat (ZC) files.

The sensitivity level can be changed in the capture settings menu, or using the **Quick Menu** and **Scroll Wheel**. To change the sensitivity level press in the number window and a numeric keypad will appear. You can type in your desired sensitivity; alternatively you can press the up/down arrows to change the sensitivity. Press **Done** when finished.

Crest Factor Threshold

The crest factor threshold is only relevant if you have selected the crest factor trigger. A higher number represents a more sensitive trigger (more likely to be triggered), and smaller numbers represent a less sensitive trigger (less likely to be triggered). This threshold level

affects the Auto recording mode and also the compressed live viewing mode. Typically a threshold of around 8-10 is appropriate, depending on the situation.

The threshold can be changed in the capture settings menu, or using the **Quick Menu** and **Scroll Wheel**. To change the threshold level press in the number window and a numeric keypad will appear. You can type in your desired threshold, alternatively you can press the up/down arrows to change the threshold. Press **Done** when finished.

Manual Record Length

When the manual recording button (above the scroll wheel) is pressed, a recording is made from the previous 10 seconds of data. For example, once a bat has flown past, you can press the manual record button if you want to save the recording to a file. The Manual Record Length represents the length (in seconds) of a manual recording and can be increased up to 20 seconds.

To change the recording length press in the number window and a numeric keypad will appear. You can type in your desired recording length, alternatively you can press the up/down arrows to change the length. Press **Done** when finished.

Maximum File Length

The Maximum File Length setting represents the maximum length of any auto recording and can be increased up to 20 seconds. When an auto recording is made, the detector will record files up to a specified number of seconds in length before starting a new file. To change the maximum recording length for automatically recorded files press in the number window and a numeric keypad will appear. You can type in your desired recording length, alternatively you can press the up/down arrows to change the length. Press **Done** when finished.

Record Wave File


The Anabat Walkabout allows you to save full spectrum files in a Wave file (.wav). To record in this format, press in the checkbox. If you do not wish to record .wav files, uncheck the box. You can also select Anabat files to record in both formats at the same time.

Record Anabat File

The Anabat Walkabout allows you to save Anabat files in a zero crossing file (.zc). To record in this format, press in the checkbox. If you do not wish to record .zc files, uncheck the box. You can also select Wave files to record in both formats at the same time.

Please note: If you are recording Anabat files, it is essential that the Zero Crossing Sensitivity be set correctly, no matter which trigger mode is selected.

AUDIO SETTINGS

The audio settings menu allows you to customise your live and playback audio. To access the Audio Settings, press  then press the **Audio button**. The Anabat Walkabout offers a range of audio options for listening to bats. They all provide different ways of allowing the ultrasonic sound to be translated to suit the frequency range of human hearing.

Pitch Shifting: This mode compresses the ultrasonic spectrum down into an audible band by shifting the pitch of the sound. Harmonic components and amplitude of the bat calls are kept in this process. This is the recommended audio mode for listening to bats over the full frequency spectrum as constant adjustments are not required for tuning or sensitivity.

Heterodyne: This mode shifts down a portion of the ultrasonic band into the human hearing range by mixing the signal with an internal reference frequency. This reference frequency is adjusted by the user to suit the frequency of bat calls of interest. The bandwidth of the heterodyne mixing is about 5 kHz, so bats calling at a significantly different frequency to the reference frequency will not be heard.

In practice, using the heterodyne mode requires frequent changes to the reference frequency by scanning it up and down. This is best done by configuring the **Scroll Wheel** to control this setting via the **Quick Menu**. Normally users start with the setting at around 45 kHz. If a bat is seen or heard, the frequency is “tuned-in” to achieve the best sound. Using the real-time display allows all frequencies to be seen at once, making it obvious what the frequency should be set to.

Comb Filter: This mode can be thought of as multiple heterodyne detectors operating simultaneously, all tuned to different frequencies to cover more of the ultrasonic range without the need for constant re-tuning.

Frequency Division: This audio mode divides down frequency of the incoming ultrasonic signal by a preset ratio (typically 16) so as to allow ultrasonic sounds to be heard by the human ear. Please note that this mode is based on zero-crossing detector and thus only the loudest frequency component will be heard. No harmonics can be heard and the amplitude of bat calls is not retained, so all sounds will be of the same volume level.

Please note: When using frequency division audio, the zero crossing sensitivity must be correctly adjusted.

Time Expansion: This mode works by playing back a recorded sound at a slower than normal speed (typically 1/10th). This has the effect of lowering the frequency of the sound so that it can be heard by humans. All amplitude and frequency components are retained. Time expansion cannot be used as a live audio mode as it is not real-time; it only works on sounds that have been recorded because the playback takes 10 times longer than the actual duration of the sound.

Mode Live

This allows you to choose an audio output whilst the microphone is switched on. Choices include pitch shifting, heterodyne, comb filter, frequency division and no audio. To change

the live audio mode, press on the **Mode - Live** row and audio options will appear in a pop-up window, select your preferred audio mode.

Mode Playback

This allows you to choose the audio output for when you play back recordings. Choices include pitch shifting, heterodyne, comb filter, frequency division, time expansion, and no audio. To change the playback audio mode, press on the **Mode - Playback** row and audio options will appear in a pop-up window, select your preferred audio mode.

Heterodyne Frequency

This controls the frequency that the heterodyne audio mode is tuned to. This setting is only applicable if you have heterodyne selected as either your playback or live audio mode.

