

Acoustic (Bird / Amphibian) and Ultrasonic (Bat) Recording with the SM3BAT

Jeff King, Wildlife Acoustics, Inc. April 2016

Introduction

The Wildlife Acoustics SM3BAT recorder has two channels and, as such, can be configured to record acoustic (bird, amphibian) and/or ultrasonic (bat) sounds. This paper will discuss the limitations that exist and configurations required when setting up your unit to do both types of recording at the same time.

Limitations

The SM3BAT has advanced scheduling capabilities that allow you to configure your recorder to capture acoustic and ultrasonic sounds as needed based on your protocol. The recorder can be set to dynamically change channels, sample rates and trigger settings based on time of day or sunrise/sunset times. Important limitations exist only if you wish to record both acoustic and ultrasonic **simultaneously**.

- The recorder can only use one sample rate at a time. This means that you will need to use the higher ultrasonic sample rate and thereby oversample the acoustic recordings. This will use up more card space for these acoustic recordings than would otherwise be necessary
- The 384 kHz sample rate can only be used in mono recordings, so it not available when doing simultaneous acoustic and ultrasonic work. The highest sample rate available for stereo recordings is 256 kHz in the SM3BAT (192 kHz when using WAC).
- Triggers cannot be used when recording acoustic and ultrasonic at the same time when recording in WAV format. This means that if you choose to use WAV, your ultrasonic recordings will be for the whole recording period, rather than only for the time that there is an appropriate sound. This will in turn use more card space and power than would otherwise be needed if you were doing ultrasonic only work. Though we suggest using WAV for most bat work, you can use

Wildlife Acoustics' proprietary WAC format to get around this limitation, though the highest sample rate will be 192 kHz.

Hardware Configuration

To set up your SM3BAT to do both acoustic and ultrasonic recording you will need to attach an acoustic microphone to one channel and an ultrasonic microphone to the other. For this paper we will assume the acoustic microphone is on channel 0 and the ultrasonic microphone is on channel 1.

Programming (SM3BAT)

Notes

- It is best to start with one of the built-in programs and alter it to your needs. This saves a lot of work setting up all of the required commands. All of the below programs were created by modifying the SUNSET to SUNRISE built-in program.
- All settings are configured via program commands including channel, sample rate and trigger settings.
- These programs are included only as examples. You can use them to create one that is specific to your needs. Please review all program commands and adjust as necessary.

Dawn Chorus and Bats

The following program for the SM3BAT will record acoustic sounds using a 16 kHz sample rate starting at one hour before sunrise until one hour after sunrise to capture the bird dawn chorus. The recorder will then sleep until sunset when it will record ultrasonic sounds using a 256 kHz sample rate all night until one hour before sunrise for bats. Since you are not recording both acoustic and ultrasonic sounds simultaneously, the limitations listed above are not applicable and you can use triggers on your ultrasonic channel.

1. HPF OFF 16 kHz
2. GAIN Automatic Automatic
3. ZC OFF DIV8
4. FRQMIN 16 kHz 16 kHz
5. FRQMAX 192 kHz 192 kHz
6. DMIN 1.5 ms 1.5 ms
7. DMAX OFF OFF
8. TRGWIN 3.0 s 3.0 s
9. TRGMAX 15.0 s 15.0 s
10. REPEAT
11. AT SRIS – 01:00:00
12. FS WAV Format CH 0 16000 Hz
13. TRGLVL OFF OFF
14. REPEAT
15. RECORD 00:30:00
16. UNTCOUNT 4 times

17. AT SSET +00:00:00
18. FS WAV Format CH 1 256 kHz
19. TRGLVL OFF 12 dB
20. REPEAT
21. RECORD 00:30:00
22. UNTSRIS – 01:00:00
23. UNTCOUNT Forever

Bats and Owls (non-simultaneous)

The following program will record acoustic sounds at an 8 kHz sample rate 20 minutes of each hour from sunset to sunrise to capture owl calls and ultrasonic sounds at 256 kHz the rest of the night to capture bat echolocations. Since you are not recording both acoustic and ultrasonic sounds simultaneously, the limitations listed above are not applicable and you can use triggers on your ultrasonic channel.

1. HPF OFF 16 kHz
2. GAIN Automatic Automatic
3. ZC OFF DIV8
4. FRQMIN 16 kHz 16 kHz
5. FRQMAX 192 kHz 192 kHz
6. DMIN 1.5 ms 1.5 ms
7. DMAX Off Off
8. TRGWIN 3.0 s 3.0 s
9. TRGMAX 15.0 s 15.0 s
10. REPEAT
11. AT SSET + 00:00:00
12. REPEAT
13. FS WAV Format CH 0 8000 Hz
14. TRGLVL Off Off
15. RECORD 00:20:00
16. FS WAV Format CH 1 256 kHz
17. TRGLVL Off 12 dB
18. RECORD 00:40:00
19. UNTSRIS + 00:00:00
20. UNTCOUNT Forever

Bats and Owls (simultaneous)

This program will record acoustic and ultrasonic sounds simultaneously from sunset to sunrise to capture the calls of both owls and bats. The limitations section above applies to this recording schedule since you are recording both acoustic and ultrasonic at the same time. The file format has been changed to WAC to allow triggers to be used on the ultrasonic channel.

1. HPF Off 16 kHz
2. GAIN Automatic Automatic
3. FS WAC Format CH 0+1 192kHz
4. ZC OFF DIV 8
5. FRQMIN 16 kHz 16 kHz
6. FRQMAX 192 kHz 192 kHz
7. DMIN 1.5 ms 1.5 ms
8. DMAX Off Off
9. TRGLVL Off 12 dB
10. TRGWIN 3.0 s 3.0 s
11. TRGMAX 15.0 s 15.0 s
12. REPEAT
13. AT SSET + 00:00:00
14. REPEAT
15. RECORD 00:30:00
16. UNTSRIS + 00:00:00
17. UNTCOUNT Forever

You can split these stereo WAC files into separate acoustic and ultrasonic files using the free version of our Kaleidoscope software then do further processing and analysis on each as appropriate. If you plan to do your ultrasonic analysis using Kaleidoscope, we still recommend splitting the stereo WAC files first with Auto-ID turned off, then in a separate batch do your ultrasonic analysis.