



# Anabat Walkabout Bat Detector

## User Manual

### Titley Scientific

Version 1.5



**TITLEY**  
SCIENTIFIC

## **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.

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## **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.

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## **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.

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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	-
1.1	15/2/2017	0.104	Basic Mode; Mode – Live Second; Heterodyne Autotune; Dynamic Range Compression; Manual Record – Continuous; Zero Crossing Display
1.2	15/03/2018	0.110	Auto-heterodyne mode; updated instructions for new user interface; creating/saving/downloading profiles; press-and-hold for memos
1.3	01/08/2018	2.0	Press-and-hold memos; lock profile setting change
1.4	07/02/2019	2.2	Format SD card; screen mirroring
1.5	10/05/2020	2.3	Address; Species labelling

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## **INTRODUCTION**

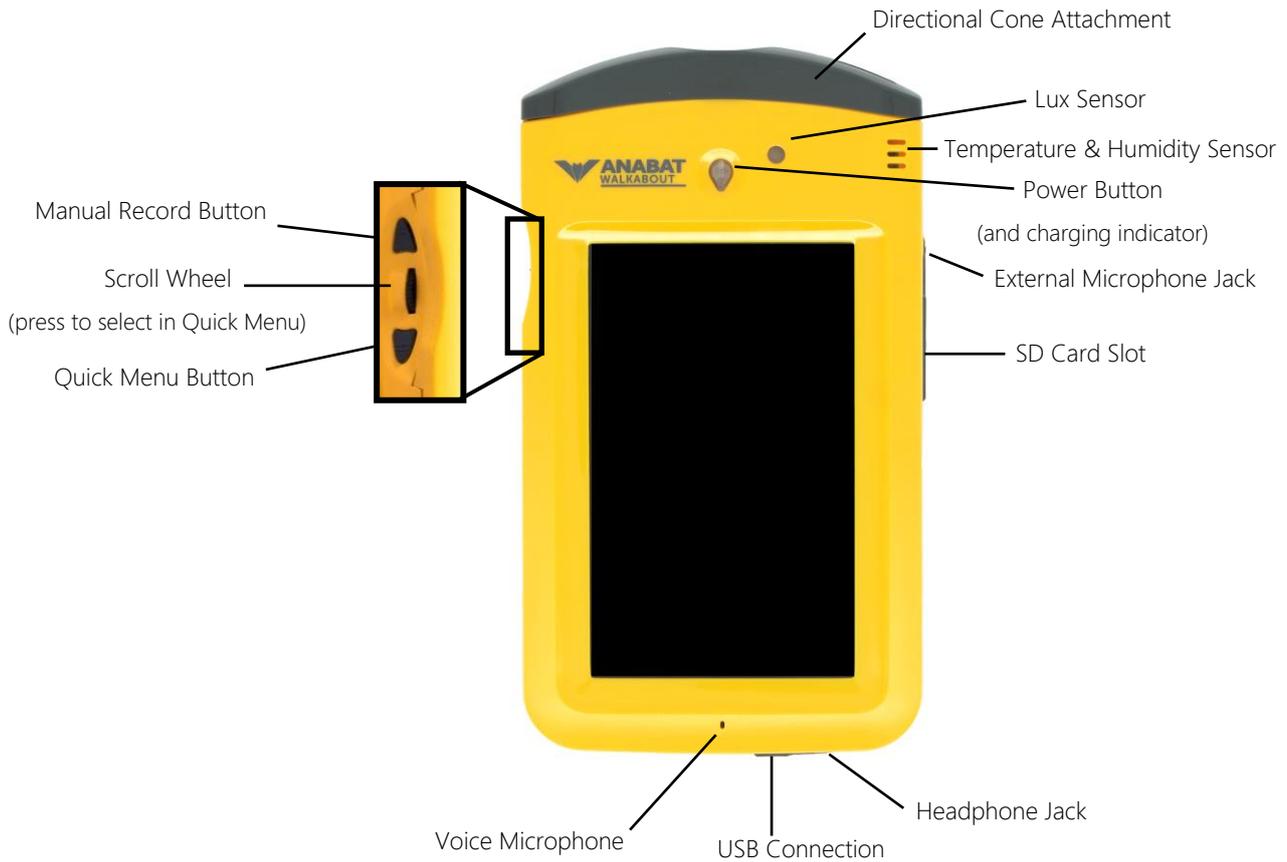
All bats in the suborder Yangochiroptera, and many in Yinpterochiroptera, use echolocation to avoid obstacles and locate prey in conjunction with their eyesight. Evolutionary history and differing ecological requirements mean echolocation calls tend to differ between species, so they are often useful 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: 

You can format and erase your SD card on the Anabat Walkabout, see [FORMAT/ERASE SD CARD](#) for more details.

## 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 WiFi is 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 96% 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. **Before first use, turn the detector on,**

then plug into the wall charger and fully charge your Anabat Walkabout, 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.