Typically this is adjusted on the fly using the **Quick Menu** and **Scroll Wheel**. However, you can also change the frequency in the audio settings menu. Press in the number window and a numeric keypad will appear. You can type in your desired frequency (kHz), alternatively you can press the up/down arrows to change the frequency in increments of 1 kHz. Press **Done** when finished.

Pitch Shift Maximum Frequency

This setting is used to set the range of frequencies that get pitch-shifted down to an audible range. It is only applicable if you have pitch shifting selected as either your playback or live audio mode. You can change between 120 kHz and 250 kHz by pressing on the Pitch Shift Max Frequency row and frequency options will appear in a pop-up window, press on your preferred frequency. 120 kHz mode divides down the incoming frequencies by 30. Therefore, a bat calling at 30 kHz will be heard through the speaker as 1 kHz. 250 kHz mode is a division of 60. Normally 120 kHz is suitable for the best sound reproduction of most bats. However if you are expecting to find bats above 120 kHz then change this setting to 250 kHz.

Pitch Shift Minimum Frequency

This setting is only applicable if you have pitch shifting selected as either your playback or live audio mode. This setting allows you to set a low frequency cutoff for the audio. This can be useful in situations where there is a large amount of low frequency noise (e.g. water or insects). No sounds below the set frequency will be heard through the speaker/headphones. The minimum setting is 5 kHz; you can type in your desired frequency (kHz), alternatively you can press the up/down arrows to change the frequency in increments of 1kHz. Press **Done** when finished.

Time Expansion Factor

This setting sets the playback speed of the time expansion audio. A factor of 10 will play back the recording at one tenth of actual speed. It is only applicable if you have time expansion selected as your playback audio mode. You can change the expansion factor by pressing in the number window and a numeric keypad will appear. Press **Done** when finished. Typically a time expansion factor of 10 is appropriate.

FD Audio Division Ratio

This setting changes the amount the incoming signal is divided by to reproduce an audible sound. For example, frequency division ratio of 16 will cause a bat calling at 40 kHz to be heard at 2.5 kHz. This setting is only applicable if you have frequency division selected as either your playback or live audio mode. You can change the audio division ratio by pressing on the FD Audio Div Ratio row and division ratio options will appear in a pop-up window (4, 8, 16 and 32), select your preferred division ratio for frequency division audio. Typically a FD Audio Division Ratio of 16 is appropriate.

Audio Feedback Reduction

This setting is used to enable or disable feedback reduction in the audio output. Enabling this feature reduces the amount of feedback from the internal speaker back into the



microphone. We recommend this setting is switched on when using the built in speaker. You can switch this off when using headphones for a higher definition sound.

SETTING TIME AND DATE

To change the date and time settings press  then press . Time/date can be set automatically when you connect to a WiFi network if you chose the **automatic date and time** setting, by pressing the checkbox. If you wish to manually set the date/time, press the checkbox to deselect Automatic date & time, then manually set the date and time.

Be sure to also set your current time zone to ensure the time displayed is correct. Press **Select time zone** to choose the correct time zone.

TURNING THE MICROPHONE ON & OFF

Press the  button (located in the Swipe Menu at the bottom of the Home Screen) to turn the microphone on and off. When the microphone is on a live display of ultrasonic sound will appear and the  icon will illuminate yellow.

SAVING FILES

To save files, you can choose either **Manual** or **Auto** mode at the bottom of the display in the **Swipe Menu**. Press your selection and it will be highlighted in yellow. In either mode, when a file is saved, the last filename will be shown at the bottom right of the screen. A red recording circle will appear briefly near the top right corner of the display while the file is being written to the SD card. You can save files in full spectrum (.wav) and/or zero crossing (.zc) formats. To choose which format you would like to use, select it in **Capture Settings**.

Please note: You can choose your recording format (full spectrum/zero crossing) independent of your display choice.

Manual Mode

At any time while the microphone is on, you can press the **Record Button** directly above the scroll wheel on the side of the detector and a recording will be saved. To indicate a file has been saved, the detector will beep. When pressed, the previous 10 seconds of data will be saved to the SD card. For example, once a bat has flown past, you can press the record button if you want to save the recording to a file. You can adjust this save time up to a maximum of 20 seconds in **Capture Settings**.

Auto Mode

Auto mode will automatically record to the SD card based on your selected trigger settings. Auto mode trigger settings are based on either ZC sensitivity or Crest Factor Threshold. Select which trigger mode you prefer in **Capture Settings**. You can then change the **Crest Factor Threshold** or **Zero Crossing Sensitivity** (depending on what trigger mode you selected) in the Capture Settings menu, or with the **Quick Menu** and **Scroll Wheel**. See the **Quick Menu section** of this manual for more information. In Auto mode you can also use the **Record** button to manually trigger save a file of the previous 10 seconds. You can adjust this manual save time in Capture Settings.

SLEEP & SCREEN OFF MODE



To enter **Sleep Mode**, the microphone must be off. Once the microphone has been turned off, briefly press (< 2 seconds) the **Power Button** and the screen will turn off. This will allow you to save power during breaks between recording sessions. Some power is still used from the battery in this mode so be sure to fully power off the detector after use to avoid discharging the battery.

If you wish to keep recording (either manual or auto save), you can enter **Screen Off** mode where the screen is off but the detector is still running. To enter Screen Off mode, the microphone must be switched on, then briefly press the Power Button and the screen will turn off. The Screen Off mode is designed to help protect your night vision or avoid distractions from the display.