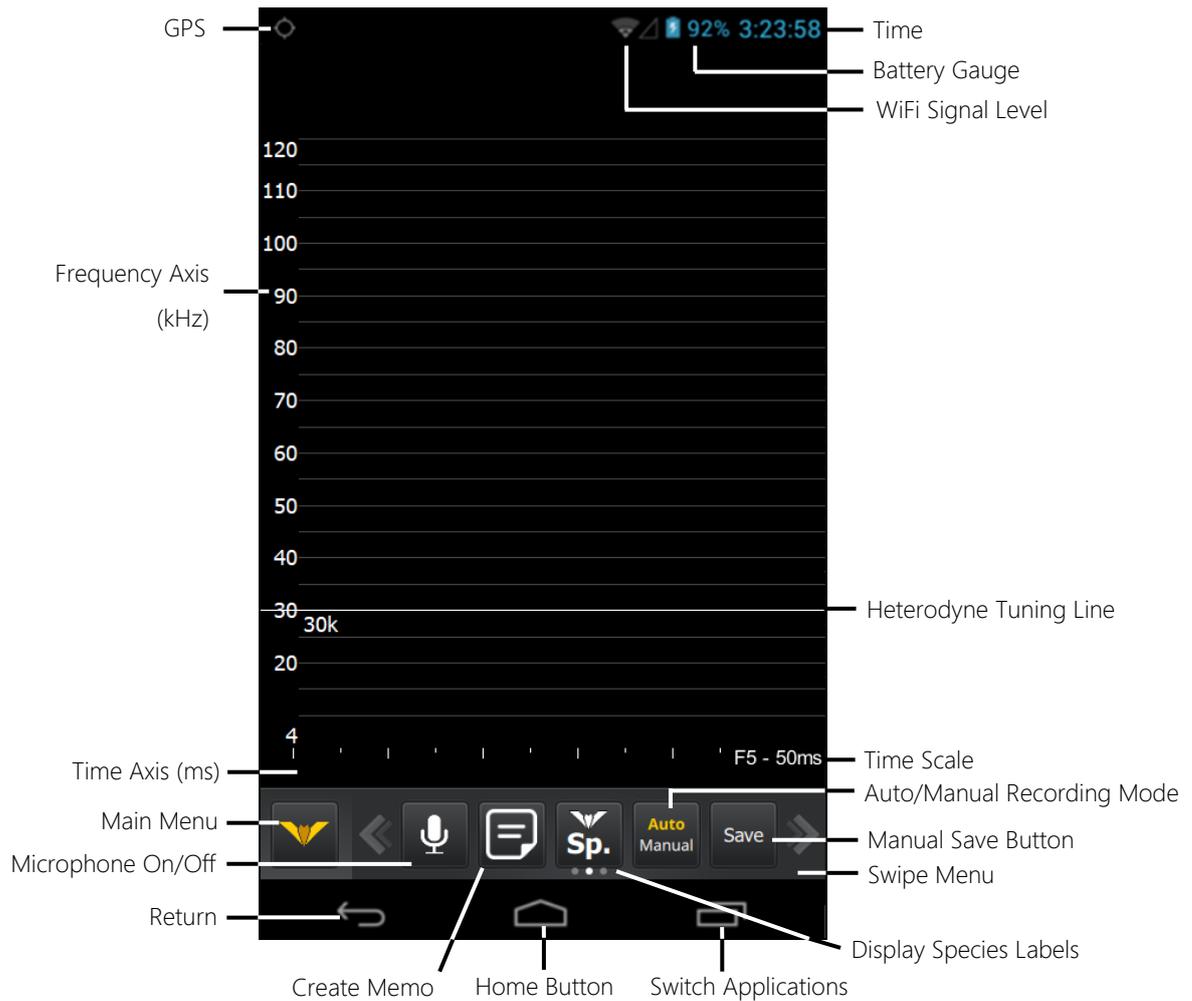
To turn the detector off, hold the power button for about 2 seconds. A menu will appear, press **Power Off** on the touchscreen, and then press **Ok**. The detector will shut down. If the power button is pressed for less than 2 seconds, the detector will enter sleep mode. See below for more information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

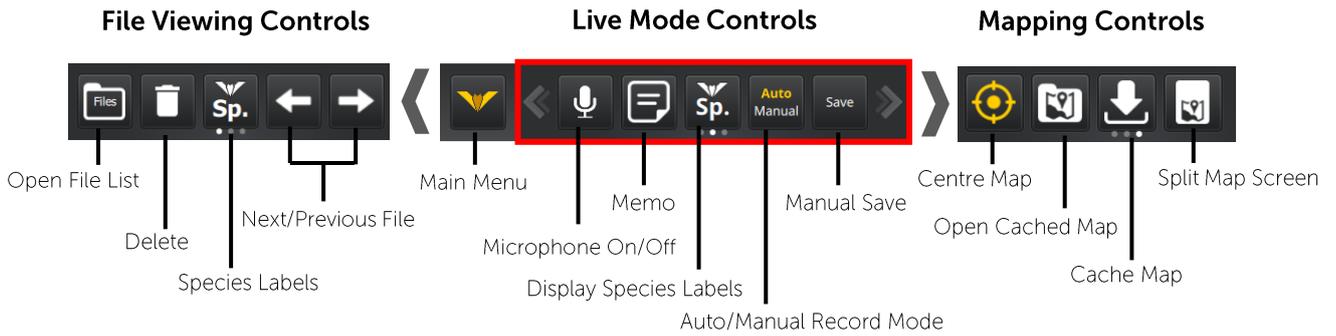
Upon startup, the Walkabout will automatically load the bat detector user interface. Other Android applications can be run on the detector, however this manual will not discuss the operation of other applications.

## Home Screen



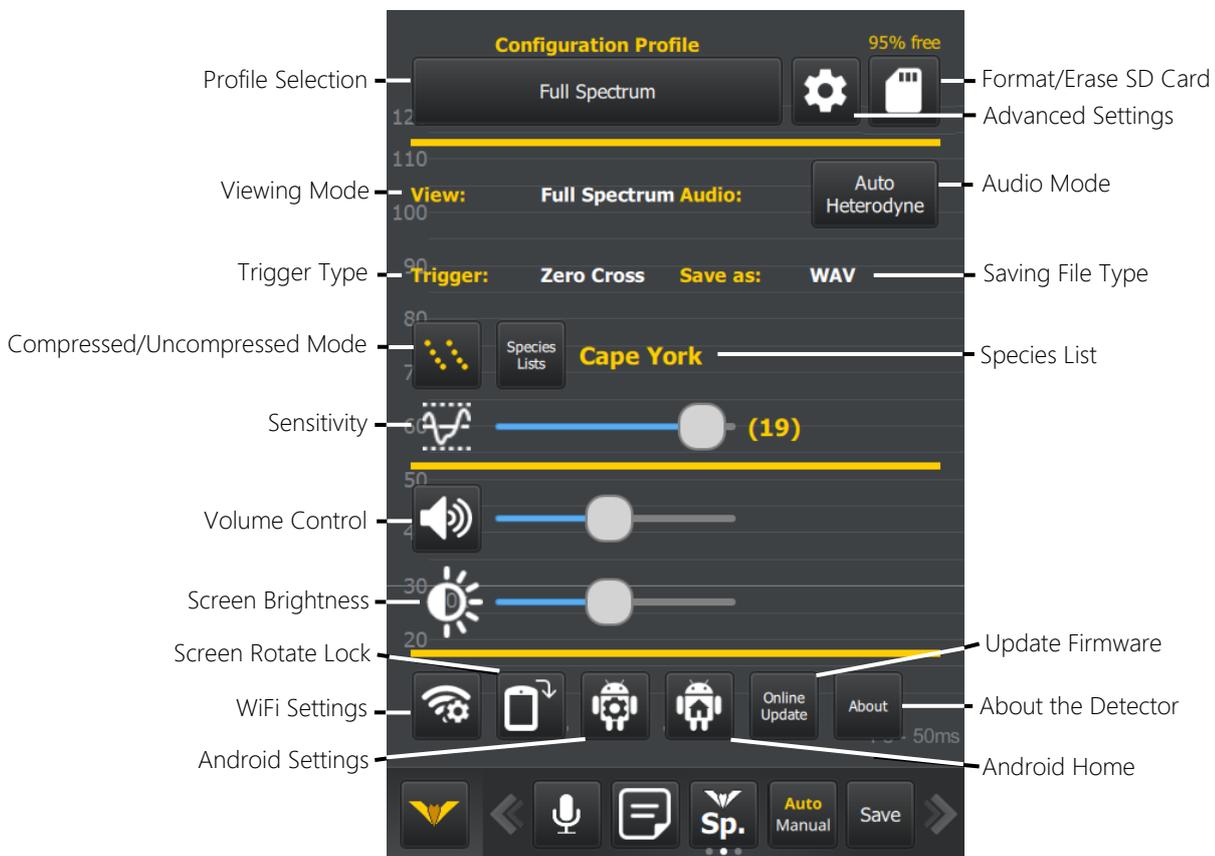
## Swipe Menu

To use the Swipe Menu, swipe your finger across anywhere on the grey bar of buttons (highlighted in red on next page). The default Swipe Menu buttons are the **Live Mode Controls**. A left swipe will display the **File Viewing Controls** and open the last saved file in the spectrogram window. A right swipe from the Live Mode Controls will display the **Mapping Controls** and open the map.



## Main Menu

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



When a button is highlighted in yellow, the feature is turned on. When the button is white, the feature is turned off.



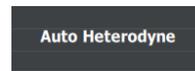
Compressed mode **off**

Compressed mode **on**

If a profile setting appears as a button, it means it can be changed (**but the changes may not be remembered**). If it does not appear as a button, it means the setting is locked in the profile, and you will need to [Creating a New Profile](#) to change this setting.



Setting **can be changed**



Setting is **locked**

## 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.

## SETTING TIME AND DATE

To change the date and time settings press  then press , scroll down to select **Date & Time**. Time/date will be set automatically when you connect to a WiFi network or acquire a GPS fix. Be sure to 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 below the spectrogram. 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, see **SAVE AS**.

### 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 or the **Save** button in the swipe menu, and a recording will be saved. To indicate a file has been saved, the detector will beep. In default Manual Mode when the Record Button is 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 **Manual Record Length**. You may choose to change this default manual mode to **Continuous Manual Recording Mode** in Capture Settings. This means that the detector will start recording when you push the Record/Save Button, and stop recording when you push the Record/Save button again.

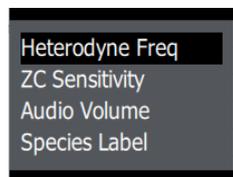
### Auto Mode

Auto mode will automatically record to the SD card based on your selected trigger settings. Auto mode trigger settings are based on either zero crossing sensitivity or crest factor threshold. The trigger mode you can choose will depend on whether you are viewing in full spectrum (zero crossing or crest factor), or zero crossing (zero crossing trigger only). You can then change the **Crest Factor Trigger** or **Zero Crossing Trigger** sensitivity (depending on what trigger mode you selected) in the Main 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/Save** button to manually trigger save a file of the previous 10 seconds.