To wake the detector from Sleep or Screen Off modes, briefly press (< 2 seconds) the Power button again.

SECURITY

Screen Lock

If you wish, you can enable a screen lock which will appear at startup. To enable the screen lock, press  then press the **Android Settings** . Scroll down to select **Security**, select **Screen Lock**, then select your preferred lock. To disable the screen lock, select **None**.

Lockable Mode

If you wish to lock the detector settings to prevent accidental changes, press  then press , which will illuminate yellow when locked. This will lock the following settings:


- Sensitivity setting on the scroll wheel
- Selected trigger mode
- Maximum and minimum frequency of the trigger
- Zero crossing division ratio
- Crest factor threshold
- Manual record length
- Maximum file length

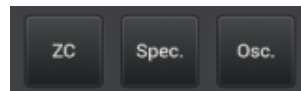
- File type recorded (full spectrum and/or zero crossing)

The user will still be able to change all other settings. To turn off the lock, press .

DISPLAY

Full Spectrum, Zero Crossing & Oscillogram

You can select Full Spectrum and/or Zero Crossing display, and turn the Oscillogram on or off. To select the live display mode, press **Main Menu** (). At the top of the menu, simply check the display mode/s you prefer.

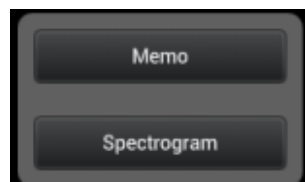


A small tick will appear on your selected display mode and the unselected modes will be greyed out. You can view all three displays simultaneously. You can also switch quickly between modes using the **Quick Menu** and **Scroll Wheel**.

Please note: You can choose your display mode independent of your recording format.

Spectrogram Contrast, Colour Scheme & Brightness


You can change the contrast, colour scheme, and brightness in **Spectrogram Settings**. To access these settings, hold your finger anywhere on the spectrogram display for 2 seconds. A **Pop-up Menu** will appear:



Select **Spectrogram** and a menu will appear. Use the drop-down box to change the colour scheme and the drag sliders to change the contrast and brightness. Press **Done** when finished. Normally the brightness and contrast are adjusted so that the background noise is



just faintly visible and the bat calls look clear. The default settings should be suitable in most cases. Very faint calls will need high brightness & contrast settings. If you can hear/see bats but their calls aren't visible on the spectrogram, you may need to adjust these settings.

Screen Brightness



To change the screen brightness, press  then drag the **Brightness Slider**  to increase or decrease the screen brightness.

Compressed & Truetime Modes

You can choose between either truetime or compressed mode. **Truetime** will constantly display all incoming ultrasonic signals. **Compressed** mode will only display signals that pass the trigger settings (which effectively means it takes away the "space" from between pulses). Compressed mode can make it easier to identify bats because the echolocation sequence can be viewed more readily and will remain on the screen longer than in truetime mode. Make sure your trigger mode, trigger settings, and sensitivity are properly set when using Compressed mode. The detector will display in truetime mode by default.

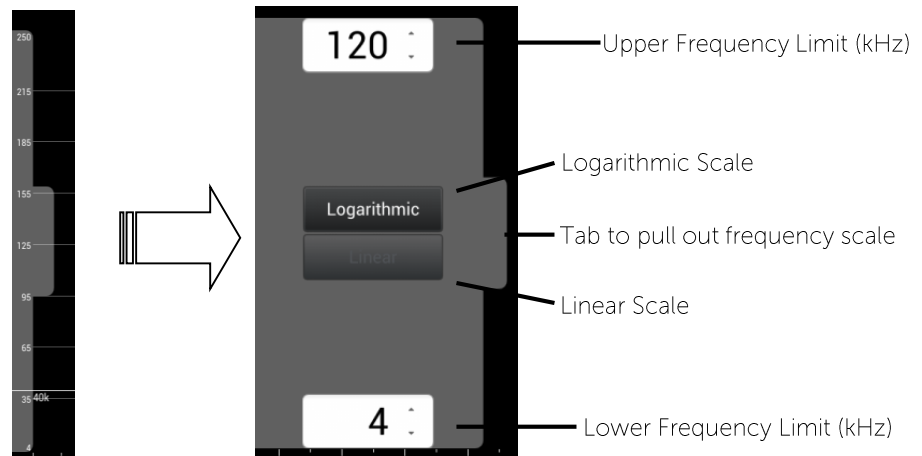
To select compressed mode press , then press  and it will illuminate yellow. When the button is white, the detector is displaying in truetime mode.

Wrap & Scroll Live Display Modes

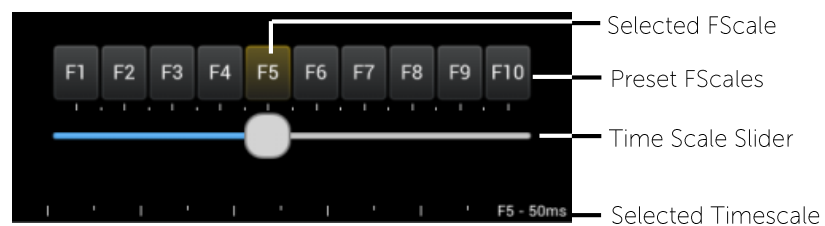
The default live display mode is **Wrap** which allows the live display to fill from left to right, then repeat; overwriting the screen from left to right again. **Scroll** live display mode will display the signal continuously scrolling across the screen from right to left. To change to Scroll mode, press  then press . When Scroll mode is selected, the button will illuminate white, when Wrap mode is selected, the button will illuminate yellow.