## SCROLL WHEEL AND QUICK MENU

Using the **Scroll Wheel**, you can quickly change the heterodyne frequency, trigger sensitivity, audio volume, 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 add a species label to a file, you will need to press in the scroll wheel to confirm your selection.

## MAIN MENU

To access the Main Menu press  .

## PROFILES

Your display, audio and capture settings are saved in profiles. Your Anabat Walkabout will come with a set of default profiles (Full Spectrum, Zero Crossing, and Basic), and you can

create new profiles which can be edited, locked, downloaded to an SD card and transferred to other detectors. To select a profile, press the **Configuration Profile** button, then choose your preferred profile or create a new one.

## **Default Profiles**

The default profiles that come with the detector are locked. This means any changes you make to these profiles will not be saved. In all the default profiles, the default sensitivity is 19, with manual recording mode selected, and compressed mode on.

## **Full Spectrum**

The full spectrum profile will make the Anabat Walkabout operate as a full spectrum bat detector. This profile will display a full colour spectrogram, based off a zero crossing trigger, and will save files as .wav. The default audio mode will be auto-heterodyne, but you can change this to another audio mode (however your change will not be remembered once the detector is turned off).

## **Zero Crossing**

The zero crossing profile will make the Anabat Walkabout operate as a zero crossing bat detector. This profile will display in zero crossing, based off a zero crossing trigger, and will save files as .zc. The default audio mode will be auto-heterodyne, but you can change this to another audio mode (however your change will not be remembered once the detector is turned off).

## **Basic**

The basic profile will make the Anabat Walkabout operate as a heterodyne bat detector. This profile will only show the basic mode display (no spectrogram), recordings will be based off a zero crossing trigger, and will save files as .wav. The default audio mode will

be auto-heterodyne, but you can change this to another audio mode (however your change will not be remembered once the detector is turned off).

## Creating a New Profile

To create a new profile, press the Configuration Profile button. You can then have two options for creating a new profile. 1) New Profile, default settings based off the full spectrum profile; 2) New Profile (copy current), default settings will be based off the settings currently running on the detector, for example if you have the Zero Crossing profile loaded, but have changed the audio mode to frequency division, it will copy these settings to a new profile.

You can then name the new profile, and press Done. The new profile will be loaded and you can press Close. Any changes you make in the Main Menu or Advanced Settings menu will automatically be saved to the profile and remembered for the next time you use this profile. To lock certain settings, see [MENU SETTINGS](#).

To edit the name of a profile you' ve created, press .

## Exporting and Importing Profiles via SD Card

Once you have created a new profile, you can then save it to the SD card to transfer it to other detectors. To begin, ensure an SD card is inserted, then press  next to the profile you want to export to the card. It will state that "Profile has been exported" . Remove the SD card and insert into another detector. Open the Configuration Profile menu on this detector and you will see the Import button. The number next to Import indicates how many profiles are on the SD card. Press the Import button and the profile will be downloaded to the detector and loaded.

## VIEW

Please note: If you are unable to change the View, it is because the profile is locked. You will need to [Creating a New Profile](#) to unlock View in [MENU SETTINGS](#).

### Full Spectrum

This will display a full colour spectrogram. **This view can only be selected if files are being saved as .wav.**

### Zero Crossing

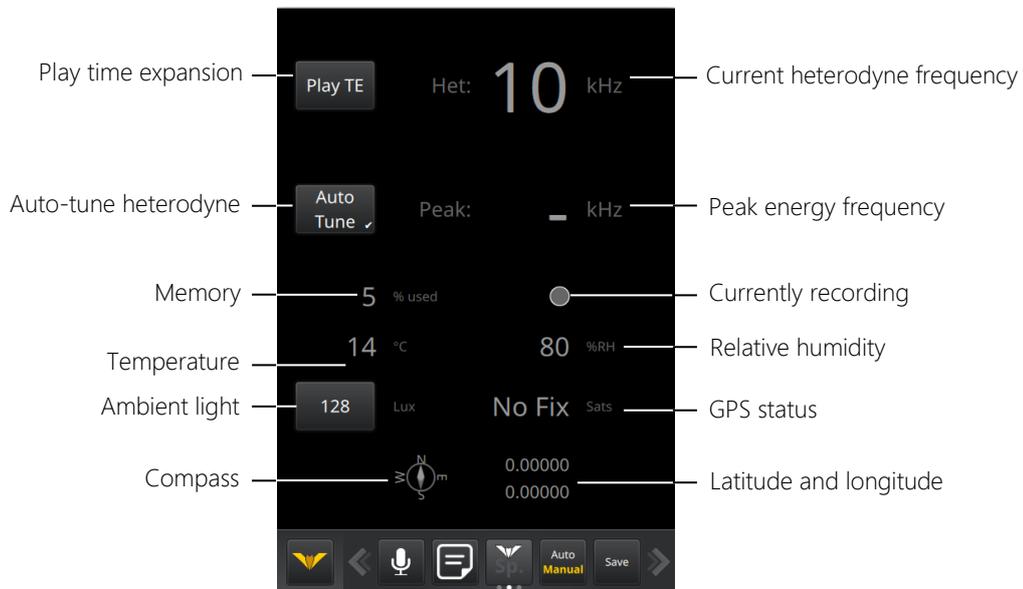
This will display the spectrogram as a series of zero crossing dots. **This view can only be selected if your trigger is zero crossing, and files are being saved as .zc, or both .zc and .wav.**

### FS + ZC

This will split the display, with full spectrum at the top and zero crossing displayed below.

### Basic Mode

Basic mode will not display a live spectrogram, only current tuned heterodyne frequency and the peak energy frequency, as well as other measurements including temperature, humidity and GPS status. This mode is useful for times where a live spectrogram could be considered distracting. The **Play TE** button will play that last 10 seconds as time expansion audio. The **Auto Tune** button, when checked, will automatically tune the heterodyne audio to the peak energy frequency. **This view can only be selected if you are saving files as .wav.**



## AUDIO

**Please note: If you are unable to change the Audio, it may be because the profile is locked. You will need to Creating a New Profile to unlock Audio in MENU SETTINGS.**

### 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. **This audio mode cannot be selected if viewing in zero crossing or basic mode.**

### 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 **SCROLL WHEEL AND 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.

### **Auto Heterodyne**

Auto-tuned heterodyne will automatically determine the peak frequency being recorded, and tune in to this frequency. This means that you will not have to manually scroll the heterodyne tuning to listen to bats at different frequencies.

### **Het & FD**

This audio mode allows you to listen to heterodyne and frequency division audio in each side of your ear/headphones simultaneously. This feature is generally only useful if you are listening to audio using ear/headphones. If you are using the built-in speaker, both audio outputs will be combined and play through the speaker together. **This audio mode cannot be selected when viewing in basic mode.**

### **Auto Het & FD**

This audio mode allows you to listen to auto-tuning heterodyne and frequency division audio in each side of your ear/headphones simultaneously. **This audio mode cannot be selected when viewing in basic mode.**

## Frequency Division

This audio mode divides down frequency of the incoming ultrasonic signal by a pre-set 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. **This audio mode cannot be selected when viewing in basic mode.**

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

## 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.

## Time Expansion

**This mode is only available for playing back saved recordings.** It 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.

## 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. We recommend zero crossing as the trigger.

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

1. Set the display to COMPRESSED MODE.
2. Start with the Zero Crossing Sensitivity/Crest Factor Threshold 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.

You can also 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, see TRIGGER SETTINGS.

**Please note: If you are unable to change the Trigger, it may be because the profile is locked. You will need to Creating a New Profile to unlock Trigger in MENU SETTINGS.**

## **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 Cross Sensitivity* below for more information.

## **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. **You can only select crest factor threshold as the trigger when you are recording .wav files.**

## SAVE AS

Please note: If you are unable to change the Save As, it may be because the profile is locked. You will need to [Creating a New Profile](#) to unlock Save As in [MENU SETTINGS](#).

## WAV

This will save full spectrum files in a Wave file (.wav). **You can only select this option if your view is Full Spectrum, Basic or FS + ZC.**

## ZC

This will save Anabat files in a zero crossing file (.zc). **You can only select this option if your view is Zero Crossing, or FS + ZC.**

## WAV+ZC

This will save both full spectrum and zero crossing files simultaneously. **You can only select this option if your view is Zero Crossing, or FS + ZC.**

## COMPRESSED MODE

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

**Please note: If you are unable to change the between compressed and truetime mode, it may be because the profile is locked. You will need to [Creating a New Profile](#) to unlock compressed view in [MENU SETTINGS](#).**

## **SPECIES LISTS AND LABELLING**

### **Species Lists**

You can create multiple species lists to put species labels on your files. To create a new list, or select a list, press . To select a list, tap on the list name, then select **Use This List**. If you wish to create a species list 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.

**Please note: If you are unable to change the Species List, it may be because the profile is locked. You will need to [Creating a New Profile](#) to unlock Species in [MENU SETTINGS](#).**

### **Species Labelling**

To add a species label to a file while in live mode, you can use the **scroll wheel**, or **species list overlay**. To use the scroll wheel method, firstly you will need to ensure that the [species labels are selected on the quick menu](#), so that you can use the scroll wheel to select a species. To apply a label, roll the scroll wheel to the appropriate label, then press the scroll wheel in to select the label.

To use the species list overlay, while the microphone is on press the **Sp. button** in the swipe menu, then select the species label from the top right of the screen.

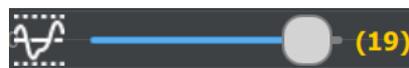
In either case, if a recording was already being saved, this will apply the species label to the recording. If no recording was being saved, selecting a species label will also act as a manual record button, whilst saving the label.

To add a species label to saved recordings, swipe to the **saved recordings menu** and open the desired file. You can either use the scroll wheel as described for live recording, or you can activate the species list overlay by pressing the **Sp. button** on the swipe menu, then press the species label in the top right of the screen to apply a label.

When a label is applied, it will appear on the bottom left of the spectrogram.

## SENSITIVITY

The  slider bar on the Main Menu controls either the zero crossing sensitivity or the crest factor threshold, depending on which trigger you have selected. Drag the slider bar to increase or decrease the sensitivity, the sensitivity number is displayed next to the bar.