Time & Frequency Scales

You can change the **frequency scale** by tapping anywhere on the frequency scale, a tab will appear, drag this tab to the right across the screen. Adjust your upper and lower frequency limits by tapping on the value and typing your preferred frequencies or tapping the up/down buttons. Choose between a **linear** or **logarithmic scale**.




You can change the **time scale** by “pinching and zooming” anywhere on the display, causing the menu below to appear. Select from the pre-set timescales (these correspond to the commonly used F Scales in Analook) or drag the slider for a customised time scale. The selected timescale is displayed at the bottom right of the time axis at all times.



Live Display

When the live display is running, you can **pause** the display by tapping once on the display. You can **scroll** 30 seconds back through the live display buffer. To do this, swipe on the display using your finger, dragging the image towards the right side of the screen. The live display will automatically pause when you scroll back. While the display is paused, the detector is still running and will continue to record and play live sound. You can still save

files using auto or manual mode whilst viewing the buffer. **Return** to the live display by pressing  on the right of the display.

To **play back**, tap on the oscillogram display where you want the playback to start from. To stop the play back, tap the oscillogram again. You must have the oscillogram selected to play back recordings. The playback mode (Time Expansion, Heterodyne, etc) can be adjusted in the **Audio Settings** in the **Main Menu**.


MEMOS & SPECIES LABELS

Memos

You can create a memo recording by pressing  button. The memo will be saved with the time you pressed the memo button.

Alternatively, if you would like to place a memo at a specific point in time (e.g. exactly on a bat call pulse) you can press and hold on the display at the point of interest for 2 seconds, then press **Memo**.




You can record a **voice memo** by pressing the **Record button**  and then speaking into the **Voice Microphone**. Stop the recording by pressing the same button. To listen to the


memo before saving, press the **play button** . Please be aware that if your detector is set at a low playback volume, you may not be able to hear the memo playback.

To write a **text memo**, tap in the blank space and a touchscreen keyboard will appear. When finished typing, press the **V** arrow at the bottom of the screen to hide the keyboard. Metadata can be optionally saved with memos, including temperature and humidity, current location, and light level measurement. To do this, press the buttons corresponding to the measurements you would like added to the memo.

Press **Save** once you have completed the memo.

Species List

You can create multiple species lists to put species labels on your files. To create a new list, press  then select the **Edit Species List button** *in the Settings Menu at the bottom of the Main Menu*. Select **Create New List**, then type in the title for the list (eg. "Region A"), then press **Done**. You can create as many lists as you like, these are saved in the internal memory on the detector. To add species to a list, select the list (eg. "Region A") by tapping on the name, then press **Add Species**. You can use whichever species names, abbreviations and codenames you like. To finish, press **Close**, then **Close** again.

To select which Species List you want to use, press  then select **Species List button** *from the Main Menu* (just below screen brightness). All of your species lists will be shown, select your preferred list.

Species Labels




To add a species label to a recording, select **Species Label** in the **Quick Menu**. Pressing in the **Scroll Wheel** will open the species labels in the currently selected list, scroll to the desired label and press the wheel again.

If a file has been opened and is currently being displayed, the species label will be added to that file. If microphone data is currently being displayed, the software will find all files that

contain the data displayed on the screen and add the species label in those files (i.e. if .wav and .zc files were recorded at that time, both files will have the species label added).

Species labels are stored in a file's metadata. Multiple species labels can be added to a file.







VIEWING SAVED FILES



To view a saved file, use the **Swipe Menu** to display the **File Viewing Controls**. Press the **Files** button  to show the file list and select the file you wish to view. It may take a few moments to load, depending on the length of the recording. You can use the  buttons to jump between files. The file names are displayed at the bottom right of the screen. To go back to live mode, swipe back to the **Live Mode Controls** on the bottom menu and press the  button.

To play back, tap on the oscillogram display where you want the playback to start from. To stop the play back, tap the oscillogram again. You must have the oscillogram selected to play back recordings. The playback mode (Time Expansion, Heterodyne, etc) can be adjusted in the Audio settings.

Please note: When loading files from the SD card you cannot record or save new files.





WIFI


To turn on the WiFi, press  then press  which will illuminate yellow. The detector will automatically connect to saved networks. If there are no saved WiFi networks a menu will appear with a list of WiFi networks available. Follow the prompts to join a WiFi network, press  twice to exit. When the detector is connected to a WiFi network,  will appear in the top bar. To turn the WiFi off, press the  then press  so it is no longer illuminated in yellow.

If you need to re-enter a WiFi password, or connect to a different network, you can do this through **WiFi Settings**. To enter WiFi Settings, press  then press . The available networks will then be shown and you can select your preferred network and enter a password.


MAPPING

Turning GPS On/Off


To turn on the GPS receiver, press  then press . This button will illuminate yellow when the receiver is turned on. To turn the GPS off, press . The GPS symbol  at the top left of the screen will indicate the status of your GPS. A solid dot inside the symbol indicates a successful GPS satellite lock, a satellite lock is required for GPS related features to work. A flashing dot indicates the GPS signal is insufficient and the lock has been lost. No dot indicates the GPS is switched on and it is attempting to find satellites, but sufficient satellites have not yet been found. Be sure to have the GPS turned on if you want the location data of each of your bat recordings to be saved into the metadata of the WAV/ZC files.