**Please note: If you are unable to change the Sensitivity, it may be because the profile is locked. You will need to Creating a New Profile to unlock Sensitivity in MENU SETTINGS.**

### 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).

To help determine the correct sensitivity for the recording situation put the detector in compressed mode; the sensitivity should begin on high, and then be slowly decreased until generally only bats (less noise) are being displayed on the screen. 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 main menu, or using the **SCROLL WHEEL AND QUICK MENU**.

### **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 **SCROLL WHEEL AND QUICK MENU**. 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.

### **VOLUME**

To change the audio volume, drag the **Volume Slider**  to increase or decrease the volume. Pressing  will mute/unmute the microphone.

### **SCREEN BRIGHTNESS**

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

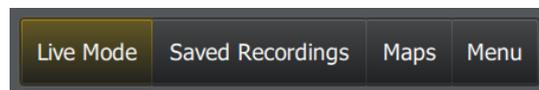
### **ADVANCED SETTINGS**

When you create a profile, you can choose the appropriate settings from the advanced settings menu. To access the advanced settings menu, first select a profile to edit. Keep in

mind that changed settings on locked profiles won't be remembered, so select a profile you have created, then press . A warning message will appear stating **Improper configuration can adversely affect the performance of your device. Do you want to continue?** Please take time to read the user manual and ensure you understand the settings, and select **Yes** to continue.

## SETTINGS TABS

There are four tabs in the Advanced Settings menu; Live Mode, Saved Recordings, Maps and Menu.



**Live Mode** will change the settings for your live viewing and recording. **Saved Recordings** will change the settings for viewing saved recordings on the SD Card. **Maps** will allow you to change map settings. **Menu** allows you to decide which settings should be available for quick editing directly from the main menu.

## CAPTURE SETTINGS

### 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.

### Manual Record Mode

There are two manual recording modes available; **Buffer** and **Continuous**.

**Buffer:** This recording mode records 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.

**Continuous:** This recording mode records continuously from when you push the record button, until you push the button again to stop the recording.

### **Manual Record Length**

The Manual Record Length is only relevant when you are using the Buffer Manual Recording Mode, and represents the length (in seconds) of a manual recording. It 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.

### **Auto Record Window**

Also known as the Trigger Window, this is the minimum amount of time recording will continue after a trigger event. This should be set longer than the shortest time between bat pulses you want to record. This will prevent a bat pass being broken up into multiple files. When a file reaches the maximum length specified in the Maximum File Length, it will be ended and a new file will be recorded. A recommended Auto Record Window is 2s.

### **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.

## TRIGGER SETTINGS

### 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.

## AUDIO SETTINGS

### 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. This can also be adjusted on the fly using the **SCROLL WHEEL AND QUICK MENU**.

### 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, and can only be set in the **SETTINGS TABS** tab. 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.

## **Dynamic Range Compression**

This is a signal processing operation that reduces the volume of loud sounds or amplifies quiet sounds by narrowing or compressing an audio signal's dynamic range. This is helpful when using the pitch shifting audio output to listen for bats.

## VIEW SETTINGS

### Frequency Scale Minimum

The minimum frequency that the frequency (Y) axis will display.

### Frequency Scale Maximum

The maximum frequency that the frequency (Y) axis will display.

### Logarithmic Frequency Scale

The default frequency scale is linear, however you can select a logarithmic scale by selecting logarithmic. This may be useful when you are using a large frequency range.

### View Oscillograms

This will display an oscillogram above the spectrogram.

### Wrap Graphs

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, uncheck Wrap Graphs.

## **MAP SETTINGS**

### **Maps Source**

There are several map providers that you can choose from. The default map provider is Open Street Map, you can also choose 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. The track log is on by default. To turn off the track log, you can uncheck the record track log box in the Map Settings menu.

### **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.

## MENU SETTINGS

Once you have selected your preferred profile settings, you can choose which settings are locked (cannot be changed without entering the Advanced Settings menu). The following profile features can be locked by checking them:

- Profile Selection
- View
- Audio
- Trigger
- Save As
- Compressed View
- Species
- Auto/Manual
- ZC Sensitivity
- Frequency Scale

## 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.

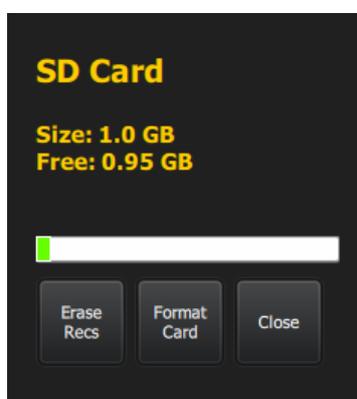
If you wish to keep recording (either manual or auto save), you can enter **Screen Off** mode where the screen is off but the detector is still running. To enter Screen Off mode, the microphone must be switched on, then briefly press the Power Button and the screen will turn off. The Screen Off mode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

## FORMAT/ERASE SD CARD

To format or erase an SD card once inserted in the detector, press  then press . It will read the SD card and identify the volume of the card and the memory which is free. You can then choose to just erase recordings (Erase Recs), or perform a full card format (Format Card).

Please note: Formatting the SD Card will erase any data saved on the card.