Please note: If the GPS symbol is flashing or has no solid dot, the GPS co-ordinates will not be saved into recordings and the track cannot be logged. The GPS symbol must look like this  for the GPS to be working.

Track Logging

To track your movements, you can turn on Track Logging. These movements will be saved as a track file on the SD card and displayed on your map. To turn on the track log, use the **Swipe Menu** to display the **Mapping Controls**, then press  so it is illuminated yellow. To turn track logging off, press the track log button again so it is illuminated in white. Each





time you turn the track logging on and off, a new track log file is created. The track logs are saved as GPX or KML files (adjustable in the **Mapping Settings**) and can be viewed in Google Earth or other GIS software.

Please note: If the GPS symbol is flashing or has no solid dot, the GPS co-ordinates will not be saved into recordings and the track cannot be logged. The GPS symbol must look like this  for the GPS to be working.

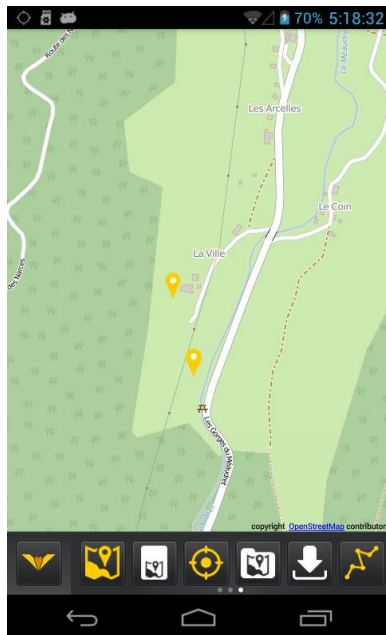
Viewing a Map

The Anabat Walkabout can display maps from Open Street Maps, MapQuest Aerial, or USGS Topographic (USA only). These maps are automatically downloaded over WiFi as required, or you can download maps and save them to the detector for use later on (cache). You can also use your own track and waypoint files in KML and GPX formats. You can generate these files with Google Earth or GIS software.

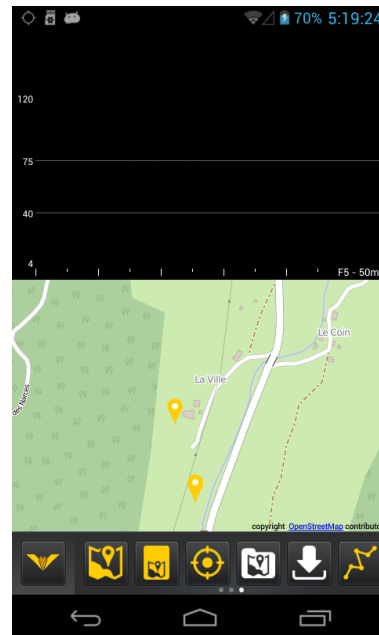
If you wish to view maps which have not been cached (saved beforehand), then you must be connected to the internet via WiFi. You may choose to tether your mobile phone as a WiFi hotspot to your Anabat Walkabout for downloading maps while in the field.


To view a map, use the **Swipe Menu** to access the **Mapping Controls**, then press the  button. This will bring up the full screen map. To view the map in a split screen with the live call display, press the  button. See below for examples of the full and split screen maps. To move the map, simply drag your finger across the touchscreen, "pinch and zoom" with your fingers to increase or decrease zoom levels (ensure map centring is not selected ). You can still record files (in either Auto or Manual mode) with a full screen map running. To exit the map, press .

Full Screen Map





Split Screen Map



If the GPS is turned on and has a satellite lock (see **Turning GPS On/Off section**) then an arrow will be shown at your current location on the map. The arrow will point in the direction you are facing according to the built-in compass. To centre the map on your current location, press .


Loading Tracks


Tracks and waypoints can be displayed on the map by loading a KML or GPX file. Press the  button and a list of suitable files found on the SD card will be shown. Select the desired file from the list. Tracks loaded from a file are shown in green. Waypoints in files are shown as .

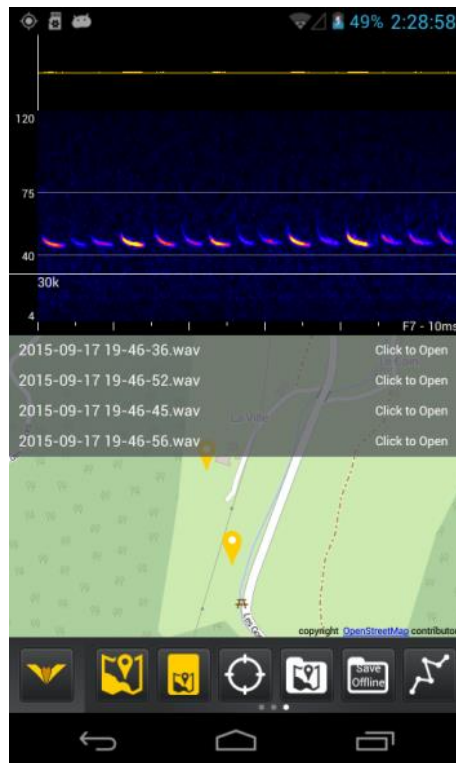
The GPX/KML files can be files generated by the Walkabout track logging, or files that you have prepared in Google Earth or other GIS software package.

Please note: Not all features of the KML file format are currently supported by the Walkabout software.