## 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**.

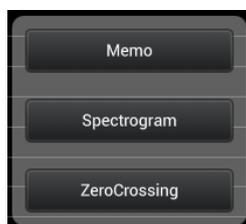
## LOCKING SETTINGS

If you wish to lock the detector settings to prevent accidental changes, ensure that the settings you want locked are unchecked in the Menu tab of Advanced Settings. If you do not want the profile to be changed when you give the detector to another user, ensure Profile Selection is unchecked in the Menu tab of Advanced Settings.

## DISPLAY

### CONTRAST, COLOUR SCHEMES & BRIGHTNESS

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

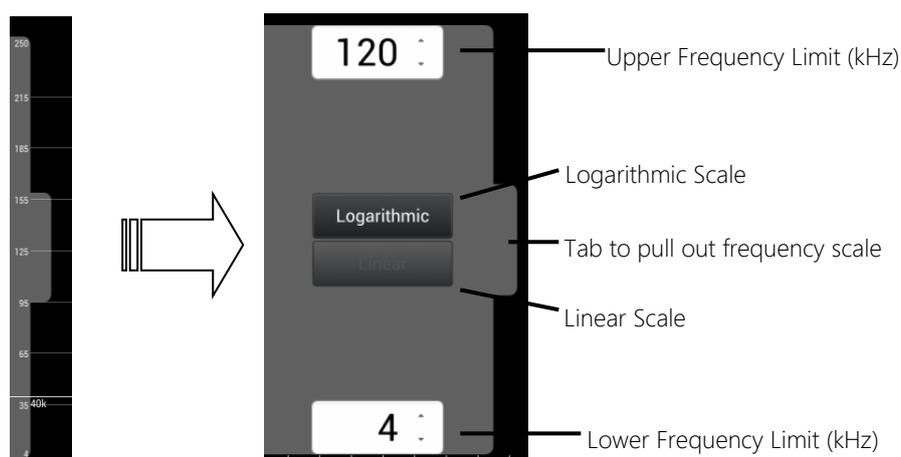


To change spectrogram settings, select **Spectrogram** and a menu will appear. Use the drop-down box to change the colour scheme and the drag sliders to change the contrast and brightness. Press **Done** when finished. Normally the brightness and contrast are adjusted so that the background noise is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

To change zero crossing settings, select **ZeroCrossing** and a menu will appear. Use the drop-down box to change the dot colour and the drag slider to change the dot size. Press **Done** when finished.

## TIME & FREQUENCY SCALES

You can set the frequency scale in the profile settings under View Settings. Alternatively you can change the **frequency scale** on-the-go 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**.



Please note: If you are unable to change the frequency scale, it is because the profile is locked. You will need to create a new profile or unlock frequency scale in Advanced Settings.

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 FScale 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 swiping right 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.

## SCREEN MIRRORING

To activate screen mirroring from the Anabat Walkabout, firstly ensure the WiFi is on (you do not need to connect to a network). Then press , go to Android Settings  then select Display, and scroll down to Wireless Display. At the bottom of the screen, press Search for Displays. Ensure your display device (eg. computer) is discoverable, and accept device pairing.

## 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**.



To record a **voice memo**, you can press and hold the **memo button** on the live controls, a red recording light and time will appear above the button to indicate it is recording, release the button to end the recording. You can also record a voice memo by pressing the memo button once, then pressing the **record button** . 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 **✓** 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.

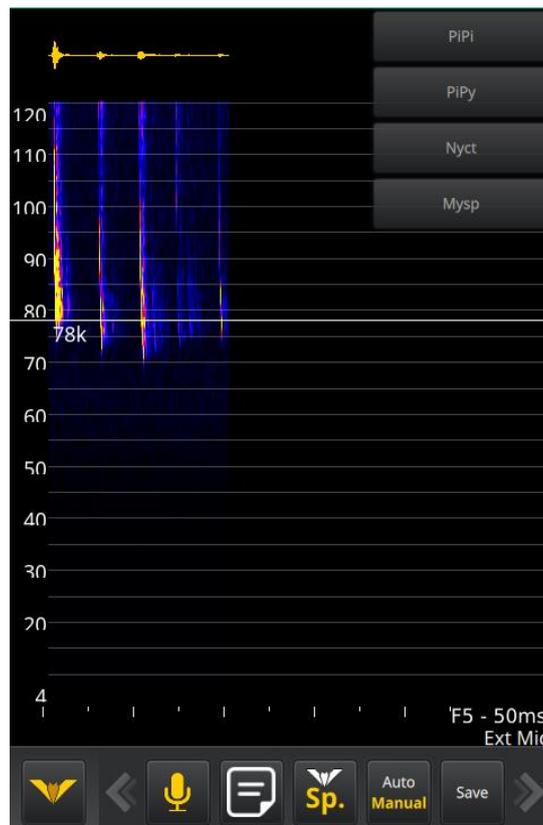
## SPECIES LABELS

To add a species label to a recording, first Species Lists in the **Main Menu**. Species labels can be applying while live streaming, or to saved recordings. You can add a species label using either the Quick Menu and Scroll Wheel, or using the Species Label Display. If a species label is applied to a file which is already saved (or being saved) the species label

will apply to that file. If no file is currently being saved, applying the species label will act as a manual save.

To add species labels with the scroll wheel select **Species Label** in the **SCROLL WHEEL AND 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.

To add species labels with the **Species Label Display**, press  then press the species button to apply label.