Viewing Recordings on a Map


All of your recordings on the SD card that were saved with location metadata will be displayed as  markers on the map (see example below). To open a recording, press on

the location marker , and a list of recordings taken at that location will appear. Click on the recording file name in the list to view the recording in a split screen display.



Caching Maps for Offline Use

While you are connected to WiFi and browsing the map, maps are automatically downloaded (cached) on the SD card for later use. If a map image can be found on the SD card it doesn't need to be downloaded again, saving time and data usage. It is possible to view maps without an internet connection, as long as the map images are cached on the SD card.


If you plan to use maps without an internet connection, you first need to ensure the area of interest is available in the cache. To do this, make sure you are connected to the internet using a WiFi connection. Swipe to the **Mapping Controls** and turn on maps, then scroll and zoom to the area you anticipate visiting in the field and press the  button. The map images for the visible area will be downloaded to the SD card, including images for closer zoom levels. You can now use these maps without an internet connection.


There is a storage limit to the area that can be saved, it is not possible to save all the maps for a very large area.

Placing Memos on a Map

To place a memo on a specific place on a map, make sure your map is open, then press and hold down on the map where you would like the memo to be saved. Follow the same instructions as creating a memo on a recording, see **Memos section** of this manual. The memo will be saved as either a .wav file or .txt file (depending on whether you saved a voice and/or text memo). These memos will be saved with the GPS coordinates from where you selected on the map (not necessarily your current location).

Map Settings

The map settings menu allows you to customize your map features. To access the Map Settings, press  then press the **Map button**.

- **Maps Source:** There are several map providers that you can choose from. The default map provider is Open Street Map, but you can choose MapQuest Aerial or USGS Topographic (USA only). To change the map provider, press on the maps source row and options will appear in a pop-up window, select your preferred map source.
- **Record Track Log:** The Anabat Walkabout is fitted with a GPS which is capable of tracking your movements at a small scale. To turn on the track log, you can check the record track log box in the Map Settings menu, or you can press  button in the **Mapping Controls** so it is illuminated in yellow.
- **Track Log Format:** If you are saving a track log, by default it will save as a GPX file (.gpx) which is compatible with most mapping software including Google Earth. You can change the track log format to KML by pressing on the track log format row and options will appear in a pop-up window, select your preferred track log format.


- **Use Downloaded Maps Only:** If you are connected to a WiFi network, but do not wish to download new maps, you can select use downloaded maps only and the Anabat Walkabout will only use pre-saved map files.

SOFTWARE

Updating Software

To check for and download the latest software updates, first connect to the internet via a WiFi network. Once connected to WiFi, press the **Online Update** button. It may take a few moments to check for updates. If a new software update is available it will ask if you would like to download now, follow the prompts to download. The download will automatically load the new software and restart the detector. It is important to check for online updates regularly as new features and improvements are continually made to the software.

Checking Software Version & Serial Number

To check the software version and serial number, press  then press the **About button**. Detector information will be displayed. Additionally, you can check for online updates and select between stable and experimental updates. To exit, press **Close**.

Stable updates have undergone significant testing and should be reliable. Experimental updates will give you early access to new features but have undergone less testing, so you may experience some errors or crashing. If you find any issues with the Walkabout software, please contact Titley Scientific and we will fix the problem as soon as possible.

WEATHER CONSIDERATIONS

The Anabat Walkabout is not fully sealed against moisture ingress. Do not allow rain/water to contact the microphone or screen. If your Walkabout does get splashed with water, pat it dry with an absorbent material as soon as possible.

Please keep in mind that constant exposure to high humidity may affect the detector. If working in very high humidity areas we highly recommend the detector is stored in a sealed container with a Humidisorb™ sachet while not in use. Be aware that other types of moisture absorber (e.g. silica gel) may require replacement/refreshing regularly to prevent moisture building up inside the container.

DOWNLOADING DATA

HOW TO DOWNLOAD YOUR DATA

Using the SD Card

To begin, ensure the microphone is turned off. Removing the SD card while the microphone is on may corrupt the files saved on the card. Remove the SD card from the detector then insert the SD card into your computer (if it has a SD card slot) or into an external SD card reader (available from Titley Scientific). Open the SD card folder with your PC file browser. You can then copy/cut the files from the SD card folder into the desired folder/storage device.

Using the USB Cable

Turn the detector on and ensure the microphone is switched off, then connect the detector to your computer using the USB cable. The detector will appear on your computer as an external storage device. Open the detector storage device with your PC file browser. You can then copy/cut the files from the detector into the desired folder/storage device.

VIEWING FILES AND UNDERSTANDING FILE NAMES

Anabat recordings are saved as either zero crossing analysis (ZC) or full spectrum files (WAV). They can be opened/viewed directly in Anabook Insight or other compatible software. Owning an Anabat Walkabout entitles you a free* licence to use the full functionality of the comprehensive Anabook Insight call analysis package.

**Please note: The free licence is limited to opening files from select Titley Scientific bat detectors only. A full licence is required to open files from other bat detectors. Please refer to the Anabook Insight product page on the Titley Scientific website for more information.*

Full Spectrum Files

Full spectrum files are saved as .wav and are compatible with most audio analysis software including Anabook Insight. Full spectrum files record the entire ultrasonic signal, including amplitude. This is typically viewed as a "spectrogram" which displays the sounds occurring over the whole applicable frequency spectrum simultaneously. The amplitude is displayed graphically as a heat-map. Whilst full spectrum files contain more information than zero crossing analysis files, they are a lot larger in size; a 500ksps 16bit recording will require 1MB of storage for each second recorded. A full spectrum file can be converted to a zero crossing file, but the additional amplitude and spectral information will be lost in this process.

The recording file name includes the date and time of the recording: "YEAR-MM-DD HRS-MINS-SECS.wav", for example 2016-01-15 18-58-37.wav was recorded on 15th January 2016 at 6:58:37pm.

Zero Crossing Files

Zero crossing analysis files are saved as .zc and are compatible with Anabook Insight, AnabookW and some other programs. Zero crossing analysis displays single points in time where the strongest frequency signal occurs. A zero crossing file typically contains a series of dots which trace the shape of the bat pulse (or other ultrasonic sound). The main

advantage of zero crossing files is that they are small, therefore allowing more recordings to be stored on an SD card and taking less space on your computer.

Anabat sequence files have a filename which encodes the date and time at which the file was recorded: YMDDhhmm.ss.zc The first character encodes the year. "a" was used for the year 2000. "o" denotes 2014, "p" 2015 etc. The second character encodes the month. January is "1", September is "9" but October is "a", November is "b" and December is "c". The next 2 numbers represent the day, where 01 would be the 1st of the month. The last four characters in the filename give the time in hours and minutes of 24 hour time, so 2035 is 35 minutes past 8 PM. Finally, the last two characters of the extension encode the seconds, from "01" to "59".

For example the file p1080239.31.zc was recorded in 2015, on 8th January at 2:39.31am, and lb272212.01.zc was recorded in 2011, on 27th November at 10:12.01pm.

Memo Files

A memo filename is the timestamp of the memo (as seen on the screen when the memo is created, not necessarily the same as the time the ultrasonic file was recorded). For example 2016-01-20 01-01-51.txt was saved on 20th January 2016 at 1:01:51am. If a voice memo is recorded, a .wav file is saved and any text notes are saved as metadata in the wav file. A .txt file is saved if no voice memo is recorded. Memos can be saved without a recording (using the memo button on **Live Mode Controls**).

TIPS FOR ACTIVE MONITORING

POWER

There are many factors which will affect your detectors battery life. To help the battery last longer, you may choose to do the following:

- Use Screen Off mode when you're not using the live display but still recording.
- Turn off the microphone and use the Sleep mode when you don't need to be recording but would like the detector to be ready to record quickly.
- Turn the GPS and WiFi off when not in use.
- Turn down the screen brightness.
- Use Manual mode to only record files you need.

If you will not have access to mains power, you may like to use the USB cable to charge the detector whilst plugged into a laptop or a car cigarette lighter adapter. We also offer a back-up power supply accessory which can be plugged directly into the detector to recharge. It can provide up to two full recharges of the Walkabout before needing to be recharged itself.

DIRECTIONAL CONE OR OMNIDIRECTIONAL MICROPHONE

Because different users have different recording needs in an active detector, we have provided an in-built omnidirectional microphone and a click-on directional cone. An omnidirectional microphone has a spherical cone of receptivity, which effectively means it records ultrasonic signal in all directions around the detector (except directly behind the microphone). Once a directional cone is added, this reduces the receptivity to a cone-like shape in front of the microphone, but also increases the receptivity distance (compared to omnidirectional). A directional cone will assist in the following circumstances:

- When there is excessive ultrasonic noise (e.g. insects) and you can point “away” from the source of the noise.
- When you are trying to record bats only from a specific area in space (e.g. cave entrance).
- When you want to record bats that are further away.
- When you want to pin-point and/or follow an individual bat.

Try using the Anabat Walkabout with and without the directional cone in different noise levels, and see what you prefer.

If your application requires a highly directional microphone, for example areas of very high insect noise, or driving transects, you can purchase an external microphone adapter which suits the SD2 Stainless Steel microphone. This allows the microphone to be fitted directly to the front of the detector for hand-held use, or on an extension cable. Please refer to the product page on our website for more detailed information.

USING THE EXTERNAL MICROPHONE AND CAR MOUNT

If you would like to use the Anabat Walkabout to conduct driving transects, you can purchase an external microphone adapter which suits the SD2 Stainless Steel microphone, extension cable, and a car mount (available from Titley Scientific). This allows you to mount the microphone on the vehicle whilst viewing a live display in the vehicle. The best position for mounting the microphone on the vehicle will depend on the aerodynamics of the car. Often it is best to point the microphone at a 45 degree angle down towards the car bonnet/roof. The ultrasonic signal reflects off the smooth surface and is captured by the microphone. Contact your local distributor for more information.

TROUBLESHOOTING

My detector battery seems to be running out of power quickly.

When you receive your detector you need to charge the batteries fully before first use, this will calibrate the battery gauge. If you have done this, try using some of the power saving options outlined in **Tips for Active Monitoring**. If you believe your detector has a faulty battery, please contact your local distributor. Typically the detector will run for approximately 6 to 8 hours, depending on how the detector is used and the amount of files being saved. In Screen Off mode the detector will record continuously for approximately 12 hours.

The live audio doesn't seem to be working.

Ensure you have the volume at an appropriate level. Also ensure that you have selected an appropriate audio mode (Heterodyne, Frequency Division etc.). If you have selected heterodyne mode, you need to ensure that your heterodyne tuning line is at the correct frequency for the bats you are listening for. If you would like to hear all frequencies, try pitch shifting or frequency division. Using headphones instead of the internal speaker can improve the listening experience.