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

## VIEWING & LISTENING TO SAVED FILES

To view a saved file, use the **Swipe Menu** to display the last saved file and **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.

To play back a saved recording, press  or tap on the oscillogram display where you want the playback to start from. To stop the play back, tap the oscillogram again or press . The playback mode (Time Expansion, Heterodyne, etc) can be adjusted in the **AUDIO SETTINGS**.

To delete a saved file, press  then to proceed with the deletion, press **Yes**.

**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 open the WiFi settings menu. Swipe the  button to . The available networks will then be shown and you can select your preferred network and enter a password.

## MAPPING

### GPS Status

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.

**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

Whenever your detector has a GPS satellite lock, it will log your track automatically. Each time you turn the detector on and off, a new track log file is created. The track logs are saved as GPX or KML files (see **Track Log Format**) and can be viewed in Google Earth or other GIS software. To turn track log off, see **Record Track Log**.

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

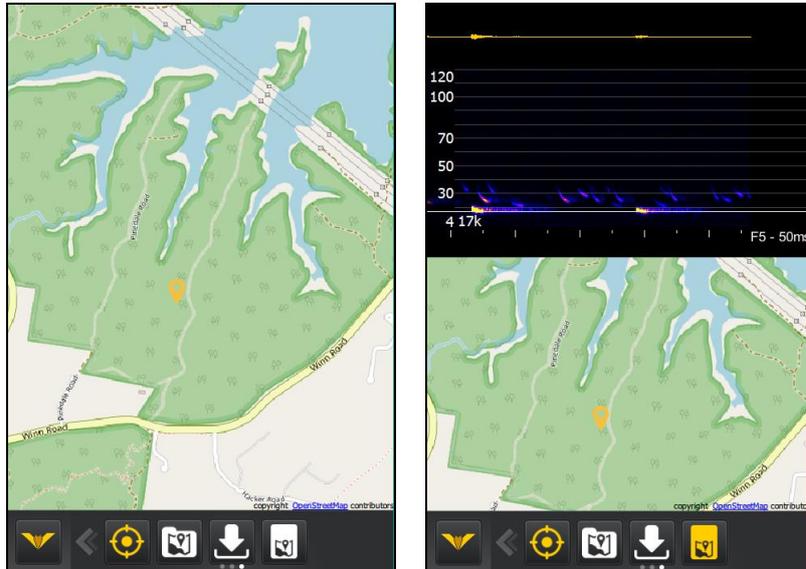
The Anabat Walkabout can display maps from Open Street Maps or USGS Topographic (USA only). These maps are automatically downloaded over WiFi as required, or you can download maps and save them to the detector for use later on (cache). You can also use your own track and waypoint files in KML and GPX 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 open the map and access the **Mapping Controls**. 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, swipe right.

**Full Screen Map**

**Split Screen Map**



If the GPS has a satellite lock (see **GPS Status** section) then an arrow will be show 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 .

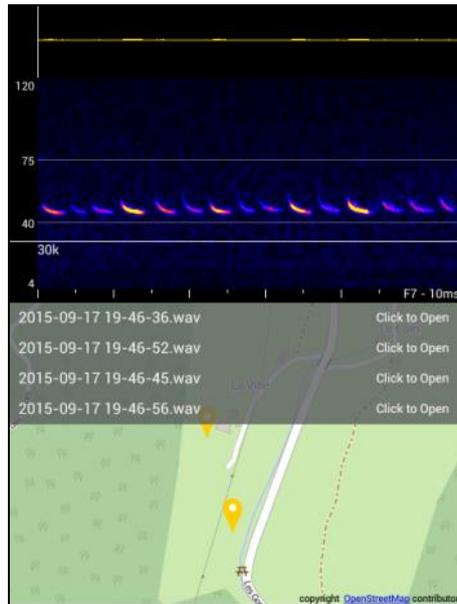
The GPX/KML files can be files generated by the Walkabout track logging, or files that you have prepared in Google Earth or other GIS software package.

**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** in 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).

## 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 Anabat Insight or other compatible software. Owning an Anabat Walkabout entitles you a free\* licence to use the full functionality of the comprehensive Anabat Insight call analysis package.

**\*The free licence is limited to opening files from selected Titley Scientific bat detectors only. A full licence is required to open files from other bat detectors. Please refer to the Anabat 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 Anabat 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 15<sup>th</sup> January 2016 at 6:58:37pm.

## Zero Crossing Files

Zero crossing analysis files are saved as .zc and are compatible with Anabat Insight, AnaloookW 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 1<sup>st</sup> 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 8<sup>th</sup> January at 2:39.31am, and lb272212.01.zc was recorded in 2011, on 27<sup>th</sup> 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 20<sup>th</sup> 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 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, with the detector turned on before first use, this will calibrate the battery gauge. You can repeat this process again at any time to re-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 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. Another reason it could be taking you back to the home screen is if the button is locked, check the setting is unlocked in the Advanced Settings menu.

### **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.**

If your sensitivity is incorrectly set, you may see bat calls live on the full spectrum spectrogram but not record them in zero crossing. For this reason, if you are viewing in full spectrum you need to record in full spectrum. However you can easily convert the full spectrum files to zero crossing in the free version of Anabat Insight.

**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. 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, we recommend you save them in a profile where the important settings are locked. 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](http://www.titley-scientific.com) or contact your local distributor.