My detector has 'frozen', what should I do?

If your detector has become unresponsive, you can manually shut it down by pressing and holding the power button for more than 8 seconds. You will hear a click and the screen will turn off. You can now restart the detector.

My recorded memos don't seem to playback.

Ensure the volume is up on the detector, when low you may not be able to hear the recording. In addition, when recording memos, be sure to speak into the voice memo microphone that is located at the bottom of the screen.


I tried to select a button on the Main Menu, but it takes me back to Home Screen.

Sometimes if you don't press the button correctly, the touchscreen assumes you are pressing the background – which is a shortcut back to the Home Screen. Try hitting the button a little lower or higher next time.

The software version I'm using has some issues.

Firstly ensure that you are using an up-to-date version of the software by checking for **Online Updates**. As users make us aware of any issues/bugs we endeavour to fix them as quickly as possible, which involves releasing new updates regularly. Secondly, ensure that you have selected **Stable** updates, experimental updates often contain new and exciting features, but have not been extensively tested and thus a higher potential for issues. Please contact your local distributor to report any issue and we will resolve it as quickly as possible.

The detector is making noise, but nothing is showing on the screen.

This is likely to be due to selecting the **Compressed** display mode. In compressed mode the display only updates when the microphone signal passes the criteria of the trigger settings. You may need to adjust your trigger settings or switch to truetime display mode. Alternatively, the live display could be paused due to an inadvertent tap on the screen or scrolling back through the buffer. If this is the case you will see a  button on the screen that you need to press to return to live display.

The calls are moving across the screen too quickly for me to see them.

Make sure you have an appropriate zoom level selected. If the zoom level is set too high the signal will pass across the screen very quickly. You can also try using **Compressed** viewing mode which takes out the space between calls and only updates the display when the incoming signal passes the trigger criteria. Be sure to have your trigger settings properly

adjusted when using compressed mode. Also try using **Wrap** viewing mode, this keeps the calls static on the display making it easier to see them.

I have a lot of background noise or insects that are triggering auto recordings and messing up the compressed view.

If there is a large amount of low frequency noise present you can adjust the trigger frequency range to exclude signals below a certain frequency. For example, if there are a lot of insects below 10 kHz, you can set the minimum trigger frequency to 10 kHz and the auto record or compressed view will then ignore any signals outside that range. You can also try using the clip on directional cone attachment.

I'm not sure if I've given a file a species label.

To check if a file has a species label, open the File Directory. If a species label has been applied to the file, it will be displayed next to the file name.

I want to watch the display in full spectrum, but record only zero crossing files.

Your live viewing and recording choices are independent, so you can watch in full spectrum and record zero crossing, or vice versa, or both!

I know there are bats but I can't see them on the display.

If you are using a full spectrum display you may need to adjust the spectrogram brightness/contrast settings. Very faint calls will need high brightness & contrast settings. If you are using zero crossing display, you may need to increase the zero crossing sensitivity in the Capture Settings. This should be increased right up to the point where you start to get the occasional dot drawn on the graph by background noise. Full Spectrum display and recording is recommended when looking for faint/whispering bats or maximum sensitivity is required.

My volunteers/field assistants keep changing my settings!

If you want to keep your selected settings from being accidentally changed you can lock them using the **Lockable Mode**. That way, your helpers can still collect data, without altering your settings accidentally.

FAQS

Q. How far away can a bat be detected using the Anabat?

A. Detection distances will vary with frequency and loudness (amplitude) of the bat calls, atmospheric attenuation, and the directional characteristics and sensitivity of the bat detector. It will also be affected by the amount of structural clutter (obstacles such as vegetation) which can block the path of the signal.

The frequency and amplitude of the bat call have a major influence on how far away the call can be detected, and makes some species easier to detect from afar than others. Quiet (low amplitude) and high frequency bat calls are more difficult to detect than loud (high amplitude) or low frequency calls. Call amplitude can vary within an individual, as many bats will reduce the amplitude of their calls as they approach prey or depending on the context in which they are flying. Call amplitude can also vary between species. Species which always produce low amplitude calls ('whispering bats') will be more difficult to detect from a distance than other species. In addition, bat calls of higher frequencies cannot usually be detected from as far as those of lower frequencies, as higher frequencies suffer greater absorption by the atmosphere than lower frequencies.

Atmospheric absorption depends upon weather conditions such as temperature, humidity and air pressure. This relationship is complex, but in general, cool dry conditions will allow the detection of bat calls over greater distances.

Given all the above, it is obvious that detection distances will vary enormously. Many bats are easily detected over 30m under typical conditions, while some species which call at low frequencies may be detectable from as far as 100m. However, some species will be hard to detect from even 1m away. This is why activity levels measured acoustically cannot easily be compared between different species. However, acoustic indices of activity are generally much less biased than indices based on capture data

Further information on detection distances and the calculation of detection fields and distances can be obtained from the software AnaVolumes.

Q. Can I adjust the gain of the amplifier?

A. The gain setting of the Walkabout is fixed and is not user adjustable. The gain of amplifier is configured to suit the full dynamic range of the microphone so no adjustment is required. Faint calls can be made brighter on the display by adjusting the spectrogram brightness and contrast settings.

FURTHER INFORMATION

For further information please visit the Titley Scientific website: www.titley-scientific.com or contact your local distributor.